The major determinants of influencing the operating performance from the perspective of intellectual capital: Evidence on CPA industry ☆

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A R T I C L E   I N F O

A B S T R A C T

From the perspective of intellectual capital theory, this paper attempts to evaluate the operating performance of Taiwan's accounting firms in the four dimensions, namely human capital, process capital, innovation capital and customer capital. It then constructs a multiple regression performance evaluation model. The results suggest that the operating performance is better for firms with young employees, a majority of field staffs, high invested labor cost, long business age, more management consulting firms, high marketing expense ratio, and provision of services in China. Overall, the human, process and customer capitals are major dimensions that affect the CPA industry in maintaining good operating performance. The findings can serve as a reference to the operating performance evaluation of accounting firms, and establishment of a well-planned management system, thus bringing positive benefits for the service quality and operating performance of the accounting firms.

1. Introduction

According to the statistics of the Financial Supervisory Commission (FSC) in 2011, there were 854, 932 and 943 accounting firms of continuous operations in 2007, 2008 and 2009, respectively. The number of accounting firms increased by 89 or 10.42% over the three years, using the number of accounting firms in 2007 as the benchmark. According to the number of Certified Public Accountants (CPAs) recorded in the Ministry of Examination, during the 11 years from 2001 to 2011, the number of CPAs shows an increasing trend. In 2011, 631 people received CPA qualification. Although the number of newly accredited CPAs is rather stable and the market supply of CPAs considerably increases, from 2001 to the present, the demand for audit and tax business has not substantially increased. Under such excessive supply, the CPA industry has begun to face difficulties in business operation (Chen, Lin, & Fu, 2008). In response to the operational difficulty, the accounting firms need to identify the key factors affecting their operating performance for the sustainable development.

According to the statistics and survey of FSC (2011) in 2009, 436 accounting firms regarded "market downturn of the industry" as their major difficulty in business operation and 259 accounting firms regarded "intense industrial competition" as their major difficulty in business operation. According to the survey results, the accounting firms are faced with intense business competition and high risk under the circumstances of such a competitive industrial environment, downturn of the market and lack of service varieties. Among these difficulties and challenges, how the accounting firms respond to the industrial challenge and market competition, as well as tolerable and bearable business operational risks, and take appropriate measures are the research motivations of this paper.

In recent years, the intellectual capital theory has been widely applied in various industries, such as the semi-conductor industry (Chang & Hsieh, 2011; Wang & Chang, 2004), the listed companies (Abeysekera, 2011; Clarke, Seng, & Whiting, 2011; Mosavi, Nekoueizadeh, & Ghaedi, 2012; Phusavat, Comepa, Sitko-Lutek, & Ooi, 2011; Taliyang, Latif, & Mustafa, 2011), TWSE/GTSM listed companies (Ahangar, 2011; Chuang, Lin, Shen, & Lee, 2011), the banking industry (Abdulsalam, Al-Qaheri, & Al-Khayyat, 2011), the

manufacturing sector (Singh & Kansal, 2011), the insurance sector (Alipour, 2012), and the logistic and transportation sector (Huang & Jhong, 2012). Chuang et al. (2011) suggest that the value created by the knowledge has the nature of intangibility, uniqueness, and deferred effectiveness. Skills, knowledge, information, experience and innovation can set one firm apart from its competitors. This is so-called "intellectual capital", which is generally divided into human capital, process capital, innovation capital, and customer capital (or relational capital) (e.g., Edvinsson & Malone, 1997; Edvinsson & Sullivan, 1996; Wang & Chang, 2004). Based on the above common categorization, this paper regards intellectual capital as the theoretical concept consisting of four dimensions, including human capital, process capital, innovation capital and customer capital for the subsequent empirical study of the operating performance of the accounting firms.

Since the accounting firms belong to the knowledge-intensive service industry, through the most important input factor (i.e., human capital), the accounting firm provides customer groups of different characteristics with specialized and customized services by their professional expertise and accumulated practical experience. In the service process, in addition to recruiting enough professional talents, a robust operating process is essential. Moreover, under the current market environment, companies need to adjust their business strategies to follow the trends of internationalization and technological development. Meanwhile, the accounting firms need to provide differentiated services according to the business demand of the clients. Therefore, in response to the rapid changing environment and market, the accounting firms should have self-innovation and R&D momentum to establish their own advantages and niche in such a highly competitive environment. This will be an important practical issue to be discussed by the application of the intellectual capital theory. Accordingly, this paper attempts to explore how the accounting firms could effectively attract client groups, deepen the interactive relationships with clients to improve business service quality as the top priorities in the business operation of the accounting firms. Based on the above mentioned research background and motivations, this paper applies the intellectual capital theory to identify the important key factors affecting the operating performance of the accounting firms under such an industrial environment. Furthermore, this paper conducts an in-depth study from four dimensions of intellectual capital, including human capital, process capital, innovation capital and customer capital. The intellectual capital is the tool and indicator to measure business strategy from the perspective of the organizational strategy. Moreover, it is not only presented by pure financial data, as the intangible assets should be converted into measurable numbers. This paper attempts to develop a performance evaluation empirical model and identifies the factors affecting the accounting firms' operating performance. The findings can serve as a reference for the accounting firm operators in improving the business management and business service quality from the perspective of the four dimensions of intellectual capital.

2. Literature review and hypothesis development

2.1. Literature relating to intellectual capital and organizational operating performance

Wang and Chang (2004) point out that the intellectual capital of human capital has a positive impact on innovation and process capital; innovation capital has an impact on process capital, process capital affects customer capital; customer capital has a positive impact on operating performance. Sharabati, Jawad, and Bontis (2010) explore the relationship between intellectual capital (i.e. human capital, structural capital, relational capital) and business

performance within the pharmaceutical sector of Jordan. The results implicate that the intellectual capital measurement is of primary interest for senior executives of pharmaceutical firms. Abdulsalam et al. (2011) study the Kuwaiti banks by using the intellectual capital value added coefficient to divide the banking industry into the commercial and non-commercial banks. The best performing bank is National Bank of Kuwait. Ahangar (2011) finds that human capital investment is more efficient than physical capital and structural capital. Chang and Hsieh (2011) argue that innovation capital of R&D investment significantly affect the company's finance operation and performance of the market value. Chu, Chan, and Wu (2011) find that intellectual capital and corporate earnings have a significant positive correlation. Clarke et al. (2011) point out that human capital and structural capital have a direct impact on the performance of the listed companies in Australia.

Daud and Yusoff (2011) argue that the integration of intellectual capital and organizational knowledge management help to improve the organizational operating performance. Hormiga, Batista-Canino, and Sánchez-Medina (2011) suggest that human capital and relational capital play a vital role to determine the sustainable operation of the company in the first few years after the establishment. St-Pierre and Audet (2011) shed light on the nature of intellectual capital in small to medium-sized enterprises (SMEs) and how it is linked to strategy and performance. They use structural equations to test the multiple relations between different components of intellectual capital and performance. The findings show that when an attempt is made to link intellectual capital components to performance, it is noticed that the latter is strategy specific, just as the variables that influence performance. Alipour (2012) points out that intellectual capital and the profitability of the insurance company are positively correlated. They suggest that insurance companies should improve their performance according to the intellectual capital development strategy. Gilaninia and Matak (2012) argue that human, relational and structural capital are correlated to the performance of small enterprises, and suggest that small enterprises should be based on intellectual capital in the management of the company. Komnenic and Pokrajčić (2012) point out that human capital has a positive correlation with return on assets, profitability and productivity.

There are no consistent conclusions regarding the classifications and components of intellectual capital. Having said that, the categories of human capital, structural capital, and customer capital are frequently seen and widely accepted (e.g., Bontis, 1998; Edvinsson & Sullivan, 1996; Johnson, 1999; Joia, 2000; Roos, Bainbridge, & Jacobsen, 2001). The classification of human capital, relational capital, and structural capital (e.g., Edvinsson & Malone, 1999; Gallego & Rodríguez, 2005; Green & Ryan, 2005) is also a popular choice. In fact, relational capital contains customer capital, and structural capital can be further divided into process capital and innovation capital. Yet another classification is human capital, process capital, innovation capital, and customer capital (Wang & Chang, 2004). In fact, while the empirical results show that intellectual capital does affect performances of the Taiwanese semiconductor industry (Wang & Chang, 2004). There are very few studies examining the correlation between intellectual capital and operating performances of accounting firms. Shih and Tsai (2014) also divide intellectual capital into human capital, process capital, innovation capital, and customer capital in their examination of the influence of intellectual capital on the operating efficiency of accounting firms. Their results indicate that human capital, innovation capital, and process capital have significant impacts on the operating efficiency of accounting firms. This paper refers to Wang and Chang (2004) and Shih and Tsai (2014) for the classification of intellectual capital into human capital, process capital, innovation

capital, and customer capital for empirical analyses.

In summary of the above, studies relating to intellectual capital and performance, human capital plays a considerably important role and is a key factor to performance. Most previous studies on intellectual capital focus on human capital. This paper is slightly different from previous studies as it does not consider the dimension of human capital as an influencing factor, but concerns relevant factors in three dimensions including process capital, innovation capital and customer capital. The authors expect to combine the intellectual capital theory and the CPA industry's characteristics to select important and featured variables. Moreover, from the business point of view, this paper adopts multiple operating performance indicators to establish the complete performance empirical model to overcome the insufficiency of using a single or a few performance indicators in previous studies. This is the research purpose and the difference from other previous studies.

2.2. Human capital

In human capital dimension, the variables often used to measure in past literature include the number of employees, educational background (or educational degree), years of service, average age, turnover rate, computer expertise and productivity (Ahangar, 2011; Clarke et al., 2011; Mosavi et al., 2012; Taliyang et al., 2011; Wang & Chang, 2004). Those variables are based on "human", suggesting that employees are the basis of the dimension of human capital.

As accounting firms are providers of professional services, human capital is the core input factor of the firms. The professional capabilities of the CPAs, group leaders, and assistants of the accounting firms directly and indirectly affect the audit quality and performance of the accounting firms (Chen et al., 2008). In practice, group leaders and assistants in the accounting firms are generally responsible for the business operation. Whether the business risk can be reduced to the acceptable level and create better operating performance for the accounting firm depends on whether the main field staffs can generate benefits. Meanwhile, the professionalism can also affect main field staffs' work competency and quality. Concerning the number of employees and the educational degree of the employees of the accounting firms, this paper argues that observable and objective human capital indicators should be determined by educational level. Hence, this paper regards the employees of college or above as employees of high educational level, who are considered to have basic and fundamental professional knowledge and sufficient training, problem-solving and learning capabilities, as well as work competency. If the managers of the accounting firms can hire more employees of high educational level, the accurate judgment and decision-making capabilities of those employees can ensure the quality of professional services. Accordingly, this paper expects that the accounting firms with a higher percentage of talents of high educational will have better operating performance.

