Agency Cost and Firm Performance: The Moderating Effect of Intellectual Capital in Asian Agribusiness Industry

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Abstract

The study examines the influence of intellectual capital on the relationship between agency costs and firm performance using a sample of Asian agricultural firms. The study uses value added intellectual coefficient (VAIC) as a proxy of intellectual capital, which is based on human capital efficiency, structural capital efficiency and employed physical capital efficiency. Using the data of 9 Asian economies, the findings suggest that intellectual capital, in general, neutralizes the negative effects of agency cost on firm performance. Further analysis reveals that human capital efficiency and capital employed efficiency mitigate while structural capital efficiency has no impact on the negative relationship between agency cost and firm performance. These findings are robust to several robust tests. Overall, the study contributes to the resource-based view of intellectual capital by documenting how firms might neutralize the negative relationship between agency cost and firm performance while emphasizing intellectual capital.

***Keywords**: Agency* costs, Intellectual capital, Human Capital, Structural Capital, Firm Performance, and Agribusiness

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Introduction

The term "agribusiness industry" refers to the collection of vertical markets that are interrelated and comprise of businesses engaged in the production, processing, and wholesale distribution of agricultural goods. The global importance of agribusiness has been recognized by sustainable development goals (SDGs) set by the United Nations. The agenda SGD02 is described as "end hunger, achieve food security and improved nutrition and promote sustainable agriculture globally". This SDG and many other SDGs cannot be met without a profitable and sustainable agriculture sector. This sector has more operational risk, therefore, requires more investment in R&D innovation and new technologies for sustainable growth. The U-shape relationship between productivity (R&D) and firm performance (FP) (Chou et al. 2022) suggests

that intellectual use of resources is necessary to boost the performance in agribusinesses. As, Intellectual capital (IC) is considered as one of the primary sources for sustainable performance, which enhances the export growth of agribusinesses (Scafarto et al. 2016).

Agency theory relates AC with the intensity of agency conflicts in the firms and associate these costs with all those activities and operational frameworks created to align the interests and/or actions of managers (agents) with those of owners (principals) (Fama and Jensen 1983). Since AC is viewed as firms' internal expenses, these costs are likely to have a negative impact on economic performance as evident in the literature (Chen et al. 2005; Wang 2010). Although, a torrent of research emphasizes on two opposing approaches to tackle agency problems, refraining approach (Gul and L. Tsui 1997; Rashid 2015), and encouraging approach (Dial and Murphy 1995; Martin et al. 2019), it is still unclear whether negative impact of AC on FP can be moderated by factor capable of neutralizing the said relationship. Our study attempts to address this research gap by exploring the moderating role of intellectual capital (IC) on the link between AC and FP using data from Asian agribusinesses. Asia employs one-third of its workforce in agriculture, which is 2.2 billion people of the world and Agri-industry maintains a crucial role for global food security, therefore, to eradicate hunger, achieve food security, and enhance nutrition, this sector must be strengthened (Rauniyar and Kanbur 2010).

This study empirically investigates the influence of IC resources on ACs and performance relationships. This study postulates that IC resources can mitigate the detrimental effect of ACs on firm's performance. Our results reveal that human capital efficiency of the organization negatively moderates the ACs and performance relationship. We do not document the same findings for structural capital efficiency in the organization, however, we also find that the extent of capital employment efficiency negatively moderates the ACs and performance relationship as well. This work tests its claims in Asian corporate agribusinesses with the use of value-added IC coefficient (VAIC model). We also find that the intellectual ability of the firm (measured by VAIC score) also negatively moderates the ACs and performance relationship

The key contribution of this work can be summarized as follows. This study not only postulates but empirically documents that IC resources can mitigate the detrimental effect of ACs on firm's performance. The study has added to the current body of knowledge by introducing IC resources as a moderator variable. More specifically, we contribute to RBV of IC by documenting how firms can reduce the negative relationship between ACs and firm's performance by emphasizing IC components (Human resource and capital employment efficiency).

