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The impact of intangible assets on firms' sustainable growth and value with the role of intellectual capital in firms listed on the Tehran Stock Exchange

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Abstract

The present study seeks to examine how intangible assets affect firm value and sustainable growth with the role of intellectual capital in firms listed on the Tehran Stock Exchange. The present work is an applied piece of research in terms of research goals and descriptive research in terms of nature and methods. As this study analyzes the current state of indicators by collecting data from the past, it also falls into the category of descriptive and retrospective studies. To perform this study, four hypotheses were developed and 138 firms were sampled through systematic elimination over the seven years of 2015-2021. Data on research indicators were collected in Excel and analyzed in Eviews statistical software. The results of testing the hypotheses suggested that intangible assets affected sustainable growth and firm value directly and significantly. Moreover, intellectual capital was revealed to impact the relationship between intangible assets and sustainable growth as well as the relationship between intangible assets and firm value.

Keywords: Intangible Assets, Intellectual Capital, Sustainable Growth, Firm Value.

Introduction

The emergence of new consumer sectors and the liberation of financial markets coinciding with market globalization and the growth of vast economic regions have presented firms with growth opportunities. Efficient utilization of all assets including tangible and intangible is crucial to ensure business effectiveness and can yield a higher productivity rate. However, everything is different from a competitive point of view since only specific assets, i.e. assets with strategic significance for the firm, can provide a competitive advantage, especially over the long term. This end can be approached through the effective composition of tangible and intangible available resources. Many authors consider intangible resources as vital resources for sustainable competitive advantage that govern firms' financial performance and market (Tahat et al., 2018). Various frameworks such as supervision over

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intangible assets have been proposed to identify and measure intangible assets and their share in the firm's market value and performance. Conventional monetary methods used to value intangible assets include balanced scored card, market-to-book value, and Tobin's Q. The economic added value of a model is also widely used –despite being often criticized- and provides the firm with a clear tool for calculating the intellectual coefficient of added value. Nazari and Herremans (2007) extended the model to better measure the relationship between intellectual capital components and financial performance. Petty and Guthrie (2004) pointed out that intellectual capital contributes to generating the knowledge required to increase firm value and create competitive advantage Petty and Guthrie (2004). The emergence of the information community has led to a visible shift from tangible to intangible resources that are also referred to as intellectual capital by some authors. However, as Andreeva and Garanina (2016) suggested, many emerging economies are still highly dependent on natural or other tangible resources. Similarly, Lazonillo and Liss (2013) pointed out that traditional industries were more reliant on physical resources. Although there appears to be a general understanding of the primary intellectual-human, structural, and relational assets, opinions regarding what they entail and how they should be evaluated vary. Examples include intellectual property assets to specific forms of knowledge such as organizational culture (Petty and Guthrie, 2000), stakeholder relations (Johnson, 1999), or assets with or without associated property rights (Corrado et al., 2005). Corrado et al. (2005) investigated the changes in the sources of economic growth and classified them into the three main groups of innovative assets, computer information, and economic merits as reflected in firm expenditure on intangible assets. Authors have suggested that any actual decline in consumption to expand future revenue currents would count as an investment and one should thus not differentiate between tangible and intangible capital (Corrado et al., 2005). Over the recent decades, many studies have sought to discover how intangible assets affect firm performance. Many studies indicated that intangible assets have positive impacts on firm performance (Olarewaju & Msumi, 2021). Newer research has focused on how intangible assets and intellectual capital affect firm value and sustainable growth. Suchoran et al. (2019) discovered that investing in intangible assets by South African firms with poor economic outcomes would result in sustainable growth. There are also pieces of research with contradicting results for sectors such as banking in China, Columbia, and Turkey (Wang et al., 2021). One could thus suggest that there is yet to be a consensus in the literature over the impact of intangible assets on firm performance. The difficulties in this regard include the definition and measurement of the results from firm performance and intangible assets as well as how the literature examines revenue structure in transition economies such as former communist economies in central and eastern Europe with stronger institutional frameworks (e.g. supervisory or normative) that other economies lack. To exploit their intangible assets, firms need to grow

capabilities to translate them into better economic outcomes. Contradictory results in this regard may have stemmed from the complex nature of the relationship between intangible assets and performance, which envelops concepts from various academic disciplines. Therefore, the current literature is not adequately clear in terms of concept and methodology. Moreover, studies on this topic are found in diverse journals with various themes, which complicates the understanding of how the same theoretical concepts are translated into different contexts. Practical literature has yet to extensively investigate the influence of intangible resources of a firm on its growth opportunities and value although important steps have been taken in this direction. The current literature is constrained in terms of focus and is generally concerned with specific topics such as research and development, innovative activities, firm growth, and firm performance.

Problem statement

As previous research suggests, reported revenue by a firm can be affected by various policies to identify intangible assets. In a review of the literature on the intangibles, Canibano et al. (2000) demonstrated that current investments in intangible assets, specifically in research and development, were associated with better future performance. The growing gap between the book and market value of firms that have reduced the value of accounting information has shifted the attention of many researchers toward the invisible values eliminated from accounting statements. Lev (2001) demonstrated that about 80% of firms' market value was absent from their financial statements. Acknowledging the real value of intangible resources has become a place of focus from both financial and managerial viewpoints. The contemporary economy is heavily reliant on intangible assets that should therefore be acknowledged in firms' financial statements to provide shareholders and investors with a clearer image of firm value. Throughout the development of the literature on intellectual capital, various scholars have sought to identify those components of intellectual capital that contribute more to firm financial performance and growth since firms seek to attain new talents and fund investment as well as valuable assets. There would appear to be a consensus that firms rely more and more on investing in intangible assets in the contemporary digital economy to achieve growth. Corrado et al. (2005) classified growth resources based on the type of intangible expenditure, i.e. computer information (software and databases), innovative properties (research and development, data mining, copyright, licensing expenditure, and other expenditures that do not lead to patent or copyright), and economic merit (bran value, human capital growth specific to the firm, and costs of organizational structure). Moreover, Corrado and Hulten (2010) suggested that a firm’s expenditure on intangible assets can directly affect growth and innovation, which has been confirmed by recent research. Acak and Findik (2019) used sustainable growth rate algorithms to prove a positive relationship between intangible assets, firm value, and