The intellectual capital can display much information relating to human capital. Victoria, Judit, and Nicoleta (2011) study and analyze the core human capital "employee"-related information, and use the findings to review and improve the human capital of enterprises. The related information includes the number, age, rank, attitude, educational degree, professional competence and work efficiency of employees. They find that employee age is one of the important factors affecting the operating performance. Chaudhry, Malik, and Ahmad (2011) suggest that employees tend to maintain a good work relationship and reduce conflict in work as they age. As a result, the reduced conflict of work can affect the operating performance of the enterprise due to the increased team cohesion. According to Kunze, Boehm, and Bruch (2011), organizational performance of an organization of employee age distribution at intervals is better than that of older employee age. In other words, the employee average age distribution has an influence on the organization's cohesion and operating performance. The discussions on the impact of the factor on performance are inconclusive in past studies, this paper intends to explore whether employee average age affects the accounting firms' operating performance without predicting the direction of the relationship of the two.

If the human resources of the company can be properly used and distributed, the operating costs of enterprises can be effectively reduced (Wang & Chang, 2004). In accounting firms, the main field staffs are the frontline service personnel, who affect the clients' impressions on the accounting firm and its service quality. A firm with a higher percentage of main field staffs also make more investments in human capital. From the perspective of cost-benefit considerations, performing business revenue (PBR) cases that can generally generate more benefits for the accounting firms require more field personnel to deliver services. Hence, this paper expects that a higher percentage of main field staffs has a positive impact on the accounting firms' operating performance.

Among previous literature, Mosavi et al. (2012) use employee salary cost as one of the measurement variables in the calculation of value added intellectual coefficient (VAIC). Other measurement variables also include the total salary cost of the enterprise. In addition, if the enterprise provides relatively satisfactory salary, bonus and welfare system, employees may have a stronger sense of identification, and be more willing to work at the enterprises for a longer time. Moreover, the empirical results of previous literature also confirm that higher employee salary can directly or indirectly improve the operating performance, as it enhances employee satisfaction (Macky & Boxall, 2007). This also applies to accounting firms. The accounting firms with more human capital input have better operating performance as the employees are more willing to devote their efforts. Hence, this paper expects that the accounting firms with more labor cost input will have better operating performance. Based on the above, the hypotheses are proposed as follows:

H 1. The accounting firms with more human capital input have better operating performance.

H 1-1. The accounting firms with more employees of high educational level have better operating performance.

H 1-2. The employee average age has an impact on the accounting firms' operating performance.

H 1-3. The accounting firms with more main field staffs have better operating performance.

H 1-4. The accounting firms with higher labor cost have better operating performance.

2.3. Process capital

Regarding the dimension of process capital, in the past literature, measurement variables widely adopted by scholars include the number of years of the establishment of the enterprise, the total asset turnover, working capital turnover, fixed asset turnover, size, employee management costs, the document use procedure (Ahangar, 2011; Chang & Hsieh, 2011; Clarke et al., 2011; Huang & Jhong, 2012; Mosavi et al., 2012; Taliyang et al., 2011; Wang & Chang, 2004). The effective and proper operating procedures or particular methods can accelerate the operating speed or reduce

the operating error rate, thus directly or indirectly enhancing the efficiency, reducing the cost of the enterprise, and improving better the operating performance.

According to Wang and Chang (2004), customers expect to perceive quality of service by the use of tangible products and intangible services. If the perceived quality and value is higher, the customer is more satisfied. To maintain the level of customers' perceived quality and sense of value of the tangible products and intangible services, enterprises need to pay for the management costs to retain the market reputation. Similarly, to maintain service quality and value reputation of the accounting firms, some costs should be invested in business operational management. In addition, for tangible products and intangible services, good management and maintenance should be regularly input with considerable management costs after the production or provision. However, such costs may not have been considered as the asset. Hence, the appropriate observation of the proportion with the input management costs can bring intangible economic benefits (Wang & Chang, 2004). In addition, to maintain a steady flow of customers, firms need to pay a considerable cost in the administration to improve the customers' perceptions concerning the service quality, and further bring more revenues to the firms. Accordingly, this paper expects that a higher percentage of management cost input of the accounting firms can bring more positive impact on the accounting firms' operating performance.

In practice, in general, older enterprises have richer accumulated process capital. Accounting firms face serious competition, and need to find a suitable operating mode to survive the competition. According to Hoegl, Weinkauf, and Gemuenden (2004), in addition to the human capital to fit the internal and external procedures, the enterprise can use the rich past experience, which is accumulated from the business age and the trust relationship with clients, in order to develop products more efficiently. Besides offering professional experiences, the accounting firms also need to maintain a trust-based relationship with the clients, in order to achieve business operation. Hence, this paper expects that longer business age of the accounting firm has a positive impact on the firms' operating performance. Based on the above, the hypotheses are proposed as follows:

H 2. The accounting firms with more process capital input have better operating performance.

H 2-1. The accounting firms with higher percentage of management cost have operating performance.

H 2-2. The accounting firms with longer business age have better operating performance.

2.4. Innovation capital

The innovation capital is commonly measured by indicators including R&D expense ratio, training expense ratio, business development rate, and the number of patents (Chang & Hsieh, 2011; Edvinsson, 1997; Mosavi et al., 2012; Wang & Chang, 2004). This dimension is an integral part in the development of new products and services for the enterprise. If the companies can make good use of the relevant measurement indicators in this dimension, the operating performance will be better.

According to Grabowksi and Mueller (1978), if the profitability is significantly higher than the average profit level, the company's R&D intensity usually accounts for a very high proportion. Sáenz, Aramburu, and Rivera (2009) study the innovation capital, finding that the impact of applying relevant knowledge exchange and innovation results on the generation of company value is more

significant in high-tech companies, as compared to non-high-tech companies. As the current market of the accounting firms is becoming saturated, to survive in such an environment of intense competition pressure, accounting firms have to innovate and create characteristics that are different from others. Hence, the input in R&D in various businesses and the relevant expense for training can promote the professional skills of the employees, strengthen business service quality, and help employees to enhance the procedural process and professional thinking. As a result, the accounting firms can make a strong impression on the clients on the premise of innovation without violating relevant regulations, as well as improve the operating performance of the firms. Accordingly, this paper expects that higher R&D intensity of the accounting firms can have a positive impact on the firms' operating performance.

According to Kalakota and Whinston (1996, 1997), e-commerce combines the business activities such as purchase, sales, and service with network technology to satisfy the business demand of consumers, merchants and business organizations, thereby effectively reducing the costs in three aspects, improving service and product quality, and accelerating the service speed. This is an innovative practice and a global trend. Chaston, Badger, Mangles, and Sadler-Smith (2001) measure the activities of e-commerce by 14 ways, and argue that such measurements can indicate the degree of using online technology. At present, some accounting firms have adopted e-commerce in practice. For the 2729 accounting firms of the original samples, 2609 use computer equipment and 2512 of them use computer in processing accounts. However, only 444 of them use computer equipment in e-commerce. The e-commerce activities of accounting firms mainly involve the provision of business information and e-trading transfer service. By e-commerce, the accounting firms can effectively reduce the measureable and immeasurable costs for paper-based work, while improving the working efficiency. Therefore, this paper expects that if the accounting firms adopt e-commerce, they can effectively improve their operating performances. Based on the above, the hypotheses are proposed as follows:

H 3. The accounting firms with more innovation capital input have better operating performance.

H 3-1. The accounting firms with higher R&D intensity have better operating performance.

H 3-2. The adoption of e-commerce can result in better operating performance of the accounting firms.

2.5. Customer capital

The most commonly accepted indicators to measure customer capital are revenue growth rate, the average number of days of sales, marketing expense ratio, management cost ratio, advertising expense ratio, the ratio of net marketing expenses, product acceptance rate, customer satisfaction, the average duration of customer relationship, product sales concentration, customer type, new market development and investment (Ahangar, 2011; Chang & Hsieh, 2011; Clarke et al., 2011; Gilaninia & Matak, 2012; Hormiga et al., 2011; Huang & Jhong, 2012; Mosavi et al., 2012; Taliyang et al., 2011; Wang & Chang, 2004). Customers generate revenues for the enterprises and are the most important and direct source of revenue; hence, maintaining good customer relation and reach for more potential customers can improve operating performance.

Regarding studies relating to the accounting firms' operating performance, Chen and Lee (2006) use multiple regression model to analyze the accounting firms' operating performance from the

perspective of resource-based theory, and find that the non-audit service revenue of the accounting firms with strategic alliance is positively correlated to operating performance, and the operating performance is significantly better than that of the accounting firms without strategic alliance. Previous studies have also suggested that customer capital and operating performance are directly correlated. To maintain good operating performance, the accounting firms, in the respect of customer capital, need to carefully design products or customized services to satisfy the needs of the customers, so as to keep and increase the source of customers of the accounting firms. Sahoo and Mishra (2012) argue that diversified business model can help the organization to utilize resources and achieve more stable financial performance. In addition, the demand on management consultants of the enterprises is gradually increasing due to the globalization trend. If the accounting firms can utilize the advantages of strategic alliance to establish independent management consultancy firms and provide more comprehensive management and consultancy services, the accounting firms can be more independent, and the management consultancy firms can refer more clients to the accounting firms. Chen and Lee (2006) mention that the accounting firms and management consulting firms may exchange client sources to increase the business revenue of both firms, thus achieving win-win outcome. This paper expects that the accounting firms with more management consulting firms have better operating performance.

Payne (1995) argues that companies should pay attention to marketing activities, which can effectively attract customers, and over time, evolve into the good long-term customer relationships. The sponsorship of public activities can result in a direct and effective communication with the customers, thus making a strong impression (Close, Finney, Lacey, & Sneath, 2006). In this paper, the self-promoting advertising of the accounting firms refers to the networking of CPAs and lectures given in schools. The lectures or presentations may be upon invitation by schools, and such promotion does not violate the relevant provisions of Article 46 of the CPA Act. The accounting firms should appropriately advertise and establish good relationship with clients, in addition to the professional competence and services, for the long-term development. Hence, this paper expects that more investment in promotion activities of the accounting firms can result in better operating performance.

In addition to the management consulting services, the accounting firms should also expand their businesses overseas. Sullivan (1996) argues that globalization can be defined with three components including: (1) foreign market penetration; (2) foreign production presence; (3) country scope. The former two components, foreign market penetration and foreign production presence, are reflected in multinational enterprises (MNEs). Country scope focuses on the range of global expansion of MNEs, namely, the span of globalization (Thomas & Eden, 2004). Understanding the importance and necessity of globalization and actively participate in overseas exploration can help the development of business brand and performance. At present, China is a vast emerging market of deeper penetration by enterprises around the world. The accounting firms should follow the concept of globalization and enter to the hottest business region for business development, in order to effectively enhance the international horizon and operating performance of the firms. Accordingly, this paper expects that the accounting firms providing services in China have a higher degree of internationalization and better operating performance.