Literature Review

According to the resource-based view (RBV), the variations in firms' portfolio of resources and interrelation of the resources can account for variations in the profitability of firms (Reed et al. 2006). In contemporary enterprises, IC is often regarded as the most critical resource of value creation and competitive advantage. In order to perform better, firms must discover, create, and apply IC efficiently (Chen et al., 2005). Over the years, there have been several attempts to reform and measure IC. One such endeavor is the introduction of the VAIC score

(Pulic 2000). VAIC methodology defines IC as the sum of human capital efficiency, structural capital efficiency, and efficiency of employed capital (sum of financial and physical capital).

The human capital represents human aspect in the organization and includes combined intelligence, skills, and expertise (Kamukama et al. 2011). The empirical evidence widely recognizes human capital for competitiveness and prosperity of a firm (Crook et al. 2011; Scafarto et al. 2016). Likewise, structural capital is "what happens among the people, how people are connected within the company, and what stays when the employee leaves the company" (Halim 2010). This includes corporate culture, information technology, explicit knowledge, product innovation and process optimization among others (Halim 2010). Generally, the literature supports structural capital as a predictor of FP (Chen et al. 2005). The inclusion of financial and physical capital is also required to better understand the IC working environment (Pulic 2000). Intangible resources cannot be created without the help of physical capital.

In VAIC methodology, human capital and structural capital are two intellectual assets whereas employed capital is a non-intellectual asset (Pulic 2000). The VAIC model is built on the premise that a business may have a greater IC but use it inefficiently or a business may have a little IC but use it efficiently. Therefore, how firms use their IC is more important than how much of it they have. Accordingly, human capital efficiency (HCE), structural capital efficiency (SCE) and employed capital efficiency (CEE) constitute a VAIC score which we take as a proxy of the intellectual capital. Human capital efficiency (HCE) reflects how much a firm generates with one monetary unit invested in its human resources. Structural capital efficiency (SCE) provides information on the amount of IC a company can generate through efficient use of structural capital. The sum of HCE and SCE is regarded as IC efficiency of a firm (Pulic 2004). IC efficiency indicates the efficient use of firms' intellectual resources. The employed capital efficiency (CEE) explains how much value is produced for each dollar invested in physical and financial capital (Pulic 2004). To get a VAIC score, all three efficiencies are added up. Thus, both monetary and intellectual components contribution can be traced by VAIC score.

Goebel (2019) shows that managers use IC disclosure as a potential channel to reduce information asymmetries among owners and satisfy their investors with higher dividend payment in response to higher investment in IC (Battisti et al. 2022). Furthermore, studies report the value enhancing effects of IC (Bayraktaroglu et al. 2019; Xu and Li 2022) through improving cashflow (Park and Jang 2013) and reducing the risk (Probohudono, et al., 2022). Agency view of controlling the agency problems suggest the effective monitoring (Rashid 2015) and interactive effect of monitoring and incentivization (Martin et al. 2019). However, resource based view reports the lower agency conflicts and higher FP in firms utilize efficiently the mix of tangible and intangible resources (Nirino et al. 2022), Therefore it can be assumed that efficient utilizational of IC resources helps the firm to mitigate the negative effects of agency costs on performance. Thus, we hypothesize that:

H1: *IC negatively moderates the relationship between AC and FP*

The worth of an organization's human resources is referred to as its "human capital." It covers all employees' abilities, expertise, core competencies, and experience. An organization can raise the value of its human capital by enhancing its hiring procedures, providing education

and training to employees at all levels of the business, and making investments in employee retention strategies (Coleman 1988). Empirical research has consistently document a positive link of firm's human capital with motivation, skills and competences, productivity and loyalty of employees, thereby influencing firm performance (Crook et al. 2011). However, high human capital and low human capital firms are predicted to experience quite different AC. As rich human capital utilization requires maintaining employees' retention, resulting in more spending on bonding costs (type of AC). Therefore, the potential impact of AC on firm performance can differ under the influence of HCE. Higher extent of human capital utilization will decrease adverse selection problem which is a leading cause of AC. Building on control hypothesis of AC (Jensen and Meckling 1976), interaction of AC with high HCE can potentially bring much improved implications for firm performance. Therefore, we hypothesize that:

