Intellectual capital and financial performance of Chinese agricultural listed companies

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Abstract

Intellectual capital (IC) is a strategic resource of an organization, which can enable the organization to obtain competitive advantage in the fierce market competition. In China's economic transformation, agricultural companies need to rely more on IC to achieve sustainable development. Based on the data of Chinese agricultural listed companies, this paper uses Value Added Intellectual Coefficient (VAIC^{TM}) model incorporating three components (i.e. capital employed, human capital, and structural capital), and examines the impact of IC and its three components on financial performance. The lagged effect of IC is also examined in the additional analysis. The results show that earnings quality is determined by capital employed efficiency (CEE), human capital efficiency (HCE), and structural capital efficiency (SCE); profitability is positively related to CEE and HCE; companies' efficiency is positively correlated with CEE and negatively correlated with HCE. The results also suggest that IC is an important factor to promote the growth of Chinese agricultural companies. Agricultural companies should pay more attention to the role of structural capital. Additionally, the lagged human capital is the most significant determinant of future financial performance of Chinese agricultural companies.

Keywords: Intellectual capital. Financial performance. Agricultural listed companies

1. Introduction

In the knowledge-based economy, an organization's value creation is largely based on intangible resources and capabilities, i.e. intellectual capital (IC) (Drucker, 1993; Edvinsson

and Malone, 1997; Stewart, 1997; Sveiby, 1997). Edvinsson and Malone (1997) suggested that intellectual assets clearly outweigh the tangible corporate value. In addition, a company's sustainable ability to compete in today's knowledge economy is derived from the exploitation of knowledge resources (Stewart, 1997; Teece *et al*., 1997). Indeed, it is generally believed that IC has a positive impact on firm performance.

Kaufmann and Schneider (2004) argued that there is no standard definition of IC and its division into three categories is not sufficient. Scholars have attempted to categorize IC on basis of different criteria so that it can be easily measured. Miller *et al*. (1999) classified IC into three components namely human capital (HC), structural capital (SC) and customer capital. Seetharaman *et al*. (2004) replaced customer capital with relational capital (RC). Abeysekera and Guthrie (2005) categorized IC into three components-external capital, internal capital and HC. It is widely accepted among researchers (Sveiby, 1997; Sydler *et al*., 2014; Wang *et al*., 2014; Bontis *et al*., 2015; Nimtrakoon, 2015; Sardo and Serrasqueiro, 2018) that IC can be decomposed into three components, i.e., HC, SC, and RC.

HC refers to the sum of employees' knowledge, competence, innovativeness, commitment and wisdom (Johnson, 1999; Morris, 2015). SC comprises the firm's most valuable strategic assets, such as organizational culture, processes, patents, copyrights, trademarks and so on (Johnson, 1999; Janoševic and Dženopoljać, 2012). RC is the knowledge obtained through the establishment, maintenance and development of relationships with external stakeholders (Johnson, 1999; Kweh *et al*. 2014).

Agricultural sector contributes to economic development in terms of transferring capital and labor to other sectors (Aydin and Unakitan, 2018). Due to industrialization and urbanization, the environmental and resource endowment constraints of China's agricultural development are increasingly emerging, which forces the growth patterns to transform from traditional extensive style to modern intensive pattern (Deng *et al*., 2018). To achieve this goal, the agricultural sector has to mainly depend on productivity efficiency and resource allocation efficiency. Agricultural productivity is the core to increase national wealth in China (Zhang, 2016; Li *et al*., 2017b)

Agricultural companies are the representative of China's agricultural productivity. Currently, Chinese agricultural companies face serious credit constraints, labor cost increases and lack of independent innovative capability, which affects the companies' scale expansion and performance improvement for a long time (Li *et al*., 2017a). In China's economic transformation, agricultural companies need to rely more on IC to achieve sustainable

development. IC efficiency and its association with financial performance of agricultural companies may be of much interest for the managers and academicians.

The purpose of this paper is to explore how IC influences financial performance of Chinese agricultural companies. To do so, this paper selects agricultural companies listed on the Shanghai and Shenzhen stock exchanges as the research sample. Value Added Intellectual Coefficient (VAIC^{TM}) model developed by Pulic (1998, 2000) is used to measure IC. This model allows managers, shareholders and other interested stakeholders to monitor and measure firms' IC performance and potential. We hope to confirm the relationship between IC and financial performance to help Chinese agricultural companies construct effective IC management system that can facilitate performance improvements.