According to Cheng, Wang, and Weng (2000), the degree of business concentration of the accounting firms can effectively reduce the service cost due to the learning curve effect, thus improving the firms' operating performance. The calculation of business concentration is based on the concept of Herfindahl index,

proposed by Hirschman (1964). It is an indicator of economics to measure market concentration for the understanding of market competition, and is calculated by the sum of square of the market shares of various firms. Berry (1971) uses industrial concentration to measure diversification degree. Higher concentration indicates lower diversified degree. This paper uses Herfindahl index to calculate the business specialty of the accounting firms. The CPA services can be further categorized into auditing, taxation, management consultancy, and other businesses. The revenue of the accounting firms may be concentrated or distributed in some categories. Hence, Herfindahl index is used to calculate the business specialty of the accounting firms, expecting that concentration on some businesses of the accounting firms can result in better operating performance. Based on the above, the hypotheses are proposed as follows:

H 4. The accounting firms with more customer capital input have better operating performance.

H 4-1. The accounting firms with more management consulting firms have better operating performance.

H 4-2. The accounting firms with a higher marketing expense ratio have better operating performance.

H 4-3. The accounting firms that provide services in China have better operating performance.

H 4-4. The accounting firms that have more concentrated service items have better operating performance.

3. Methodology

3.1. Data source

This paper studies the data of 2729 accounting firms in the period of 2007–2009 from the "Public Accounting Firms Service Investigation Report" database. The data in the survey report are collected from questionnaire surveys, thus omissions, errors and unreasonable data or information are possible. Hence, this paper selects the samples in two stages. The sample selection process is as shown in Table 1. In Stage I, data omissions are found in 6 firms regarding the number of employees, 7 firms regarding revenue data, 22 firms regarding expense data, thus those samples are deleted. In Stage II, for data accuracy, the samples with unreasonable abnormal data, such as one firm with total revenue less than 1000 NTD, 20 firms with total operating assets below 10,000 NTD, 11 firms with a business age more than 58 years, are deleted. After the two-stage sample selection process, 67 samples are deleted; thus, there 2662 samples for the subsequent empirical tests.

3.2. Variable selection and definition

3.2.1. Dependent variables

3.2.1.1. Categorized by PBR and NPBR. Performing business revenue (PBR) includes public offering auditing revenue, financing auditing revenue, income tax audit reporting revenue, other financial auditing revenue, tax planning revenue, tax administrative remedies, other tax revenue, management consulting revenue, business registration revenue and other performing business revenue. Non-performing business revenue (NPBR) includes interest revenue, rental revenue and other non-performing business revenue.

3.2.1.2. Categorized by major business items of the accounting firms. In addition to the above categorization, PBR can be divided into auditing business revenue (ABR), tax revenue (TXR), management

Table 1
Sample selection process table.

Two-stage selection	Selection process	Number of samples
Stage I Delete incomplete data	Total number of samples Number of employees Revenue data Expense data	2729 (6) (7) (22)
Stage II Delete unreasonable data	Stage I number of samples Total revenue < 1000 NTD Total operating assets < 10,000 NTD The business age of the accounting firms > 58 years	2694 (1) (20) (11)
	Number of valid samples	2662
Number of valid samples by year	2007 2008 2009	833 909 920

consulting revenue (MCR) and other performing business revenue (OPR).

3.2.1.3. Categorized by TAR and NTAR.
PBR can be further divided into auditing revenue (TAR) and non-auditing revenue (NTAR).

3.2.2. Independent variables

Wang and Chang (2004) indicate that human capital is the leading indicator among the four constructs of intellectual capital, as it is the fundamental element for business operations. Further management and control over this indicator are beneficial to the improvement of accounting firms' operating quality. Hence, in the "human capital" dimension, variables including percentage of employees of high educational level (HEDU), employee average age (AGE), percentage of main field staffs (RFS) and percentage of labor cost (LC) are the measurement variables.

In terms of the construct of process capital, Wang and Chang (2004) believe that customers obtain greater value from the effectiveness of services rendered. The better the perceived service quality is, the higher the value and the greater the satisfaction there will be. However, further investments in business and operations are required in other to improve quality and value. Hoegl et al. (2004) suggest that the greater the trust relationship is between companies and customers, the more able the companies can achieve sustainable operations. Hence, the number of years since inception and the level of operating results are correlated. Hence, in the "process capital" dimension, variables including percentage of management cost (MAC) and the business age of the accounting firms (BAG) are the measurement variables.

As far as the construct of innovation capital is concerned, Grabowksi and Mueller (1978) posit that companies with high R&D intensity report significantly better profitability than average. Chaston et al. (2001) suggest that e-commerce can reduce costs and enhance the efficiency of companies. Hence, in the "innovation capital" dimension, variables including R&D intensity (RD) and e-commerce (EC) are the measurement variables.

Regarding the construct of customer capital, Chen and Lee (2006) contend that accounting firms and management consulting companies are complementary in resources and professionalism. Hence, the sharing of resources can expand clientele and revenues for both. Payne (1995) argues that appropriate packaging by companies helps to attract customers. Thomas and Eden (2004) believe that multinational companies (compared to companies only active in a single market) enjoy a diversified stream of revenues and report better operating performances. Cheng et al. (2000) employ the Herfindahl-Hirschman Index to measure whether businesses are focused on a single sector. The higher the Herfindahl-Hirschman Index is, the better the operating performances are. Hence, in the "customer capital" dimension, variables

including the number of management consulting firms (MCF) set up by the accounting firms, marketing expense ratio (SEL), provision of services in China (CHA) and the firms' specialty (SPEC) are the measurement variables.

3.2.3. Control variable

The frequently used proxy variables for firm sizes are total revenues, number of employees, and total assets (Chen, Chen, & Goan, 2010). The most commonly used control variable is firm size in the empirical study and the regression analysis of the audit industry. Chen et al. (2010) refer to the number of partners as the proxy variable for firm size. The larger the firm size is, the better the management's capability will be and the greater its operating performance. Chen, Goan, and Chen (2011) measure firm size from the businesses revenues of firms. The results suggest that for national, regional, and local firms, the larger the firm size is, the better the financial performances. Chen, Huang, and Hsu (2011) evaluate firm size by market share. The research suggests that for international, national, regional, and local firms, the higher their market shares are, the better their operating performances. Lee (2012) uses total fixed asset value of the individual accounting firm as the proxy variable for firm size. The results indicate that the larger the firm size is, the lower the operating profitability and return to fixed assets will be. Chen, Hsu, Huang, and Yang (2013) examine the relations between audit quality, audit firm size, and financial performance. The results report a positive association between audit firm size and audit quality for the three categories of audit firms. Besides, the positive relationship of national audit firms is higher than that of regional and local audit firms. They use total revenues of audit firms as the proxy variable of audit firm size. Lee (2013) utilizes the total number of staff at the end of the year as the proxy variable for the size of accounting firms. Her research findings suggest a significant and positive influence of scale on the operating performance of accounting firms. Sundgren and Svanström (2013) refer to the number of CPAs as the proxy variable for the size of audit offices. Their results indicate that the probabilities of warnings or exclusions from the profession are much higher for non-Top 6 auditors in Sweden than for Top 6 auditors. Furthermore, they find a strong negative association between the likelihood of sanctions and audit office size for non-Top 6 auditors. Lee (2014) uses the total number of employees as the indicator for scale, with the results showing that the larger the firm scale is, the better it is for operating revenue or total revenue. Lee and Chen (2016) also measure the scale of accounting firms with the total number of employees. Their study suggests that the larger the firm sizes are, the better the overall operating performances will be.

In general, stronger capital investment of an enterprise can better drive the operating performance of the enterprise. Deaconu

(2011) argues that more investment in tangible assets of transportation vehicles by the Romanian company have a significant and positive impact on the share price of the company. As an airliner, more investment by the Romanian company can more effectively attract customers, improve operating performance, and result in higher share prices. Moreover, the measurement of physical capital refers to the deduction of the total assets by the intangible assets. The result is the "physical" operating assets (Ahangar, 2011; Mosavi et al., 2012). Accordingly, this paper selects operating assets (OPA) as the control variable of the regression model to measure the operating scale of the accounting firms.

The definitions of the above variables are summarized as shown in Table 2:

3.3. Multiple regression model

According to the above research hypotheses, this paper establishes multiple regression models as shown by Equations (1)–(8). By combining the empirical analysis results and the perspective of

the intellectual capital theory, this paper identifies the key factors that affect the operating performance of the accounting firms, in order to provide a reference for the accounting firm operators in decision-making.

3.3.1. Regression equations categorized by PBR and NPBR

$$\text{Model 1: PBR} = \beta_0 + \beta_1\,\text{HEDU} + \beta_2\,\text{AGE} + \beta_3\,\text{RFS} + \beta_4\,\text{LC} + \beta_5\,\text{MAC} + \beta_6\,\text{BAG} + \beta_7\,\text{RD} + \beta_8\,\text{EC} + \beta_9\,\text{MCF} + \beta_{10}\,\text{SEL} + \beta_{11}\,\text{CHA} + \beta_{12}\,\text{SPEC} + \beta_{13}\,\text{OPA} + \varepsilon_1 \tag{1}$$

$$\text{Model 2: NPBR} = \beta_0 + \beta_1\,\text{HEDU} + \beta_2\,\text{AGE} + \beta_3\,\text{RFS} + \beta_4\,\text{LC} + \beta_5\,\text{MAC} + \beta_6\,\text{BAG} + \beta_7\,\text{RD} + \beta_8\,\text{EC} + \beta_9\,\text{MCF} + \beta_{10}\,\text{SEL} + \beta_{11}\,\text{CHA} + \beta_{12}\,\text{SPEC} + \beta_{13}\,\text{OPA} + \varepsilon_2 \tag{2}$$

where, PBR is the performing business revenue; NPBR is the non-performing business revenue; HEDU is the percentage of employees of high educational level; AGE is employee average age; RFS

Table 2
Summary of variable definitions.