H2: *HCE negatively moderates the relationship between AC and FP*

Structural capital is concerned with the structure and information systems that can contribute to business intelligence (Pulic 2004). Organizational routines, patents, process handbooks, and databases are all examples of "knowledge deposits" that constitute structural capital. In order to strengthen the business and establish a solid and reliable connection between people and their operations, it serves as both the skeleton and the adhesive of the organization (Scafarto et al. 2016). Managing structural capital is crucial for businesses to increase productivity and gain a sustainable competitive edge (Coleman 1988). A torrent of IC literature documents that this form of IC is related with firm innovation and performance (Beltramino et al. 2020). ACs are incurred to resolve agency conflicts, however, there seems little evidence on the interaction of AC and structural capital. Though, the presence of organizational structure and informational systems is likely to reduce agency conflicts. We argue that when AC interacts with structural capital, it will become part of the organizational innovation mechanism to promote improved utilization of organizational resources, resulting in enhanced performance. Therefore,

H3: *SCE negatively moderates the relationship between AC and FP*

It has been extensively covered in the agency literature that capital/financial structure influences the size of AC. Theoretically, Jensen and Meckling (1976) contend that an optimal capital structure should exist to minimize the AC. Other researchers view that high leverage lowers AC by pushing managers to act more in the interests of stockholders (Grossman and Hart 1986). On the hand, ineffective management of extra funds (cash as physical capital) used by managers to develop their empires would also raise AC (Jensen 2005). These findings lead us to the view that efficient use of organizational capital can reduce AC. Therefore, we argue that when AC interacts with efficient capital usage, it will result in enhanced operating performance. In formal words,

H4: *CEE negatively moderates the relationship between AC and FP*

Methods

We select a sample of 389 agribusiness firms based on the three-digit Standard Industrial Classification (SIC) code from COMPUSTAT for the period 2000-2016 involving 9 Asian countries (Bangladesh, China, Indonesia, Malaysia, Pakistan, Philippine, Taiwan, Thailand, and Turkey). Panel A of table 1 reports the frequency of data from sub-agribusiness related industries. The highest representation (18.97%) is from Fats and Oils sub-industry, while lowest representation (2.95%) is from Meat and Meat Products sub-industry. In terms of number of observations, Fats and Oils have 521 observations, while Meat and Meat products have 65 observations in the total sample of 2747 observations. Panel B of table 1 shows the country wise distribution of the sample. Malaysia is ranked first placed with 1046 observations (38.08%), while the Taiwan is standing at last place with 55 observations (2%).

Table 1 Panel A. Agro-Food Sub-industries wise sample distribution

SIC Code	Food sub-industries	Observations	percentage
10	Corp Production	226	8.23
20	Animal production	143	5.21
200	Food and Kindred Product	303	11.03
201	Meat and meat products	65	2.67
202	Dairy products	76	2.77
203	Fruits and vegetable products	197	7.17
204	Grain mill products	210	7.64
205	Bakery products	81	2.95
206	Sugar and confectionary products	362	13.18
207	Fats and oils	521	18.97
208	Beverage products	286	10.41
209	Miscellaneous food and kindred products	277	10.08
Total		2747	100

Table 1 Panel B. country wise sample distribution

Country code	Food sub-industries	Observations	Percentage
1	Bangladesh	57	2.075
2	China	97	3.53
3	Indonesia	374	13.61
4	Malaysia	1046	38.08
5	Pakistan	292	28.90
6	Philippine	211	10.63
7	Taiwan	55	2.00

8	Thailand	424	15.44
9	Turkey	191	6.95
Total		2747	100

MODEL

$$\begin{aligned} Perf_{i,t} = {} & \beta_0 + \beta_1 AC_{i,t} + \beta_2 IC_{i,t} + \beta_3 AC * IC_{i,t} + \beta_4 Size_{i,t} + \beta_5 Leverage_{i,t} + \beta_6 Cash_{i,t} \\ & + \beta_7 Intangible_{i,t} + \beta_8 Working\ Capital_{i,t} + \beta_9 Dividend\ to\ Assets_{i,t} \\ & + Industry\ Year\ Country\ Fixed\ Effe + \varepsilon_{i,t} \end{aligned}$$