Our contributions to the literature can be concluded as follows. First, this paper fills the existing gap in research studies seeking to identify the drivers of success among agricultural companies in China, an emerging country. To the best of our knowledge, this is the first empirical study that has been conducted in China's agricultural sector. Second, our study investigates the impact of each of IC components on the firms' performance that few research studies have focused on. Third, in order to minimize external influences, this paper adds the macroeconomic indicator ignored in the extent literature. Fourth, this paper investigates the lagged effect on firms' financial performance of IC that has been largely ignored in previous studies. Finally, the study is beneficial for Chinese agricultural companies to improve financial performance through effectively and efficiently managing IC

The rest of the paper is organized as follows. Section 2 reviews the related literatures and develops three hypotheses, followed by the development of research methodology in Section 3. Section 4 reports the empirical results of model estimation, and Section 5 investigates the lagged effect of IC on financial performance. Section 6 concludes our research results and reveals the policy implications.

2. Literature Review and Hypotheses Development

A majority of studies (Firer and Stainbank, 2003; Chen *et al*., 2005; Shiu, 2006; Gan and Saleh, 2008; Chan, 2009; Ting and Lean, 2009; Pal and Soriya, 2012; Rahman, 2012; Janošević *et al*., 2013; Nimtrakoon, 2015; Dženopoljac *et al*., 2016; Dzenopoljac *et al*., 2017) have applied VAIC^{TM} model to assess the linkage between IC and financial, economic and business performance of the companies.

In the extant literature, few studies have been made to assess the impact of IC on earnings quality. Janošević *et al*. (2013) carried out a study in Serbia and revealed that there is no significant correlation between operating revenue and the efficient use of IC. However, Jordão and de Almeida (2017) suggested that IC is positively related to earnings before interest, taxes, depreciation, and amortization (EBITDA). The findings of Dzenopoljac *et al*. (2017) showed that structural and physical capital positively affect companies' earnings in the Arab region. This study aims at extending the literature and filling this gap by assessing whether IC affects companies' earnings measured by earnings before interest and taxes (EBIT). Therefore, we come to the following hypothesis:

H1: IC has a positive impact on companies' earnings.

A large body of literature has proved the positive relationship between IC and profitability. An early empirical study conducted by Bontis *et al*. (2000) revealed that SC has a great influence on business performance and HC is of significance regardless of industry type. A later study by Chen *et al*. (2005), aimed at measuring the relationship between the value creation efficiency and firms' market value as well as financial performance, found that firms with better IC efficiency yield greater profitability, measured by return on equity (ROE) and return on assets (ROA).

Wang and Chang (2005), based on the data of IT industry in Taiwan, found that IC elements directly affect business performance measured through ROA and ROE, with the exception of HC. Yalama and Coskum (2007) also proved the positive and significant impact of IC on profitability.

Ting and Lean (2009) analyzed the IC performance of financial institutions in Malaysia and concluded that VAIC and ROA are positively related. Pal and Soriya (2012) in the study of Indian pharmaceutical and textile industry found that profitability and IC are positively associated.

Recently, Khalique *et al*. (2015) conducted a study on small and medium enterprises (SMEs) in Pakistan and observed that five components of IC are found to play a significant positive role in enhancing the performance of SMEs.

Nimtrakoon (2015) in an empirical research found that IC is positively associated with margin ratio and ROA. Results also showed that capital employed efficiency and human capital efficiency are the most influential value drivers for financial performance.

The findings of Andreeva and Garanina (2016) showed that HC and SC positively influence organizational performance in Russia.

Dzenopoljac *et al*. (2017) found that profitability is significantly affected by structural and physical capital. Sardo and Serrasqueiro (2018) also suggested that the IC efficiency of the current period has a positive impact on the financial performance of high-, medium-, and low-tech European firms, measured by ROA. Based on the above considerations, we formulate the following hypothesis:

H2: IC has a positive impact on companies' profitability.