Variable type	Intellectual capital dimension	Variable description	Variable definition
Dependent variables		PBR	It is measured by the logarithm of the sum of items including public offering auditing revenue, financing auditing revenue, income tax audit reporting revenue, other financial auditing revenue, tax planning revenue, tax administrative remedies, other tax revenue, management consulting revenue, business registration revenue and other performing business revenue. (Original unit: NTD)
		NPBR	It is measured by the logarithm of the sum of items including interest revenue, rental revenue and other non-performing business revenue. (Original unit: NTD)
		ABR	It is measured by the logarithm of the sum of items including public offering auditing revenue, financing auditing revenue and other financial auditing revenue. (Original unit: NTD)
		TXR	It is measured by the logarithm of the sum of items including income tax audit reporting revenue, tax planning revenue, tax administrative remedies and other tax revenue. (Original unit: NTD)
		MCR	It is measured by the logarithm of management consulting revenue. (Original unit: NTD)
		OPR	It is measured by the logarithm of other performing business revenue. (Original unit: NTD)
		TAR	It is measured by the logarithm of the sum of items including public offering auditing revenue, financing auditing revenue, income tax audit reporting revenue and other financial auditing revenue. (Original unit: NTD)
		NTAR	It is measured by the logarithm of the sum of items including tax planning revenue, tax administrative remedies, other tax revenue, management consulting revenue, business registration revenue, other performing business revenue and non-performing business revenue. (Original unit: NTD)
Independent variables	Human capital	Percentage of employees of high educational level (HEDU)	The number of employees with the university or above education ÷ the total number of employees (Original unit: Percentage)
		Employee average age(AGE)	The accounting firm employee age is calculated by the following equation: (25 × the number of employees aged below 25 year-old)+(29.5 × the number of employees aged from 25 year-old to 34 year-old)+(39.5 × the number of employees aged 35 from year-old to 44 year-old)+(49.5 × the number of employees aged from 45 year-old to 54 year-old)+(59.5 × the number of employees aged from 55 year-old to 64 year-old)+(65 × the number of employees aged above 65 year-old)÷total number of employees (Original unit: Age)
		Percentage of main field staffs (RFS)	The number of professional team leaders and professional assistants ÷ the total number of employees (Original unit: Percentage)
		Percentage of labor cost (LC)	(Payroll expenses + meals + employee benefits + pension prepare + pension funds + overtime expenses) ÷ the total expenditures (Original unit: Percentage)
	Process capital	Percentage of management cost (MAC)	It is measured by the logarithm of the percentage of the sum of insurance, tax, non-performing debt loss and amortization divided by the total expenditures. (Original unit: Percentage)
		Business age of the accounting firm (BAG)	It is measured by the logarithm of the business age of the accounting firms. (Original unit: Number of years)
	Innovation capital	R&D intensity (RD)	It is measured by the logarithm of the percentage of the sum of R&D expense and on-job training expense divided by the total expenditures. (Original unit: Percentage)
		E-commerce (EC)	Having or having no e-commerce business activities, it is 1 for having the e-commerce business activities; otherwise, it is 0.
	Customer capital	The number of management consulting firms (MCF)	It is measured by the logarithm of the number of management consulting firms set up by the accounting firms. (Original unit: Number of firms)
		Marketing expense ratio(SEL)	It is measured by the logarithm of the percentage of the sum of advertising expense and social interaction expense divided by the total expenditures. (Original unit: Percentage)
		Provision of services in China (CHA)	The accounting firm providing services in China or not, it is 1 if providing the service in China; otherwise, it is 0.
		The accounting firms' specialty (SPEC)	$(\text{ABR} \div \text{PBR})^2 + (\text{TXR} \div \text{PBR})^2 + (\text{MCR} \div \text{PBR})^2 + (\text{OPR} \div \text{PBR})^2$
Control variable		Operating assets (OPA)	It is measured by the logarithm of the sum of self-owned assets, rented assets and borrowed assets. (Original unit: NTD)

is the percentage of main field staffs; LC is the percentage of labor cost; MAC is the percentage of management cost; BAG is the business age of the accounting firms; RD is the R&D intensity; EC is the adoption of e-commerce; MCF is the number of management consulting firms; SEL is the marketing expense ratio; CHA is the provision of services in China; SPEC is the accounting firms' specialty; OPA is the operating assets; β_0 is the intercept item; β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8, β_9, β_{10}, β_{11}, β_{12} and β_{13} are the parameters of regression model; ε_1 and ε_2 are the error items.

3.3.2. Regression equations categorized by major business items of the accounting firms

Model 3: $ABR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_3$ (3)

Model 4: $TXR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_4$ (4)

Model 5: $MCR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_5$ (5)

Model 6: $OPR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_6$ (6)

where, ABR is the auditing business revenue; TXR is the tax revenue; MCR is the management consulting revenue; OPR is the other performing business revenue; other independent variables and β_0 to β_{13} are the same with those in regression equation (1); ε_3, ε_4, ε_5 and ε_6 are the error items.

3.3.3. Regression categorized by TAR and NTAR

Model 7: $TAR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_7$ (7)

Model 8: $NTAR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_8$ (8)

where, TAR is the auditing revenue; NTAR is the non-auditing revenue; other independent variables and β_0 to β_{13} are the same with those in regression equation (1); ε_7 and ε_8 are the error items.

4. Empirical results

4.1. Descriptive statistics analysis

4.1.1. Dependent variables

As shown in Table 3, the PBR mean of 26,269,720 NTD is higher than the median of 4,309,897 NTD, suggesting that the accounting service is dominated by a few accounting firms. The ABR mean of 13,516,294 NTD is higher than the TXR, MCR and OPR means of 8,570,744 NTD, 1,298,057 NTD and 2,884,624 NTD, respectively, suggesting that PBR of the accounting firms mainly comes from ABR. The TAR mean of 19,152,541 NTD is higher than the NTAR mean of 7,295,175 NTD, indicating that the accounting firms mainly make profits from the auditing service.

4.1.2. Independent and control variables

As shown in Table 3, in the human capital dimension, the percentage of employees of high educational level (HEDU) and the percentage of main field staffs (RFS) medians are 0.7 and 0.615 respectively, indicating that the educational level of college and above has become the threshold for the accounting firms. The percentage of main field staffs (RFS) mean is 0.555, meaning that employees below the level of professional team leader are the mainstay of labor force of the accounting firms. The employee average age (AGE) is between 26 year-old and 65 year-old, and the mean is 38 year-old, indicating that the labor force of the accounting firms is dominated by middle-aged staffs. The percentage of labor cost (LC) median and mean are 0.611 and 0.563 respectively, suggesting that labor cost is the most investment of cost for the accounting firms. Moreover, as the accounting firms provide "product" of professional knowledge and service, human capital cost is relatively higher as compared to other costs and expenses.

In the process capital dimension, the percentage of management cost (MAC) median is 0.065 and mean is 0.074. Although they are lower than percentage of labor cost (LC), the maximum is 0.816, indicating that the accounting firms invest significant management costs. The accounting firms' business age (BAG) median, mean and maximum are 14, 15 and 58 years respectively, indicating that nearly half of the accounting firms are established in recent 15 years. This finding is consistent with the survey result of most accounting firms believe that the market competition is intense.

In the innovation capital dimension, R&D intensity (RD) median and mean are 0.002 and 0.011 respectively, indicating that more than half of the accounting firms do not attach great importance to the investment in R&D innovation. The median of the adoption of e-commerce (EC) is 0.000, suggesting that more than half of the accounting firms do not use the electronic equipment for business operations. Moreover, its mean is 0.163, indicating that 16.3% accounting firms provide operating information, e-business transaction and other e-commerce operating behaviors.

In the customer capital dimension, the number of management consulting firms (MCF) median is 0.000, indicating that half of the accounting firms do not have management consulting firms. However, as the highest number is 4.000, it means that some accounting firms set up four management consulting firms. Although the marketing expense ratio (SEL) median is 0.041 and its mean is 0.042, it is inferred that most of the accounting firms do not invest too much in marketing. However, as the highest number is 0.616, it means that the accounting firms attach importance to marketing. The median of provision of services in China (CHA) is 0.000, indicating that more than half of the accounting firms focus on business in Taiwan. It is not a common practice for accounting firms in Taiwan to provide services in China. The median of accounting firm's specialty (SPEC) is 0.516 and mean is 0.556, indicating that the accounting firms concentrate on certain type of business.

Regarding the control variable, the operating assets (OPA) median and mean are 4,298,545 NTD and 17,722,403 NTD respectively, indicating that the operating assets of the accounting firms vary considerably by size.

4.2. Regression results analysis

4.2.1. Categorized by PBR and NPBR

As shown in Table 4, Model 1 uses PBR as the variable of operating performance. As seen, except for the percentage of employees of high educational level (HEDU) in human capital dimension, the employee average age (AGE), the percentage of main field staffs (RFS) and the percentage of labor cost (LC) have a significant impact on PBR. Hence, H1-1 is rejected, and H1-2, H1-3 and H1-4 are accepted.

Table 3
Descriptive statistics of variables.

Categories of variables	Variables	Median	Mean	Minimum	Maximum	Std. Dev.
Categorized by PBR and NPBR	PBR	4,309,897	26,269,720	1000	6,297,951,098	264,886,760
	NPBR	136	177,996	0	73,194,230	2,398,935
Categorized by major business items of the accounting firms	ABR	730,000	13,516,294	0	4,527,235,958	181,087,234
	TXR	2,283,493	8,570,744	0	1,025,368,831	53,879,122
	MCR	0	1,298,057	0	384,638,897	14,450,194
	OPR	360,000	2,884,624	0	516,785,903	23,786,381
Categorized by TAR and NTAR	TAR	2,588,900	19,152,541	0	4,661,732,183	200,790,160
	NTAR	1,375,587	7,295,175	0	1,753,835,021	66,381,940
Human capital	HEDU	0.700	0.668	0.000	1.000	0.280
	AGE	37	38	26	65	7
	RFS	0.615	0.555	0.000	1.000	0.258
	LC	0.611	0.563	0.000	1.000	0.216
Process capital	MAC	0.065	0.074	0.000	0.816	0.058
	BAG	14	15	1	58	9
Innovation capital	RD	0.002	0.011	0.000	1.000	0.035
	EC	0.000	0.163	0.000	1.000	0.369
Customer capital	MCF	0.000	0.118	0.000	4.000	0.372
	SEL	0.041	0.042	0.000	0.616	0.035
	CHA	0.000	0.035	0.000	1.000	0.184
	SPEC	0.516	0.556	0.255	1.000	0.183
Control variable	OPA	4,298,545	17,722,403	10,000	4,151,107,313	135,588,630

Notes: 1. Variables are defined in Table 2. 2. The number of samples is 2662.

Table 4
Impact of intellectual capital on PBR and NPBR.

Model 1: PBR = β_0 + β_1 HEDU + β_2 AGE + β_3 RFS + β_4 LC + β_5 MAC + β_6 BAG + β_7 RD + β_8 EC + β_9 MCF + β_{10} SEL + β_{11} CHA + β_{12} SPEC + β_{13} OPA + ε_1 (1)

Model 2: NPBR = β_0 + β_1 HEDU + β_2 AGE + β_3 RFS + β_4 LC + β_5 MAC + β_6 BAG + β_7 RD + β_8 EC + β_9 MCF + β_{10} SEL + β_{11} CHA + β_{12} SPEC + β_{13} OPA + ε_2 (2)

Intellectual capital	Variable	Predicted sign	Model 1: PBR			Model 2: NPBR		
			Coefficient	t value	p value (one-tailed)	Coefficient	t value	p value (one-tailed)
	Intercept		5.185	46.594	<0.000***	−0.389	−0.817	0.207
Human capital	HEDU	+	−0.003	−0.089	0.465	0.418	3.298	<0.000***
	AGE	?	−0.021	−14.933	<0.000***	−0.033	−5.409	<0.000***
	RFS	+	0.368	10.080	<0.000***	0.320	2.049	0.020**
	LC	+	0.341	7.275	<0.000***	0.475	2.371	0.009***
Process capital	MAC	+	−2.349	−6.354	<0.000***	0.175	0.111	0.456
	BAG	+	0.534	20.501	<0.000***	0.320	2.869	0.002***
Innovation capital	RD	+	0.016	0.024	0.491	−5.444	−1.913	0.028**
	EC	+	0.066	3.067	0.001***	−0.050	−0.539	0.295
Customer capital	MCF	+	0.494	6.147	<0.000***	1.908	5.557	<0.000***
	SEL	+	4.379	7.190	<0.000***	4.320	1.659	0.049**
	CHA	+	0.652	14.602	<0.000***	1.191	6.235	<0.000***
	SPEC	+	−0.530	−11.876	<0.000***	−1.216	−6.377	<0.000***
Control variable	OPA		0.233	19.986	<0.000***	0.477	9.566	<0.000***
	R^2		0.600			0.187		
	Adjusted R^2		0.598			0.183		
	F-statistic		306.012	<0.000***		46.961	<0.000***	

Notes: 1. Variables are defined in Table 2. 2. This paper uses Variance Inflation Factor (VIF) to test the variable collinearity. The VIF values of variables are below 2, indicating that there is no serious collinearity problem among the variables. 3. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. 4. The number of samples is 2662.