Where $Perf_{i,t}$ represents the proxy of firm's performance. The performance is measured using return on assets (ROA) which defines as net income to total assets (Chen, Cheng, and Hwang 2005; Kamukama, Ahiauzu, and Ntayi 2011; Scafarto, Ricci, and Scafarto 2016). We also use return on sales (net income over net sales) (Probohudono, Pratiwi, and Rochmatullah 2022; Vishnu and Kumar Gupta 2014) and return of equity (net income over total shareholders' equity (Chen, Cheng, and Hwang 2005; Maditinos et al. 2011) . Following the Rashid (2015), we use two measures of AC. The first proxy is general, selling, and administration expenses to sales and second is inverse of asset turnover ratio which is calculated as -1 multiple by ratio of sales divided total assets.

The moderator IC is a dummy variable given value 1 if firm IC is greater than median of food sector IC in a country, otherwise 0. Similarly, we construct dummy variables for HCE, SCE and CEE. To calculate IC, we use approach of Probohudono et al., (2022) 1. For IC, we first calculate value added (VA) which is sum of income after tax, taxes, depreciation and amortization, interest expenses, and wages and salaries. In the second step, we calculate each component of IC. First, we calculate HCE as VA over HC where HC is human capital defined as total salaries and wages. Next, we calculate SCE as SC divided by VA, where SC is structural capital defined as VA minus HC. Lastly, we measure the CEE as VA divided CE, where CE is capital employed defined as total assets minus intangible assets.

The model also includes standard determinants of firm performance. Such as, $Size_{i,t}$ is firm size defined as natural log of total assets. $Leverage_{i,t}$ is total liabilities to total assets. $Cash_{i,t}$ is cash and marketable securities to total assets. $tangible_{i,t}$ is tangible assets to total assets. $Working\ Capital_{i,t}$ is net working capital to total assets. $Dividend_{i,t}$ is the total dividend paid to total assets. Finally, we include the sub-food industries' fixed effects, years fixed effects and country's fixed effects.

Results and Discussion

Summary Statistics

[1] For detail how to calculate intellectual capital see Probohudono et al. (2021).

Table 2 reports the mean and standard deviations of food sector of selected Asian countries, high IC, and low IC countries than average global median of IC from Solability's sustainable competitiveness index. The average (standard deviation) of ROA is .5 (.09) with no significant difference between high IC and Low IC countries. The average (standard deviation) of AC is 0.14 (0.13) in our sample. The agribusinesses have significantly higher AC (.03***) in high IC countries as compared to low IC countries. The sample average IC score is 5.23, while Asian agribusinesses from countries with highest IC score as compared to global median invest significantly less in IC. The difference reported in table 2 is -1.31 significant at a level less than 1%. A similar tendency has been noted for HEC and CEE. For example, the significant difference is -1.17 (-0.06) for HEC (CEE) significant at level less than 1%. Moreover, table 2 also reports differences in control variables between high IC countries and low IC countries. For example, firms from high IC countries have significantly less leverage (-.12***) and hold significantly more cash (0.04***), invest significantly more in tangible (.02***) and working capital (.07***).

Table 2. Summary Statistics

	All Countries			IC>Global Median (N=1389)		IC>Global Median (N=1358)		Mean Difference
	N	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
ROA	2747	.05	.09	.04	.09	.06	.09	-.02
AC	2747	.14	.13	.15	.13	.12	.12	.03***
IC	2747	5.23	5.28	4.58	4.29	5.89	6.05	-1.31***
HEC	2747	4.34	5.00	3.76	4.05	4.93	5.75	-1.17***
SCE	2747	.63	.45	.61	.46	.64	.43	-.03
CEE	2747	.2	.12	.17	.11	.23	.13	-.06***
Size	2747	7.98	2.91	6.29	1.57	9.71	2.96	-3.41***
Leverage	2747	.43	.23	.38	.20	.49	.23	-.12***
Cash	2747	.10	.11	.12	.12	.08	.10	.04***
Tangibility	2747	.45	.19	.47	.20	.44	.19	.02***
Working Capital	2747	.13	.21	.14	.19	.13	.22	.07***
Divided	2747	.02	.04	.02	.04	.01	.04	.04