IC is considered to be the driver of companies' efficiency in knowledge-based economies. The relationship between IC and productivity is not consistent. A study in Malaysia by Gan and Saleh (2008) showed that companies with greater IC tend to have a more efficient productivity, and HC is a more significant factor in relation to productivity. However, Firer and Stainbank (2003) studied the 65 South African publicly traded companies and found that IC performance have significant but negative explanatory power for companies' productivity. Similarly, Shiu (2006) used the VAIC^{TM} model to examine the correlation between corporate performances based on 80 Taiwan listed technological firms. The results revealed that there is a negative relationship between IC and productivity (measured by asset turnover). Chan (2009) also found that VAIC^{TM} does not have a significant effect on productivity. In addition, Pal and Soriya (2012) observed that IC does not play any significant role in the productivity of Indian pharmaceutical and textile companies. Accordingly, our third hypothesis is stated as follows:

H3: IC has a positive impact on companies' efficiency.

3. Methodology

3.1. Sample

The sample comprises agricultural companies listed on the Shanghai and Shenzhen stock exchanges during 2012-2016. After removing firms with missing information, firms issuing other kinds of shares, like B, H, S, etc, and special treatment (ST) firms, 195 observations are left for estimation. The financial data are retrieved from the China Stock Market & Accounting Research (CSMAR) database. Table 1 shows the summary of sample distribution.

Table 1: Sample description

Year	2012	2013	2014	2015	2016	2012-2016
Observations	36	37	40	41	41	195

Source: Author's calculation

3.2. Variables

Guided by Janošević *et al*. (2013), Dzenopoljac *et al*. (2017), and Jordão and de Almeida (2017), earnings quality is measured by the logged value of EBIT.

ROA and ROE are frequently used measures in empirical studies (Chen *et al*., 2005; Wang and Chang, 2005; Pal and Soriya, 2012; Tripathy *et al*., 2015; Dzenopoljac *et al*., 2017; Jordão and de Almeida, 2017) on IC-profitability relation assessment and calculated as:

$$ROA = \text{Net income/Total assets}$$

$$ROE = \text{Net income/Shareholder's equity}$$

Assets turnover ratio (ATO) measures the productivity of the companies and use of assets in generating sales and calculated as:

$$ATO = \text{Revenue/Total assets}$$

VAIC^{TM} model was developed by Pulic (1998, 2000) to measure the efficiency of IC. It is more widely used by scholars because it is simple to measure and the results are based on audited financial statements of the companies that are easily available, compared with the others. Total value added (VA) is the difference of the output (total revenue) and input (total expenses excluding employee expenditures) in the organization.

$$VA = \text{Output} - \text{Input}$$

After computing VA, the model calculates HC by total employee expenditures. SC is the difference between VA and HC (SC=VA−HC).

According to VAIC^{TM} model, total value of the organization is the sum of physical capital (CE), HC and SC. VAIC^{TM} is divided into three components, they are calculated as follows:

Capital employed efficiency (CEE), measuring the efficiency of capital employed, is calculated as ratio between VA and the capital employed both physical and financial capital. Human capital efficiency (HCE) measures the value added generated per monetary unit invested in manpower, and is computed by dividing VA with HC. Finally, structural capital efficiency (SCE) measures the value added in the organization by the utilization of structural capital. It is calculated as the ratio between SC and VA. Since VAIC represents the sum of the three efficiencies (VAIC=CEE+HCE+SCE), it is obvious that the sum of HCE and SCE represents the efficiency of IC (ICE).

In terms of control variables, debt ratio (LEV), measured by total debt to its total assets, and firm size (SIZE), measured as the natural logarithm of total assets at year-end are included in the regression model, as it was done in research studies with similar research objective (e.g. Firer and Williams, 2003; Alipour, 2012; Mondal and Ghosh, 2012; Nimtrakoon, 2015; Dženopoljac *et al.*, 2016; Xu *et al*., 2017). In addition, GDP growth rate (GDP) is introduced to control external influences.