The employee average age (AGE) has a significant and negative impact on PBR, suggesting that older average age means poorer PBR of the accounting firms. The percentage of main field staffs (RFS) has a significant and positive impact on PBR, suggesting that more field staffs can result in better PBR of the accounting firms. In practice, most of the accounting firm employees are field staffs of young and middle age, and the employees of that age group can improve the working efficiency of the accounting firms. Moreover, the work content and audit inspection by field staffs are closely related. Therefore, field staffs are indispensable to the accounting firms. If more young and middle-aged field staffs can be hired, the burden of field staffs of the accounting firms can be shared to improve audit quality and efficiency. The percentage of labor cost (LC) has a significant and positive impact on PBR. The accounting industry is a labor and professionalism intensive industry. The "sales costs" generated by the "products" are relevant costs

including salaries. Hence, in the cost structure of the accounting firms, more labor costs input can result in better operating performance of the firms.

The percentage of management cost (MAC) in the dimension of process capital has a significant and negative impact on PBR, which is contrary to the expectation; hence, H2-1 is rejected. The accounting firms' business age (BAG) has a significant and positive impact on PBR; hence, H2-2 is accepted. This suggests that older accounting firms have better reputation among clients. The accounting firms can utilize the reputation and credibility to maintain existing clients and develop potential clients.

The R&D intensity (RD) in the innovation capital dimension has no significant impact on PBR, and thus H3-1 is rejected. The adoption of e-commerce (EC) has a significant and positive impact on PBR, and thus H3-2 is accepted. The accounting firms' e-commerce activities include providing business information and e-

transaction services. Although most of the accounting firms have electronic equipment, only about 16.3% accounting firms have e-commerce activities. This suggests that e-commerce can make the accounting work more efficient, and provide real-time professional information to clients, thus enhancing their satisfaction and PBR.

The number of management consulting firms (MCF) in the dimension of customer capital has a significant and positive impact on PBR, and thus H4-1 is accepted. For the accounting firms establishing management consulting firms, they may refer client to the management consulting firms, while the management consulting firms can also refer clients to the accounting firms. Therefore, through mutual referrals, the accounting firms and management consulting firms can increase the revenues. The marketing expense ratio (SEL) has a significant and positive impact on PBR, and thus H4-2 is accepted. In addition to providing the premium professional service to the clients, the accounting firms should also promote image in sales and marketing, in order to strengthen the reputation among existing clients and attract potential clients. The good business relationship with existing and potential clients can enhance the firms' operating performance. The provision of services in China (CHA) has a significant and positive impact on PBR, and thus H4-3 is accepted. Although it is not a common practice for accounting firms in Taiwan to provide services in China, the firms in Taiwan have more experiences in accounting and auditing, and can provide guidance to the accounting industry in China. This can help increase the revenue of the accounting firms as well. The accounting firms' specialty (SPEC) has a significant and negative impact on PBR, and thus H4-4 is rejected. This is not as expected, possibly because as the accounting industry becomes saturated, the focus on specific industries may not be able to satisfy the needs of the clients. This result is consistent with the finding that the accounting firms with management consulting firms have better operating performance. Hence, in a highly competitive market, the accounting firms should broad the service scope to satisfy clients' diverse needs and gain more revenue sources.

The control variable of operating assets (OPA) has a significant and positive impact on PBR. In practice, besides the number of employees, operating assets also represent the size of the accounting firms. Larger accounting firms can have richer sources as compared to smaller accounting firms, and thus they can better and more effectively attract clients.

As shown in Table 4, Model 2 uses NPBR as the variable of operating performance, in the human capital dimension, except that the employee average age (AGE) has a significant and negative impact on NPBR, the percentage of employees of high educational level (HEDU), the percentage of main field staffs (RFS) and the percentage of labor cost (LC) have a significant and positive impact on NPBR. Thus, H1-1, H1-2, H1-3 and H1-4 are accepted. In other words, if the number of employees with a college degree or above, the percentage of field staffs and the labor cost increase, the NPBR of the accounting firm also increase. However, if the employee average age is relatively high, the NPBR of the accounting firm is poorer. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on NPBR, and thus H2-1 is rejected. The accounting firms' business age (BAG) has a significant and positive impact on NPBR, and thus H2-2 is accepted. In other words, when the age of the accounting firm is older and the reputation is better, the clients are more like to trust the professional competence. In the dimension of innovation capital, the R&D intensity (RD) has a significant and negative impact on NPBR, and thus H3-1 is rejected. The adoption of e-commerce (EC) has no significant impact on NPBR, and thus H3-2 is rejected. As e-commerce is mainly adopted for business activities, and is rarely applied in non-performing business, it does not have a significant impact on NPBR. In the customer capital dimension, the number of

management consulting firms (MCF), the marketing expense ratio (SEL) and provision of services in China (CHA) have a significant and positive impact on NPBR, and thus H4-1, H4-2, H4-3 are accepted. This suggests that the establishment of management consulting firms, appropriate promotion and marketing of the accounting firms, and the exploration of the Chinese market can strengthen clients' impression, share the sources of clients, and increase the revenue, thereby positively contributing to NPBR of the accounting firms. The accounting firms' specialty (SPEC) has a significant and negative impact on NPBR, and thus H4-4 is rejected. The control variable of operating assets (OPA) has a significant and positive impact on NPBR. By utilizing resources, the investment in operating assets can help the accounting firms to improve the operating performance.

4.2.2. Categorized by major business items of the accounting firms

As shown in Table 5, Model 3 uses ABR as the variable of operating performance, the percentage of employees of high educational level (HEDU) in the human capital dimension has no significant impact on ABR, and thus H1-1 is rejected. The employee average age (AGE) and ABR have a significant and negative relationship, and thus H1-2 is accepted. The percentage of main field staffs (RFS) has a significant and positive impact on ABR, and thus H1-3 is accepted. The percentage of labor cost (LC) has a significant and negative impact on ABR, and thus H1-4 is rejected. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on ABR, and thus H2-1 is rejected. The business age of the accounting firm (BAG) has a significant and positive impact on ABR, and thus H2-2 is accepted. In the dimension of innovation capital, the R&D intensity (RD) and the adoption of e-commerce (EC) have no significant impact on ABR, and thus H3-1 and H3-2 are rejected. In the customer capital dimension, the number of management consulting firms (MCF) and the marketing expense ratio (SEL) have no significant impact on ABR, and thus H4-1 and H4-2 are rejected. Provision of services in China (CHA) has a significant and positive impact on ABR, and thus H4-3 is accepted. The accounting firms' specialty (SPEC) has a significant and negative impact on ABR, and thus H4-4 is rejected. The control variable of operating assets (OPA) has a significant and positive impact on ABR.

As shown in Table 5, Model 4 uses TXR as the variable of operating performance. In the human capital dimension, the percentage of employees of high educational level (HEDU) has a significant and negative impact on TXR, and thus H1-1 is rejected. The employee average age (AGE) has a significant and negative impact on TXR, and thus H1-2 is accepted. The percentage of main field staffs (RFS) and the percentage of labor cost (LC) have a significant and positive impact on TXR, and thus H1-3 and H1-4 are accepted. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on TXR, and thus H2-1 is rejected. The business age of the accounting firm (BAG) has a significant and positive impact on TXR, and thus H2-2 is accepted. In the innovation capital dimension, the R&D intensity (RD) has no significant impact on TXR, and thus H3-1 is rejected. The adoption of e-commerce (EC) has a significant and negative impact on TXR, and thus, H3-2 is rejected. In the customer capital dimension, the number of management consulting firms (MCF), the marketing expense ratio (SEL) and provision of services in China (CHA) have a significant and positive impact on TXR, and thus H4-1, H4-2 and H4-3 are accepted. The accounting firms' specialty (SPEC) has a significant and negative impact on TXR, and thus H4-4 is rejected. The control variable of operating assets (OPA) has a significant and positive impact on TXR.

As shown in Table 6, Model 5 uses MCR as the variable of operating performance. In the human capital dimension, the

Table 5
Impact of intellectual capital on ABR and TXR.

Model 3: $ABR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_3$ (3)
Model 4: $TXR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_4$ (4)

Intellectual capital	Variable	Predicted sign	Model 3: ABR			Model 4: TXR		
			Coefficient	t value	p value (one-tailed)	Coefficient	t value	p value (one-tailed)
	Intercept		5.469	12.947	<0.000***	5.192	14.740	<0.000***
Human capital	HEDU	+	−0.050	−0.442	0.329	−0.291	−3.105	0.001***
	AGE	?	−0.016	−3.027	0.001***	−0.042	−9.350	<0.000***
	RFS	+	1.044	7.529	<0.000***	0.449	3.887	<0.000***
	LC	+	−0.301	−1.692	0.045**	0.823	5.545	<0.000***
Process capital	MAC	+	−0.169	−0.121	0.452	−1.211	−1.034	0.151
	BAG	+	0.770	7.782	<0.000***	0.758	9.181	<0.000***
Innovation capital	RD	+	−0.434	−0.172	0.432	−0.386	−0.183	0.427
	EC	+	−0.003	−0.035	0.486	−0.090	−1.310	0.095*
Customer capital	MCF	+	−0.187	−0.614	0.270	0.697	2.741	0.003***
	SEL	+	1.556	0.673	0.251	12.485	6.476	<0.000***
	CHA	+	0.814	4.802	<0.000***	0.257	1.817	0.035**
	SPEC	+	−5.605	−33.101	<0.000***	−2.181	−15.443	<0.000***
Control variable	OPA		0.355	8.022	<0.000***	0.329	8.910	<0.000***
	R^2		0.433			0.316		
	Adjusted R^2		0.431			0.312		
	F-statistic		155.959		<0.000***	94.058		<0.000***

Note: The detailed explanations of footnotes are the same with those of Table 4.

percentage of employees of high educational level (HEDU) has a significant and positive impact on MCR, and thus H1-1 is accepted. The employee average age (AGE) has no significant impact on MCR, and thus H1-2 is rejected. The percentage of main field staffs (RFS) has a significant and negative impact on MCR, and thus H1-3 is rejected. The percentage of labor cost (LC) has no significant impact on MCR, and thus H1-4 is rejected. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on MCR, and thus H2-1 is rejected. The business age of the accounting firm (BAG) has a significant and positive impact on MCR, and thus H2-2 is accepted. In the innovation capital dimension, the R&D intensity (RD) and the adoption of e-commerce (EC) have no significant impact on MCR, and thus H3-1 and H3-2 are rejected. In the customer capital dimension, the number of management consulting firms (MCF) and the marketing expense ratio (SEL) have no significant impact on MCR, and thus H4-1 and H4-2 are rejected. The number of management consulting firms has a

positive relationship with MCR without any significant impact. The possible reason may be the non-audit services provided by the accounting firms for audit clients to keep audit quality and the principle of independence (such as providing management consulting service). In this case, it needs to evaluate the impact on independence. If the impact is serious, the accounting firms should reject the commission for the audit cases. Accordingly, for the maintenance of audit quality, when the audit clients need management consulting services, the accounting firms may refer the clients to the management consulting firms, thus, no significant positive benefits to MCR of the accounting firms will be resulted as the revenues of such services will be earned by the management consulting firms. Another possible reason may be the strategic alliance formed between the management consulting firms and the accounting firms (Chen & Lee, 2006). This is a type of diversified business strategy as the management consulting services are provided by the independent management consulting firms. In this

Table 6
Impact of intellectual capital on MCR and OPR.