Table 3. Correlation Analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ROA	1.00											
AC	-.12*	1.00										
IC	.24*	-.10*	1.00									
HCE	.23*	-.11*	.98*	1.00								
SCE	.13*	-.02	.38*	.30*	1.00							
CEE	.73*	.00	.03	.02	.05*	1.00						
Size	.14*	-.03	.19*	.19*	.12*	.14*	1.00					
Leverage	-.32*	-.05*	-.02	-.03	-.04*	-.10*	.16*	1.00				
Cash	.29*	.12*	.09*	.08*	.11*	.20*	.01	-.40*	1.00			
Tangibility	-.12*	-.06*	-.01	-.02	-.01	-.14*	-.01	.02	-.32*	1.00		
Working Capital	.35*	-.03	.05*	.06*	.04	.24*	.03	-.58*	.57*	-.49*	1.00	
Dividend	.44*	.02	.04*	.02	.08*	.46*	-.06*	-.14*	.22*	-.08*	.15*	1.00

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The correlation analysis in table 3 suggests that ROA is significantly negatively related to agency cost (0.12) and significantly positively related to IC (0.24), HEC (0.23), SCE (0.13), and CEE (0.73). These findings partially support our hypothesis. Furthermore, correlation among all independent variables is significantly low. The highest correlation (-0.58) is between size and working capital. Overall, correlation matrix suggests that data does not have multicollinearity issue.

Table 4. Moderating Role of IC and its components (HCE, SCE, and CEE) on Relationship between AC and FP

	(1)	(2)	(3)	(4)
VARIABLES	ROA	ROA	ROA	ROA
AC	-.12***	-.12***	-.09***	-.14***
	(-3.07)	(-3.02)	(-3.59)	(-3.12)
IC	.04***			
	(6.60)			
AC x IC	.13**			
	(2.766)			
HCE		.04***		
		(5.88)		
AC x HCE		.15**		
		(2.81)		
SCE			.03***	
			(5.11)	
AC x SCE			-.03	
			(-.69)	
CEE				.05***
				(6.67)
AC x CEE				.15**
				(2.29)
Size	0.01***	0.006***	0.009***	0.007***
	(3.88)	(3.724)	(4.834)	(4.217)
Leverage	-0.08***	-0.075***	-0.090***	-0.086***
	(-4.31)	(-4.265)	(-4.971)	(-5.665)
Cash	0.01	0.015	0.016	-0.000
	(0.56)	(0.644)	(0.600)	(-0.021)
Tangibility	0.03	0.027	0.046	0.026
	(0.73)	(0.799)	(1.354)	(0.936)
Working Capital	0.07**	0.066**	0.066**	0.040
	(2.29)	(2.267)	(2.188)	(1.537)
Dividend	0.79***	0.832***	0.872***	0.711***
	(14.21)	(12.242)	(13.133)	(11.471)
Constant	0.011	0.036*	0.011	0.054**
	(0.39)	(1.735)	(0.391)	(2.152)
Year Effects	Yes	Yes	Yes	Yes
Sub_Sector Effects	Yes	Yes	Yes	Yes
Country Effects	Yes	Yes	Yes	Yes
Cluster by Firm-Year	Yes	Yes	Yes	Yes
Observations	2,747	2,747	2,747	2,747
R-squared	0.467	0.387	0.467	0.504

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4 reports the regression results using Ordinary Least Square (OLS) regressions cluster by firm-year and controlled by year, sub-sector of Agribusiness, country fixed effects. The coefficients of AC (IC, HCE, SCE, and SCE) are negatively (positively) associated with ROA in all models at 1% significance level and support the arguments that higher AC firms have lower profitability while IC enhance FP. In model 1, the coefficient of interaction terms (AC x IC) is .13 significant at level of 5% with t_value 2.76 which is in the line of prediction that high IC utilization inversely moderates the relationship between AC and ROA and increases the firm profitability by 29.06% (0.127*0.1327/0.058) in economic terms. This finding is in line with many other studies who view role of IC in developing and sustaining competitive advantage of firms from the resource-based approach (Massaro et al. 2019; Rehman et al. 2021; Scafarto, Ricci, and Scafarto 2016).