3.3. Models

Ordinary least square (OLS) regression is used to check the impact of IC on the financial performance of Chinese agricultural companies. Model (1) is applied in the earnings section.

$$EBIT_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 LEV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GDP_{i,t} + \varepsilon_{i,t} \quad (1)$$

Model (2) and (3) are used to explain the IC-profitability relationship.

$$ROA_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 LEV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GDP_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$ROE_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 LEV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GDP_{i,t} + \varepsilon_{i,t} \quad (3)$$

To test H3, model (4) gives an overview of IC-efficiency impact.

$$ATO_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 LEV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GDP_{i,t} + \varepsilon_{i,t} \quad (4)$$

Model (5)-(8) are utilized to examine the relationships between the various components of VAIC and companies' financial performance in the observed period in China.

$$EBIT_{i,t} = \beta_0 + \beta_1 CEE_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 GDP_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$ROA_{i,t} = \beta_0 + \beta_1 CEE_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 GDP_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$ROE_{i,t} = \beta_0 + \beta_1 CEE_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 GDP_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$ATO_{i,t} = \beta_0 + \beta_1 CEE_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 GDP_{i,t} + \varepsilon_{i,t} \quad (8)$$

where $i = 1, \ldots n$ and $t = 1, \ldots t$ represent firm and year, respectively; ε denotes the disturbance.

4. Results

The research hypotheses are tested through descriptive statistics, correlation analysis, and multiple regression models.

4.1. Descriptive statistics

Table 2 presents descriptive statistics of the sample. The mean value of ROA and ROE is 0.0214 and 0.0301, suggesting that agricultural listed companies face a difficulty in making profit. The mean VAIC of 2.3763 reveals that agricultural listed companies create RMB 2.3763 for every RMB 1.00 utilized. The HCE is the most influential component with the greatest mean value of 1.8547, compared to CEE and SCE. This is consistent with previous findings that HC is the most effective driver of value creation (Rahman 2012; Nimtrakoon, 2015). In addition, the mean value of LEV, SIZE, and GDP is 0.4205, 9.4183, and 0.0730, respectively.

Table 2: Descriptive statistics

Variables	n	Mean	Min	Max	SD
EBIT	164	8.0125	6.3195	10.0867	0.5601
ROA	195	0.0214	-0.4018	0.3300	0.0790
ROE	195	0.0301	-0.7815	0.6272	0.1517
ATO	195	0.5551	0.0828	2.2254	0.3295
VAIC	195	2.3763	-23.7562	8.4544	2.7059
CEE	195	0.1513	-1.0875	1.3845	0.1995
HCE	195	1.8547	-6.0516	7.3487	1.6278
SCE	195	0.3703	-23.8018	4.9234	1.9884
LEV	195	0.4205	0.0496	0.8425	0.1794
SIZE	195	9.4183	8.4591	10.6174	0.3859
GDP	195	0.0730	0.067	0.079	0.0047

Source: Author's calculation

4.2. Correlation analysis

The results of correlation analysis in Table 3 show that EBIT, ROA, ROE, and ATO have non-consistent relationships with different elements of the VAIC coefficient. The analysis points to the conclusion that EBIT correlates with three elements, ROA and ROE does not correlate with SCE, while ATO does not have significant correlation with HCE and SCE. These relationships will be taken into consideration in multiple regression analysis. We compute the variance inflation factors (VIFs) and find most to be less than 2, suggesting that multi-collinearity is not a major issue in our study.

Table 3: Pearson correlation

Variables	EBIT	ROA	ROE	ATO
VAIC	0.590***	0.555***	0.504***	0.021
CEE	0.455***	0.701***	0.733***	0.217***
HCE	0.540***	0.793***	0.754***	0.035

SCE	0.596***	0.035	-0.004	-0.022

*** indicates significance at the 1% level (two-tailed test).
Source: Author's calculation

4.3. Regression models

Regression analysis results are shown in Table 4 and 5.

Table 4: Regression results of model (1)-(4)

Variables	Model (1)	Model (2)	Model (3)	Model (4)
Constant	-0.998	-0.294**	-0.366	-1.610**
	(-1.303)	(-1.997)	(-1.231)	(-2.077)
VAIC	0.187***	0.015***	0.026***	-0.005
	(12.125)	(8.689)	(7.608)	(-0.586)
LEV	-0.086	-0.138***	-0.259***	-0.310**
	(-0.646)	(-5.414)	(-5.032)	(-2.310)
SIZE	0.942***	0.038***	0.053**	0.184***
	(14.778)	(3.039)	(2.125)	(2.814)
GDP	-5.482	-0.222	-0.787	7.926
	(-1.124)	(-0.230)	(-0.404)	(1.559)
Adj. R^2	0.743	0.397	0.333	0.038
F	119.052***	32.986***	25.168***	2.895**
D.W.	1.378	1.739	1.932	0.708
n	164	195	195	195

** and *** indicates significance at the 5% and 1% level, respectively (two-tailed test). T-statistics are in the parenthesis.
Source: Author's calculation

Model (1) has high quality: explanatory power is 74.3 percent. VAIC has a significant and positive impact on EBIT, consistent with Chen *et al*. (2005) and Diez *et al*. (2010) who suggested that firms with greater IC perform better in terms of revenue growth. Hence, H1 is confirmed.