Model 5: $MCR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_5$ (5)
Model 6: $OPR = \beta_0 + \beta_1 HEDU + \beta_2 AGE + \beta_3 RFS + \beta_4 LC + \beta_5 MAC + \beta_6 BAG + \beta_7 RD + \beta_8 EC + \beta_9 MCF + \beta_{10} SEL + \beta_{11} CHA + \beta_{12} SPEC + \beta_{13} OPA + \varepsilon_6$ (6)

Intellectual capital	Variable	Predicted sign	Model 5: MCR			Model 6: OPR		
			Coefficient	t value	p value (one-tailed)	Coefficient	t value	p value (one-tailed)
	Intercept		0.135	0.201	0.421	7.444	16.832	<0.000***
Human capital	HEDU	+	0.491	2.748	0.003***	−0.296	−2.516	0.006***
	AGE	?	0.001	0.122	0.451	−0.062	−10.848	<0.000***
	RFS	+	−0.476	−2.160	0.015**	0.235	1.618	0.053*
	LC	+	0.273	0.966	0.167	0.266	1.428	0.077*
Process capital	MAC	+	−1.526	−0.684	0.247	−1.524	−1.037	0.150
	BAG	+	1.216	7.734	<0.000***	0.360	3.478	<0.000***
Innovation capital	RD	+	0.396	0.099	0.461	−4.702	−1.778	0.038**
	EC	+	0.036	0.277	0.391	0.341	3.968	<0.000***
Customer capital	MCF	+	0.290	0.598	0.275	0.796	2.494	0.006***
	SEL	+	−0.749	−0.204	0.419	0.130	0.054	0.479
	CHA	+	1.519	5.639	<0.000***	0.485	2.734	0.003***
	SPEC	+	−4.899	−18.209	<0.000***	−4.203	−23.710	<0.000***
Control variable	OPA		0.471	6.700	<0.000***	0.274	5.919	<0.000***
	R^2		0.217			0.325		
	Adjusted R^2		0.213			0.322		
	F-statistic		56.417		<0.000***	98.286		<0.000***

Note: The detailed explanations of footnotes are the same with those of Table 4.

way, the clients can receive high quality professional consulting service, while the accounting firms can focus on the audit-related services. Accordingly, based on the above two possible reasons, this paper infers that they are the reasons of failing to bring significant benefits to MCR of the accounting firms. Provision of services in China (CHA) has a significant and positive impact on MCR, and thus H4-3 is accepted. The accounting firms' specialty (SPEC) has a significant and negative impact on MCR, and thus H4-4 is rejected. The control variable of operating assets (OPA) has a significant and positive impact on MCR.

As shown in Table 6, Model 6 uses OPR as the variable of operating performance. In the human capital dimension, the percentage of employees of high educational level (HEDU) and the employee average age (AGE) have a significant and negative impact on OPR, and thus H1-1 is rejected and H1-2 is accepted. The percentage of main field staffs (RFS) and the percentage of labor cost (LC) have a significant and positive impact on OPR, and thus H1-3 and H1-4 are accepted. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on OPR, and thus H2-1 is rejected. The business age of the accounting firm (BAG) have a significant and positive impact on OPR, and thus H2-2 is accepted. In the dimension of innovation capital, the R&D intensity (RD) and OPR have a significant and negative relationship, and thus H3-1 is rejected. The adoption of e-commerce (EC) and OPR have a significant and positive relationship, and thus H3-2 is accepted. In the customer capital dimension, the number of management consulting firms (MCF) and OPR has a significant and positive relationship, and thus H4-1 is accepted. The marketing expense ratio (SEL) and OPR have no significant relationship, and thus H4-2 is rejected. Provision of services in China (CHA) and OPR have a significant and positive relationship, and thus H4-3 is accepted. The accounting firms' specialty (SPEC) and OPR have a significant and negative relationship, and thus H4-4 is rejected. The control variable of operating assets (OPA) and OPR have a significant and positive relationship.

4.2.3. Categorized by TAR and NTAR

As shown in Table 7, Model 7 uses TAR as the variable of operating performance. In the human capital dimension, the percentage of employees of high educational level (HEDU) and the employee average age (AGE) have a significant and negative relationship with TAR, and thus H1-1 is rejected and H1-2 is accepted. The percentage of main field staffs (RFS) and the percentage of labor cost (LC) have a significant and positive relationship with TAR, and thus H1-3 and H1-4 are accepted. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on TAR, and thus H2-1 is rejected. The business age of the accounting firm (BAG) and TAR have a significant and positive relationship, and thus H2-2 is accepted. In the innovation capital dimension, the R&D intensity (RD) and TAR have a significant and negative relationship, and thus H3-1 is rejected. The adoption of e-commerce (EC) has no significant relationship with TAR, and thus H3-2 is rejected. In the customer capital dimension, the number of management consulting firms (MCF), the marketing expense ratio (SEL) and provision of services in China (CHA) have a significant and positive relationship with TAR, and H4-1, H4-2 and H4-3 are accepted. The accounting firms' specialty (SPEC) has a significant and negative relationship with TAR, and H4-4 is rejected. The control variable of operating assets (OPA) has a significant and positive relationship with TAR.

As shown in Table 7, Model 8 uses NTAR as the variable of operating performance. In the human capital dimension, the percentage of employees of high educational level (HEDU) and the employee average age (AGE) have a significant and negative relationship with NTAR, and thus H1-1 is rejected and H1-2 is accepted. The percentage of main field staffs (RFS) and the percentage of labor cost (LC) have a significant and positive relationship with NTAR, and thus H1-3 and H1-4 are accepted. In the process capital dimension, the percentage of management cost (MAC) has no significant impact on NTAR, and thus H2-1 is rejected. The business age of the accounting firm (BAG) has a significant and positive relationship with NTAR, and thus H2-2 is accepted. In the innovation capital dimension, the R&D intensity (RD) has no significant impact on NTAR, and thus H3-1 is rejected. The adoption of e-commerce (EC) and NTAR have a significant and positive relationship, and thus H3-2 is accepted. In the customer capital dimension, the number of management consulting firms (MCF) and NTAR have a significant and positive relationship, and thus H4-1 is accepted. The marketing expense ratio (SEL) and NTAR have no significant relationship, and thus H4-2 is rejected. Provision of services in China (CHA) and NTAR have a significant and positive relationship, and thus H4-3 is accepted. The accounting firms' specialty (SPEC)

Table 7
Impact of intellectual capital on TAR and NTAR.

Model 7: TAR $= \beta_0 + \beta_1$ HEDU $+ \beta_2$ AGE $+ \beta_3$ RFS $+ \beta_4$ LC $+ \beta_5$ MAC $+ \beta_6$ BAG $+ \beta_7$ RD $+ \beta_8$ EC $+ \beta_9$ MCF $+ \beta_{10}$ SEL $+ \beta_{11}$ CHA $+ \beta_{12}$ SPEC $+ \beta_{13}$ OPA $+ \varepsilon_7$ (7)
Model 8: NTAR $= \beta_0 + \beta_1$ HEDU $+ \beta_2$ AGE $+ \beta_3$ RFS $+ \beta_4$ LC $+ \beta_5$ MAC $+ \beta_6$ BAG $+ \beta_7$ RD $+ \beta_8$ EC $+ \beta_9$ MCF $+ \beta_{10}$ SEL $+ \beta_{11}$ CHA $+ \beta_{12}$ SPEC $+ \beta_{13}$ OPA $+ \varepsilon_8$ (8)

Intellectual capital	Variable	Predicted sign	Model 7: TAR			Model 8: NTAR		
			Coefficient	t value	p value (one-tailed)	Coefficient	t value	p value (one-tailed)
	Intercept		5.471	16.880	<0.000***	5.683	16.428	<0.000***
Human capital	HEDU	+	−0.177	−2.049	0.020**	−0.169	−1.831	0.034**
	AGE	?	−0.032	−7.654	<0.000***	−0.047	−10.533	<0.000***
	RFS	+	0.684	6.426	<0.000***	0.357	3.148	0.001***
	LC	+	0.330	2.419	0.008***	0.216	1.484	0.069*
Process capital	MAC	+	−1.329	−1.234	0.109	−0.418	−0.363	0.358
	BAG	+	1.031	13.585	<0.000***	0.426	5.254	<0.000***
Innovation capital	RD	+	−4.658	−2.404	0.008***	−0.869	−0.420	0.337
	EC	+	−0.045	−0.710	0.239	0.265	3.940	<0.000***
Customer capital	MCF	+	0.534	2.283	0.011**	0.769	3.080	0.001***
	SEL	+	9.817	5.536	<0.000***	2.002	1.057	0.145
	CHA	+	0.553	4.248	<0.000***	0.490	3.526	<0.000***
	SPEC	+	−2.731	−21.021	<0.000***	−1.794	−12.938	<0.000***
Control variable	OPA		0.260	7.675	<0.000***	0.326	8.990	<0.000***
	R^2			0.391			0.260	
	Adjusted R^2			0.388			0.257	
	F-statistic			130.957	<0.000***		71.665	<0.000***

Note: The detailed explanations of footnotes are the same with those of Table 4.

has a significant and negative impact on NTAR, and thus H4-4 is rejected. The control variable of operating assets (OPA) has a significant and positive relationship with NTAR.

4.3. Regression results summary and analysis and managerial implications

Table 8 is the summary of regression model results. The ranking of the models of explanatory power of the independent variables against dependent variables is Model 1 (the impact of the variable of the intellectual capital's four dimensions on PBR), Model 3 (the impact of the variable of the intellectual capital's four dimensions on ABR) and Model 7 (the impact of the variable of the intellectual capital's four dimensions on TAR), R^2 is 0.600, 0.433 and 0.391, the adjusted R^2 is 0.598, 0.431 and 0.388.