In model 2 (4), the coefficients of interaction terms AC x HCE (AC x CEE) are .04 (.15) significant at the 5% level respectively. However, the interaction term AC x SCE is insignificant in model 3. Overall, these findings suggest that HCE and CCE inversely moderate the relationship between AC and ROA. However, SCE efficiency does not alleviate the negative effects of AC on firm performance.

Table 5. GMM and Fama Macbeth Regressions

	GMM				Fama Macbeth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA
L.ROA	.06***	.07***	.03**	.14***				
	(5.85)	(14.52)	(2.46)	(15.86)				
Agency	-.17***	-.04***	-.10***	-.17***	-.14**	-.15**	-.06*	-.18***
	(-12.03)	(-6.72)	(-9.63)	(-9.46)	(-3.04)	(-3.30)	(-2.12)	(-4.19)
IC	.04***				.03***			
	(12.64)				(4.76)			
Agency x IC	.10***				.20***			
	(6.17)				(4.67)			
HEC		.04***				.02***		
		(41.44)				(3.89)		
Agency x HCE		.03***				.24***		
		(6.81)				(4.93)		
SCE			.04***				.03***	
			(11.53)				(3.61)	
Agency x SCE			-.075***				-.07	
			(-4.649)				(-1.17)	
CEE				.031***				.05***
				(14.57)				(7.23)
Agency x CEE				.18***				.17***
				(9.31)				(3.18)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	No	No	No	No
Sub_Sector Effects	Yes	Yes	Yes	Yes	No	No	No	No
Country Effects	Yes	Yes	Yes	Yes	No	No	No	No
Observations	2,023	2,023	2,023	2,023	2,747	2,747	2,747	2,830

R-squared					0.47	0.48	0.42	0.57
AR (1)	-1.99** (0.04)	-1.98** (0.04)	-1.99** (0.04)	-1.93** (0.05)				
AR (2)	-0.31 (0.76)	-0.37 (0.71)	-0.18 (0.85)	-0.11 (0.91)				
Hansen J	181.1 (0.248)	216.2 (0.27)	179.2 (0.28)	162.2 (0.72)				

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

In terms of control variables, overall, the signs of coefficients remain constant in all models except the signs of size and leverage in model 1. Collectively, these models suggest that performance is significantly higher in dividend paying and high working capital firms and significantly lower in higher cash holding and higher leverage firms.

Furthermore, we re-estimate baseline models using fixed effect methods to address the time invariant firm characteristics biases. The un-tabulated2 results are qualitatively the same as reported in table 4.

Addressing Endogeneity Concerns

Baum, Schaffer, & Stillman (2003) argue that generalization method of moment (GMM) is robust approach to address endogenous biases omitting variable, simultaneity, and dynamic endogeneity. Therefore, we employ GMM, and the results are reported in Table 5. All the models satisfy the dynamic nature and validity of GMM suggested by the diagnostics such as coefficient of lagged ROA, AR1, AR2, and Hensen J. statistics. The interaction terms of IC and its components (HCE, SCE, CEE) with AC are positively significant at 1% level in models 1, 2, and 4, except model 4, where AC x SCE is negatively significantly related to ROA at 1% level. This further strengthens our baseline findings results.

Cross-Sectional Analysis

Next, we address the cross-sectional variations in variables using Fama-MacBeth methodology. The proposed method has two steps: firstly, cross-sectional regressions are estimated in each year; secondly, average value of intercept and slope coefficients are calculated. Models 5-8 of table 5 show the Fama-MacBeth Regressions' results. Overall, the findings are in line with our baseline results considering the interaction effects of IC and its components. The variable AC is negatively significantly related to the firm's performance. The interaction terms of IC and its components (HCE, SCE, CEE) with AC are positive and significant at 1% level in models 5, 6, and 8, except model 7, where AC x SCE is negatively insignificant.