In model (2) and (3), there is a significant and positive relationship between VAIC and company profitability measured by ROA and ROE, which provides the evidence for H2.

The last selected measure of companies' financial performance is efficiency, which is usually measured by ATO. The regression analysis results of model (4) demonstrate IC-efficiency relationship. VAIC has a non-significant impact on ATO. Therefore, H3 is not fully supported.

In addition, LEV negatively affects financial performance while SIZE has a positive effect. The coefficients of GDP are not significant at the 5% level. Xu *et al*. (2017) found that GDP is significantly negatively related to enterprise performance.

Table 5: Regression results of model (5)-(8)

Variables	Model (5)	Model (6)	Model (7)	Model (8)
Constant	-1.493	-0.066	0.102	-1.405*
	(2.823)***	(-0.745)	(0.586)	(-1.847)
CEE	1.236***	0.169***	0.387***	0.497***
	(10.632)	(10.477)	(12.203)	(3.566)
HCE	-0.055**	0.024***	0.040***	-0.043**
	(-2.180)	(12.088)	(10.103)	(-2.452)
SCE	1.610***	0.001	-0.00006	-0.003
	(10.512)	(0.838)	(-0.023)	(-0.268)
LEV	-0.461***	-0.120***	-0.235***	-0.387***
	(-4.709)	(-7.775)	(-7.694)	(-2.887)
SIZE	0.965***	0.014*	0.006	0.172***
	(22.014)	(1.851)	(0.380)	(2.675)
GDP	-3.881	-0.872	-2.172*	6.918
	(-1.167)	(-1.522)	(-1.925)	(1.396)
Adj. R^2	0.881	0.788	0.777	0.090
F	201.969***	121.380***	113.900***	4.216***
D.W.	1.422	1.620	1.782	0.754
n	164	195	195	195

*, ** and *** indicates significance at the 10%, 5% and 1% level, respectively (two-tailed test). T-statistics are in the parenthesis.
Source: Author's calculation

Table 5 shows the regression results of model (5)-(8). The results about the relationship between three components of VAIC and company earnings are shown in model (5). Logged value of earnings is determined by CEE, HCE, and SCE. It is observed that the impacts of structural and physical capital are similar in strength and direction. HC negatively affects the earnings of agricultural companies in China, similar to Dzenopoljac *et al*. (2017).

In terms of profitability, the main conclusions from model (6) and (7) are that physical and human capital have a direct significant impact on the profitability of agricultural companies in China; SC does not affect companies' profitability. However, the research results presented by Dzenopoljac *et al*. (2017) suggested that physical capital is a significant determinant of profitability of Arab companies, regardless of the measures.

With regard to efficiency, physical capital positively affects companies' ATO while human capital has a negative impact. This result differs significantly from previous studies. For example, Shiu (2006) found a significant but inverse relationship between IC and efficiency. When analyzing top 25 pharmaceutical companies in India, Kamath (2008) asserted that the HC is the one that has the major impact on the efficiency of the firms, while other components and overall IC failed to show any significant impact. Dzenopoljac *et al*.

(2017) observed that the only factor that affects Arab companies' ATO is physical capital.

5. Additional Analysis

Additional analysis is conducted to assess the 1-year lagged effect of IC on the performance of Chinese agricultural listed companies. Tripathy *et al*. (2015) confirmed that the lagged physical capital and lagged relational capital are the significant determinants for ROA and ROE in the Indian automobile and consumer goods industries. Sardo and Serrasqueiro (2018) stated that VAIC in the previous period has a positive impact on the financial performance of high-tech firms.