In summary of the eight models' regression results, in the human capital dimension, the percentage of employees of high educational level (HEDU) cannot effectively create more revenue for the accounting firms. Although the educational level of the employee reflects the professional competence, it is only a qualification for employment because practical experience is also important and is acquired outside of schools. If employees with lower level of education can be assisted by senior employees or gain practical experience over time, the operating performance of the accounting firms can also be improved. The employee average age (AGE) has no significant relationship with MCR and has a significant and negative relationship with rest dependent variables. This suggests that the accounting firms with older employees have higher revenues. The recruitment of young employees can improve work efficiency and reduce the operating costs of the accounting firms. The percentage of main field staffs (RFS) has a positive and significant impact on most dependent variables and has a significant and negative impact on MCR. The field staffs as the major force of the accounting firms are indispensable employees, and most of the auditing and judgment are done by field staffs. If the accounting firms can increase the percentage of field staffs, they can effectively distribute the work loads to improve work efficiency and service

quality, thus improving the operating performance. The percentage of labor cost (LC) has no significant impact on MCR and has a significant and positive impact on most dependent variables. Therefore, if the accounting firms increase the investment of labor costs, it can increase the incentives to the employees and enhance the quality of work, thereby improving the operating performance of the accounting firms.

In the process capital dimension, the percentage of management cost (MAC) has a significant and negative impact on PBR, and has no significant impact on other dependent variables. Obviously, it does not contribute to the revenue. As the management costs of the accounting firms generally include insurance fee, taxation, bad debt loss and amortization that cannot be directly controlled by the firms, the firms should consider changing the management cost structure to bring positive benefits to the revenue. The business age of the accounting firm (BAG) has a positive relationship with all dependent variables, indicating that older accounting firms can better professional competence to the clients and attract more potential clients upon referral by existing clients. Hence, the older accounting firm's business age is, the better operating performance of the accounting firm is.

In the innovation capital dimension, the R&D intensity (RD) has a significant and negative impact on NPBR, OPR and TAR, and has no significant impact on other dependent variables. Compared to other industries, such as the high-tech industry, in which the investment in R&D directly contributes to the revenue, the R&D investment of the accounting firms is reflected by professional competence, hence, the R&D investment of the accounting industry should be adjusted to make it a key factor. Although the adoption of e-commerce (EC) has a significant and positive impact on PBR, OPR and NTAR, as PBR is the major source of revenue of the accounting firms, the adoption of e-commerce can help the accounting firms improve the work efficiency and reduce the cost of maintaining clients to effectively improve the operating performance.

In the customer capital dimension, the number of management consulting firms (MCF) has a positive and significant impact on PBR, NPBR, TXR, OPR, TAR and NTAR. An accounting firm cannot satisfy

Table 8
Summary of regression model results.

Intellectual capital	Independent variables	Predicted sign	Hypotheses	Model1 PBR	Model2 NPBR	Model3 ABR	Model4 TXR	Model5 MCR	Model6 OPR	Model7 TAR	Model8 NTAR
Human capital	HEDU	+	H1-1	rejected (-)	accepted (+) ***	rejected (-)	rejected (-) ***	accepted (+) ***	rejected (-) ***	rejected (-) **	rejected (-) **
	AGE	?	H1-2	accepted (-) ***	accepted (-) ***	accepted (-) ***	accepted (-) ***	rejected (+)	accepted (-) ***	accepted (-) ***	accepted (-) ***
	RFS	+	H1-3	accepted (+) ***	accepted (+) **	accepted (+) ***	accepted (+) ***	rejected (-) **	accepted (+) *	accepted (+) ***	accepted (+) ***
	LC	+	H1-4	accepted (+) ***	accepted (+) ***	rejected (-) **	accepted (+) ***	rejected (+)	accepted (+) *	accepted (+) ***	accepted (+) *
Process capital	MAC	+	H2-1	rejected (-) ***	rejected (+)	rejected (-)	rejected (-)	rejected (-)	rejected (-)	rejected (-)	rejected (-)
	BAG	+	H2-2	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) ***
Innovation capital	RD	+	H3-1	rejected (+)	rejected (-) **	rejected (-)	rejected (-)	rejected (+)	rejected (-) **	rejected (-) ***	rejected (-)
	EC	+	H3-2	accepted (+) ***	rejected (-)	rejected (-)	rejected (-) *	rejected (+)	accepted (+) ***	rejected (-)	accepted (+) ***
Customer capital	MCF	+	H4-1	accepted (+) ***	accepted (+) ***	rejected (-)	accepted (+) ***	rejected (+)	accepted (+) ***	accepted (+) **	accepted (+) ***
	SEL	+	H4-2	accepted (+) ***	accepted (+) **	rejected (+)	accepted (+) ***	rejected (-)	rejected (+)	accepted (+) ***	rejected (+)
	CHA	+	H4-3	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) **	accepted (+) ***	accepted (+) ***	accepted (+) ***	accepted (+) ***
	SPEC	+	H4-4	rejected (-) ***	rejected (-) ***	rejected (-) ***	rejected (-) ***	rejected (-) ***	rejected (-) ***	rejected (-) ***	rejected (-) ***

Notes: 1. Variables are defined in Table 2. 2. "accepted" denotes the hypothesis is accepted, "rejected" denotes the hypothesis is rejected. 3. (−) denotes a negative relationship, (+) denotes a positive relationship. 4. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. 5. The number of samples is 2662.

all needs of the clients; hence, by establishing management consulting firms, they can refer their clients to the management consulting firms, or vice versa. Hence, based on the benefits of exchanging clients between the accounting firms and management consulting firms, the establishment of management consulting firms can effectively improve the operating performance of the accounting firms. The marketing expense ratio (SEL) has a significant and positive impact on PBR, NPBR, TXR and TAR. In addition to the professional competence, the accounting firms need to appropriately promote themselves to strengthen the clients' impression about the accounting firms. Such advertising benefits can improve the operating performance of the accounting firms. In the customer capital dimension, it is noteworthy that provision of services in China (CHA) has a significant and positive impact on all the dependent variables, the main reason is because the market in Taiwan has become saturated. If the firms can invest in the emerging market of Asia, including China, they can effectively increase the revenue. Moreover, the accounting industry of China is developing, and accounting firms established in China can attract international attention and explore new market to bring positive benefits. Cheng et al. (2000) find that the accounting firm specialty has a significant and positive impact on the operating performance of the firms. The findings of this paper are different from the previous literature. The main reason is that the accounting industry has evolved, and specialization in specific industries fails to satisfy all the needs of the clients, thus affecting the operating performance of the firms. Hence, under the current market environment, the accounting firms should develop diverse services to provide audit, accounting and taxation services for different categories of clients, and improve the operating performance of the accounting firms.

5. Conclusions and suggestions

This paper explores how accounting firms can use the four dimensions of the intellectual capital theory to effectively attract clients and achieve sustainable operation in the competitive market. According to the regression results, the independent variables, including the percentage of main field staffs, the percentage of labor cost, the business age of the accounting firm, the number of management consulting firms, the marketing expense ratio and provision of services in China have a significant and positive impact on most dependent variables. Independent variables have a negative relationship with most dependent variables include the percentage of employees of high educational level, the employee average age, the R&D intensity and the accounting firms' specialty. Based on the above research findings, in the four dimensions of intellectual capital, this paper provides the following practical implications.

In the human capital dimension: (1) the accounting firms should set the qualification of college degree or above for new employees; observe the working attitude, personality and other aspects of the candidates; strengthen the work experience of the employees; and hire more young employees to enhance the operating efficiency; (2) the accounting firms should increase the percentage of main field staffs, though the main labor force of the accounting firms is the professional team leader and assistants, in order to improve work efficiency and increase the business revenue; (3) the accounting firms should increase the percentage of labor cost, in order to enhance the morale of employees, improve work efficiency, and reduce other operating costs of the firms.

In the process capital dimension: (1) the accounting firms should attach great importance to the control of management cost (e.g., insurance fee, taxation, bad debt loss and amortization), and change the management cost structure to improve the operating

performance; (2) the accounting firms can retain existing clients and explore potential clients by the "business brand", in order to bring stable revenue, create new revenue sources, and improve operating performance.

In the innovation capital dimension: (1) as the accounting firms provides services, instead of products, the investment and development costs on providing accounting, auditing, taxation and other related professional knowledge to the employees, the R&D costs have the characteristics of "timeliness" (meaning the provision of professional knowledge for the coming work content) and "deferred effect" (meaning the inability of reflecting the current investment in R&D costs in the current operating performance but can be reflected in the following stage or future operating performance); hence, the accounting firms should invest the R&D costs in the development and segmentation of the clients, establish knowledge databases for intellectual capital (e.g., accounting, auditing, taxation, management consulting) as a learning platform for new employees, customize the professional services for clients of different industries, in order to allow the R&D costs improving the operating performance; (2) the accounting firms should utilize their electronic devices and equipment for business operation or trading, in order to provide more efficient services and more diversified trading channels to enhance work efficiency, reduce error rates, and effectively improve operating performance.

In the customer capital dimension: (1) the accounting firms should establish management consulting firms for mutual client referrals, thus improving the operating performance; (2) the accounting firms may promote their services and attract potential clients through school lectures, while the students can also gain practical knowledge; (3) the accounting firms should consider expanding the services to the Chinese market, thus acquiring more sources of revenue; (4) the accounting firms should diversify the service scope to satisfy all needs of the clients, thereby improving the operating performance.

Compared to existing literature, the main differences and contributions of this paper are as follows.

1) This paper samples secondary data from a government census survey on the operational performances of all accounting firms in Taiwan. The nature of such data is unique, unbiased and objective, and different from data obtained from questionnaires, which denote a traditional approach.
2) The majority of studies on intellectual capital classify it into three categories: human capital, structural capital, and relational capital. However, this paper refers to Wang and Chang (2004) and Shih and Tsai (2014) by dividing intellectual capital into four segments: human capital, process capital, innovation capital, and customer capital. This is done by dividing structural capital into two constructs: process capital and innovation capital. Relational capital also contains customer capital. In sum, this paper adopts a refined classification and leverages the uniqueness of the secondary data in order to conduct an analysis on the basis of different data attributes and different categories of intellectual capital.
3) Few studies on the auditing industry examine issues relating to intellectual capital. The research findings of this paper can fill in the gap in academic research and provide a template for the management of accounting firms.
4) This paper applies a total of eight operating indicators (in contrast with a single indicator in most reports) to evaluate the operating performance of the audit industry. It is hoped that the research findings produced by this paper on the basis of multiple indicators can robustly, objectively, and comprehensively present the overall operations of accounting firms. These are the characteristics and contributions of this paper.

It is suggested that further studies may apply statistical techniques such as factor analysis or principal component analysis to extract key factors and consolidate the number of variables. This will facilitate an in-depth analysis on the impact of the interactions between different intellectual capital constructs on operating performances and the validation of whether moderating effects between factors exist. It is further suggested that the verification of a non-linear relationship between independent variables and accounting firms' operating performance be taken into account. Future studies may place emphasis on similar tests so that the design development and empirical findings will be more robust and closer to industry practice.

It is worth mentioning that, in order to preserve the confidentiality of operating data of the accounting firms surveyed and to avoid potential troubles for the accounting firms, the Financial Supervisory Commission codes all the firm names into numbers, and these numbers are adjusted each year for the report. In other words, an observation with the same code number in 2007, 2008, and 2009 signifies different companies in each year. As all the firms get new codes every year, it is not possible to analyze the time-series effects. This is a research limitation. If it is possible to confirm the names of specific firms, then it is suggested that follow-up studies can conduct time-series analyses, so as to produce robust and comprehensive research methods, structures, and analytical findings.