Sub-Sample Analysis

In this section, we divide countries into high IC countries (China, Taiwan, Malaysia and Turkey) and lower IC countries (Bangladesh, Pakistan, Indonesia and Thailand). We identify a country as high IC if its average ranks among top 50 countries in Solability's Intellectual Capital

[2] These results can be provided upon request.

Index, otherwise it is lower IC country. Models 1-4 (5-8) of table 6 report high (low) IC countries regression results. The interaction terms of AC with IC and its components (HEC, SCE, and CEE) are significant with their expected signs except AC x SCE which is significant (insignificant) in model 3 (7). Overall, subsample analysis suggests IC mitigates the negative effects of AC in high (low) IC countries.

Robustness Tests

First, we use alternative measures of AC (inverse of sales over total assets) and firm performance (ROS, ROE). In unreported findings, we find a significantly positive relationship between Alter_ AC x IC and the firm's performance. In regression with ROS and ROE dependent variables, our findings are significant and qualitatively similar to the findings of Table 3. Overall, our results hold for alternative measures of FP and AC.

Conclusion

This study examines the moderating role of different components of intellectual capital (IC) on the link between AC and firm performance. The VAIC method is used to determine the IC variables. Using data from Asian agricultural listed firms, the study finds that intellectual capital of the firm (measured by VAIC score) negatively moderates the AC and performance relationship. Furthermore, the moderating effects are significantly driven by HCE and CEE. The results hold for different proxies of AC, firm performance, and alternative methodologies. The results remain consistent in high (low) IC countries. This study contributes to intellectual capital and agribusiness literature and suggests that agribusiness firms can enhance their profitability by enhancing the level of intellectual capital.

Table 6. Sub-Sample Analysis on High Intellectual Capital VS Low Intellectual Capital Countries

	High Intellectual Capital Countries				Low Intellectual Capital Countries			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA
AC	-0.11*	-0.11*	-0.13***	-0.12*	-0.13**	-0.14**	-0.08***	-0.15**
	(-2.01)	(-1.97)	(-2.93)	(-1.83)	(-2.29)	(-2.29)	(-3.48)	(-2.64)
IC	0.04***				0.03***			
	(3.16)				(4.19)			
Agency x IC	0.20*				0.13**			
	(1.92)				(2.66)			
HEC		0.04***				0.03***		
		(3.36)				(3.679)		
Agency x HEC		0.19*				0.15**		
		(1.88)				(2.73)		
SCE			0.03***				0.027***	
			(3.16)				(3.58)	
Agency x SCE			0.037				-0.05	
			(0.498)				(-0.92)	
CEE				0.05***				0.04***
				(4.09)				(6.06)
Agency x CEE				0.25**				0.12**

				(2.59)				(2.365)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub_Sector Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by Firm-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,358	1,358	1,358	1,358	1,389	1,389	1,389	1,389
R-squared	0.48	0.48	0.42	0.52	0.49	0.49	0.43	0.51

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Contributions and Implications

This study makes a novel contribution in agency cost and firm performance literature by introducing IC resources as a moderator. The study also contributes to the intellectual capital literature by documenting the RBV of IC. This study enhances the literature of Asian agribusinesses by documenting how firms can reduce the negative relationship between ACs and firm's performance by emphasizing IC components (Human resource and capital employment efficiency. The managers of firms with higher agency costs enhance the performance of their firms by efficient utilization of their IC, particularly human and capital employed. The investors of agribusinesses should take into account the level of IC at the time of investment. The owners should pay particular attention to how the intellectual capital resources are managed by managers.

List of Abbreviations

Abbreviation	Means
VAIC	Value Added Intellectual Coefficient
IC	Intellectual Capital
HCE	Human Capital Efficiency
SCE	Structural Capital Efficiency
CEE	Capital Employed Efficiency
AC	Agency Cost
SDGs	Sustainable Development Goals
RBV	Resource Based View
VA	Value Added
ROA	Return on assets
ROE	Return on equity
OLS	Ordinary Least Square
GMM	Generalize Method of Moments

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