Table 6 shows the 1-year lagged effect of IC on financial performance. Examining the estimated value of VAIC in model (1), model (2), and model (3) suggests that VAIC in the previous period is a significant determinant of firms' future financial performance measured by EBIT, ROA, and ROE. In addition, the lagged VAIC has a negative impact on ATO.

Table 6: Regression results of model (1)-(4)

Variables	Model (1)	Model (2)	Model (3)	Model (4)
Constant	-2.163*	-0.540***	-0.789*	-1.257
	(-1.811)	(-2.639)	(-1.954)	(-1.559)
VAIC	0.038***	0.005**	0.008*	-0.019**
	(3.298)	(2.335)	(1.881)	(-2.120)
LEV	-0.033	-0.178***	-0.354***	-0.336**
	(-0.166)	(-5.194)	(-5.220)	(-2.484)
SIZE	1.117***	0.068***	0.107***	0.169**
	(11.859)	(4.067)	(3.267)	(2.580)
GDP	-6.412	-0.265	-1.013	5.250
	(-0.774)	(-0.178)	(-0.345)	(0.894)
Adj. R^2	0.595	0.221	0.190	0.054
F	47.584***	11.918***	10.050***	3.187**
D.W.	1.486	1.948	2.103	0.739
n	128	155	155	155

*, ** and *** indicates significance at the 10%, 5% and 1% level, respectively (two-tailed test). T-statistics are in the parenthesis.
Source: Author's calculation

Table 7 shows the regression results of the 1-year lagged effect of three components of VAIC. Of the three VAIC components, HC is the most significant variable related to firms' future earnings and profitability measured via EBIT, ROA, and ROE. The results of model (8) show that lagged physical capital positively affects companies' efficiency while lagged HC has a negative impact.

Table 7: Regression results of model (5)-(8)

Variables	Model (5)	Model (6)	Model (7)	Model (8)
Constant	-1.814	-0.489**	-0.693*	-1.252
	(-1.506)	(-2.381)	(-1.705)	(-1.559)
CEE	0.043	-0.002	0.020	0.310**
	(0.230)	(-0.048)	(0.276)	(2.125)
HCE	0.069***	0.012***	0.019**	-0.053***
	(2.949)	(2.711)	(2.106)	(-2.964)
SCE	0.023	0.002	0.003	-0.011
	(1.648)	(0.703)	(0.502)	(-1.037)
LEV	-0.020	-0.174***	-0.351***	-0.405***
	(-0.100)	(-4.995)	(-5.086)	(-2.970)
SIZE	1.084***	0.063***	0.098***	0.176***
	(11.351)	(3.730)	(2.957)	(2,689)
GDP	-7.769	-0.467	-1.422	4.828
	(-0.937)	(-0.314)	(-0.483)	(0.830)
Adj. R^2	0.599	0.232	0.196	0.081
F	32.618***	8.737***	7.243***	3.261***
D.W.	1.562	2.135	2.285	0.748
n	128	155	155	155

*, ** and *** indicates significance at the 10%, 5% and 1% level, respectively (two-tailed test). T-statistics are in the parenthesis.
Source: Author's calculation

6. Conclusions

It is generally believed that IC is the source of competitive advantage and future value creation in the knowledge-based economy. This paper of Chinese agricultural listed companies assesses the impact of VAIC elements on companies' earnings, profitability, and efficiency. The conclusions can be summarized in several points. First, IC positively affects the earnings and profitability of Chinese agricultural listed companies. Second, EBIT is significantly influenced by three VAIC elements. Third, the ROA and ROE are determined by the physical and human capital components of VAIC. Fourth, the efficiency of companies is significantly determined by physical and human capital. Finally, the lagged HC is the most significant variable relating to firms' future financial performance. These conclusions are somewhat in line with Dzenopoljac *et al*. (2017), who argued that SC and physical capital are the most significant underlying resource of corporate performance in the Arab region.

There are some practical implications of this study. Shareholders and managers of Chinese agricultural companies must be aware of the importance of investing and managing IC in order to obtain competitive advantage. Agricultural companies should maintain

sufficient funds as the basic guarantee for their sustainable development. In addition, agricultural companies should improve employees' occupation accomplishment and job skills so that they can have a better development. Also, agricultural companies need to adjust organizational structure, accumulate structural capital, establish a scientific and effective corporate culture, build a powerful employee incentive program, and set up a reasonable promotion mechanism.

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