References

Abdulsalam, F., Al-Qaheri, H., & Al-Khayyat, R. (2011). The intellectual capital performance of Kuwaiti banks: An application of VAIC™[1] model. iBusiness, 3(1), 88–96.

Abeysekera, I. (2011). The relation of intellectual capital disclosure strategies and market value in two political settings. Journal of Intellectual Capital, 12(2), 319–338.

Ahangar, R. G. (2011). The relationship between intellectual capital and financial performance: An empirical investigation in an Iranian company. African Journal of Business Management, 5(1), 88–95.

Alipour, M. (2012). The effect of intellectual capital on firm performance: An investigation of Iran insurance companies. Measuring Business Excellence, 16(1), 53–66.

Berry, C. H. (1971). Corporate growth and diversification. The Journal of Law and Economics, 14(2), 371–383.

Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. Management Decision, 36(2), 63–76.

Chang, W. S., & Hsieh, J. J. (2011). Intellectual capital and value creation-is innovation capital a missing link? International Journal of Business and Management, 6(2), 3–12.

Chaston, I., Badger, B., Mangles, T., & Sadler-Smith, E. (2001). The internet and e-commerce: An opportunity to examine organisational learning in progress in small manufacturing firms? International Small Business Journal, 19(2), 13–30.

Chaudhry, A. A., Malik, M. I., & Ahmad, I. (2011). Examining the relationship of work-life conflict and employee performance (a case from NADRA Pakistan). International Journal of Business and Management, 6(10), 170–177.

Chen, Y. S., Chen, S. P., & Goan, K. T. (2010). Association between education level of partners and performance of CPA firms. Journal of Commercial Modernization, 5(4), 203–222.

Chen, Y. S., Goan, K. T., & Chen, S. P. (2011). Training and audit firms financial performance: Consideration of strategy and market segment. Journal of Human Resource Management, 11(4), 23–46.

Cheng, T. W., Wang, K. L., & Weng, C. C. (2000). A study of technical efficiencies of CPA firms in Taiwan. Review of Pacific Basin Financial Markets and Policies, 3(1), 27–44.

Chen, Y. S., Hsu, J., Huang, M. T., & Yang, P. S. (2013). Quality, size, and performance of audit firms. The International Journal of Business and Finance Research, 7(5), 89–105.

Chen, Y. S., Huang, M. T., & Hsu, J. C. S. (2011). Determinants of operating performance for Taiwanese audit firms under market segment. Soochow Journal of Accounting, 4(1), 51–94.

Chen, Y. S., & Lee, C. C. (2006). Performance of strategic alliances between business consulting and accounting firms: A resource-based perspective. Journal of Management & Systems, 13(4), 499–522.

Chen, Y. S., Lin, C. L., & Fu, C. J. (2008). Audit fee deregulation, market share, and financial performance-evidences from partnership public accounting firms. Commerce & Management Quarterly, 9(2), 169–196.

Chuang, C. H., Lin, F. L., Shen, M. J., & Lee, Y. J. (2011). Employee stock bonus and firm performance: A perspective of intellectual capital. Journal of Management & Systems, 18(2), 207–237.

Chu, S. K. W., Chan, K. H., & Wu, W. W. Y. (2011). Charting intellectual capital performance of the gateway to China. Journal of Intellectual Capital, 12(2), 249–276.

Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. Journal of Intellectual Capital, 12(4), 505–530.

Close, A. G., Finney, R. Z., Lacey, R. Z., & Sneath, J. Z. (2006). Engaging the consumer through event marketing: Linking attendees with the sponsor, community, and brand. Journal of Advertising Research, 46(4), 420–433.

Daud, S., & Yusoff, W. F. W. (2011). How intellectual capital mediates the relationship between knowledge management processes and organizational performance? African Journal of Business Management, 5(7), 2607–2617.

Deaconu, A. (2011). An econometric analysis of the operating profit of Romanian companies. Accounting and Management Information Systems, 10(4), 535–546.

Edvinsson, L. (1997). Developing intellectual capital at Skandia. Long Range Planning, 30(3), 366–373.

Edvinsson, L., & Malone, M. S. (1997). Intellectual capital: Realizing your company's true value by finding its hidden brainpower. New York, NY: U.S.A., HarperBusiness Publisher.

Edvinsson, L., & Malone, M. (1999). Le capital immate'riel de l'entreprise: Identification, measure, management (Immaterial Capital of the Enterprise: Identification, Measure, Management). Paris: Éditions Maxima.

Edvinsson, L., & Sullivan, P. (1996). Developing a model for managing intellectual capital. European Management Journal, 14(4), 356–364.

Financial Supervisory Commission. (2011). Public accounting firms service investigation report in 2010. November, 1–73, Taiwan.

Gallego, I., & Rodríguez, L. (2005). Situation of intangible assets in Spanish firms: An empirical analysis. Journal of Intellectual Capital, 6(1), 105–120.

Gilaninia, S., & Matak, A. A. (2012). Examination of relationship between intellectual capital and the small business enterprises performance in Guilan province. Journal of Basic and Applied Scientific Research, 2(3), 2291–2297.

Grabowksi, H. G., & Mueller, D. C. (1978). Industrial research and development intangible capital stocks and firm profit rates. The Bell Journal of Economics, 9(2), 328–343.

Green, A., & Ryan, J. J. C. H. (2005). A framework of intangible valuation areas (FIVA): Aligning business strategy. Journal of Intellectual Capital, 6(1), 43–52.

Hirschman, A. O. (1964). The paternity of an index. The American Economic Review, 54(5), 761–762.

Hoegl, M., Weinkauf, K., & Gemuenden, H. G. (2004). Interteam coordination, project commitment, and teamwork in multiteam R&D projects: A longitudinal study. Organizational Science, 15(1), 38–55.

Hormiga, E., Batista-Canino, R. M., & Sánchez-Medina, A. (2011). The role of intellectual capital in the success of new ventures. International Entrepreneurship and Management Journal, 7(1), 71–92.

Huang, W. C., & Jhong, C. H. (2012). Construct intellectual capital performance model for a logistic industry. African Journal of Business Management, 6(9), 3207–3213.

Johnson, W. H. A. (1999). An integrative taxonomy of intellectual capital: Measuring the stock and flow of intellectual capital components in the firm. International Journal of Technology Management, 18(5–8), 562–575.

Joia, L. A. (2000). Measuring intangible corporate assets: Linking business strategy with intellectual capital. Journal of Intellectual Capital, 1(1), 68–84.

Kalakota, R., & Whinston, A. B. (1996). Frontiers of electronic commerce. Redwood City: U.S.A., Addison Wesley Longman Publishing Co., Inc.

Kalakota, R., & Whinston, A. B. (1997). Electronic commerce: A manager's guide. Indianapolis, IN: U.S.A., Addison-Wesley Professional Publishing Company, Inc.

Komnenic, B., & Pokrajčić, D. (2012). Intellectual capital and corporate performance of MNCs in Serbia. Journal of Intellectual Capital, 13(1), 106–119.

Kunze, F., Boehm, S. A., & Bruch, H. (2011). Age diversity, age discrimination climate and performance consequences - a cross organizational study. Journal of Organizational Behavior, 32(2), 264–290.

Lee, C. C. (2012). The causal correlations among market structure, conduct and performance of the CPA industry. The Service Industries Journal, 32(3), 431–450.

Lee, C. C. (2013). Business service market share, international operation strategy and performance. Baltic Journal of Management, 8(4), 463–485.

Lee, C. C. (2014). Performance evaluation of CPA firms in Taiwan from the perspective of industry-specific client groups. Service Business, 8(2), 267–293.

Lee, C. C., & Chen, T. H. (2016). Analysis on the relationship between strategic human capital allocation and operating performance. Organization and Management, 9(1), 39–88.

Macky, K., & Boxall, P. (2007). The relationship between 'high-performance work practices' and employee attitudes: An investigation of additive and interaction effects. The International Journal of Human Resource Management, 18(4), 537–567.

Mosavi, S. A., Nekoueizadeh, S., & Ghaedi, M. (2012). A study of relations between intellectual capital components, market value and finance performance. African Journal of Business Management, 6(4), 1396–1403.

Payne, A. (1995). Advances in relationship marketing. London, UK: Kogan Page.

Phusavat, K., Comepa, N., Sitko-Lutek, A., & Ooi, K. B. (2011). Interrelationships between intellectual capital and performance: Empirical examination. Industrial Management & Data Systems, 111(6), 810–829.

Roos, G., Bainbridge, A., & Jacobsen, K. (2001). Intellectual capital analysis as a strategic tool. Strategy & Leadership, 29(July-August), 21–26.

Sáenz, J., Aramburu, N., & Rivera, O. (2009). Knowledge sharing and innovation performance: A comparison between high-tech and low-tech companies. Journal of Intellectual Capital, 10(1), 22–36.

Sahoo, D., & Mishra, P. (2012). Operational diversification and stability of financial performance in Indian banking sector: A panel data investigation. *Research Journal of Finance and Accounting, 3*(3), 70—87.

Sharabati, A. A. A., Jawad, S. N., & Bontis, N. (2010). Intellectual capital and business performance in the pharmaceutical sector of Jordan. *Management Decision, 48*(1), 105—131.

Shih, T. C., & Tsai, S. F. (2014). An empirical study of the impact of intellectual capital on operating efficiency of group practice accounting firms in Taiwan. *Fu Jen Management Review, 21*(2), 55—84.

Singh, S., & Kansal, M. (2011). Voluntary disclosures of intellectual capital: An empirical analysis. *Journal of Intellectual Capital, 12*(2), 301—318.

St-Pierre, J., & Audet, J. (2011). Intangible assets and performance: Analysis on manufacturing SMEs. *Journal of Intellectual Capital, 12*(2), 202—223.

Sullivan, D. (1996). Measuring the degree of internationalization of a firm: A reply. *Journal of International Business Studies, 27*(1), 179—192.

Sundgren, S., & Svanström, T. (2013). Audit office size, audit quality and audit pricing: Evidence from small- and medium-sized enterprises. *Accounting and Business Research, 43*(1), 31—55.

Taliyang, S. M., Latif, R. A., & Mustafa, N. H. (2011). The determinants of intellectual capital disclosure among Malaysian listed companies. *International Journal of Management and Marketing Research, 4*(3), 25—33.

Thomas, D. E., & Eden, L. (2004). What is the shape of the multinationality-performance relationship? *Multinational Business Review, 12*(1), 89—110.

Victoria, B., Judit, P., & Nicoleta, P. D. (2011). Intellectual capital reporting and disclosure in the annual reports of Romanian manufacturing listed companies-methodology and discussion of results. *Annals of Faculty of Economics, 1*(2), 466—476.

Wang, W. Y., & Chang, C. F. (2004). The impacts of intellectual capital on performance: An empirical investigation of the Taiwan semiconductor industry. *The International Journal of Accounting Studies, 39*(July), 89—117.