sustainable growth in firms listed on Turkey's Stock Exchange. Similarly, Xu and Wang (2018) demonstrated the direct impact of intellectual capital on firms' sustainable growth and financial performance in the Korean production sector using the intellectual capital model and sustainable growth rate algorithms. An extensive study on American firms by Riahi-Belkaoui (2003) suggested that firms with higher intellectual capital had higher market value as well. That et al. examined the influence of intangible assets on firms' financial performance and current and future markets using a sample of non-financial British firms and found evidence of the role of intangible assets in improving the future financial performance of firms and their market performance. Their study found positive correlations between a firm's (brand's) good intentions and research and development and their financial performance and future market, which suggests that good intentions and research and development could contribute to profitability and are worth considering when making investment decisions. However, studies performed across the globe have offered varying results regarding the relationship between intellectual capital and firm value and financial performance. On the one hand, some of the works have confirmed positive relations between intellectual capital or specific elements of intellectual capital and firm performance. The positive and significant relationship between intangible assets and firms' value, growth, and performance in various European contexts examined by Sardo and Serrasqueiro (2018) revealed the remarkable influence of patents and research and development on market value. In Asia, Chan et el. (2005) discovered a direct relationship between intellectual capital expenditures and firms' financial performance and market value in the case of Taiwanese firms. Xu and Sim (2018) found similar results in their studies on South Korean and Chinese firms, while Gamayuni (2015) found similar results in Indonesia. Chauvin and Hirschey (1993) suggested that advertisement, research and development, and investment in intangible assets would be profitable and affect shareholder value. In Australia, Nadeem et al. (2018) found a direct relationship between intellectual capital efficiency and public firms' financial performance. Khalique and Bontis (2015) discovered that intellectual capital was positively associated with organizational performance in Pakistan. Smriti and Das (2018) demonstrated the positive influence of intellectual capital on market value in Indian firms. Other studies focused on diverse industries such as manufacturing, high-tech firms, microfinance, biotechnology (Guo et al., 2012), service-oriented firms, and electronics (Wang, 2008) have also confirmed positive relationships between financial performance and intellectual capital. On the other hand, some studies have failed to find any direct relationship between intellectual capital and firms' financial performance and stock market value in South Africa and Greece. Other scholars have found contradicting results in Japanese industries and have proposed that although intangible assets may be of some value, this value may not be the same across all firms and in all sectors. Moreover, researchers have also accentuated on the scarcity of disclosed

information on firms' intangible assets, resulting in investors' inability to understand their value. Lev (2004) and Nimtrakoon (2015) have made similar observations regarding firms' financial statements. Another issue discussed in the literature is the difference between emerging and developed economies alongside the lack of adequate research on the latter when it comes to the influence of intellectual capital indices' impact on firm growth. In this regard, quantitative research in Romania has examined the intangible impacts on firms' market value and performance. Morariu (2014) used the intellectual capital model to examine this relationship in stock market firms with negative outcomes. One possible explanation pointed to market immaturity and the influence of the 2008 global economic crisis. Knowledge-based industries have been more efficient in creating value from their intellectual capital compared to financial and physical capital. A more recent study analyzed the sustainable growth rate of stock market firms in Romania; however, this work was restricted to five firms in the energy sector and utilized a different model than ours. Studies confirm steady and sustainable growth mainly through the persistence rate. Despite the growing interest in the analysis of intellectual capital's impact on firms' performance, a review of the literature suggests a scarcity of such studies in specific and emerging markets. Moreover, it has been revealed that the current studies are rather dismissive of the differences between the countries, and the authors have remained mainly focused on the relationship between intellectual capital and firm performance in developed companies. This can be explained by the fact that most of the authors come from developed countries such as the US, Japan, and Germany. It has also been suggested that generalizing the same approach to both developed and emerging economies cannot guarantee reliable results since firms in different countries partake in diverse innovation activities (Boiko, 2021). Researchers point out that the research and development pattern varies significantly across emerging and advanced economies. In this regard, Lee and Choi (2015) discovered the highly positive influence of research and development in the pharmaceutical industry using Tobin's Q, and Zhu and Huang (2012) found that Chinese IT firms' financial performance increased rapidly with research and development investments. On the other hand, empirical evidence from Taiwanese manufacturing firms suggested a negative relationship between profitability and research and development (Yang et al., 2010). There is limited insight into the relationship between firm performance and research and development as results remain contradictory. Conflicting views on the bond between performance and research and development suggest that the nature of this relationship is highly complex. Another study examined how investments in intangible assets by firms listed on the Bucharest Stock Exchange were reflected on their financial statements to address the research gap on the state of intellectual capital in emerging economies, specifically in Romania. The sample contained a larger set of firms in industries such as

pharmaceuticals, manufacturing, heavy industries, gas, oil, power, and tourism. As mentioned earlier, the scarcity of research on the growth of intellectual capital in Romanian firms and how investment in intangible assets was evaluated in the stock market led this study to focus on the relationship between growth resources in the current economy and firms' sustainable growth.

Building on the aforementioned, the present study seeks to explore how intangible assets affect firm value and sustainable growth with the role of intellectual capital in firms listed on the Tehran Stock Exchange.

Research background

Lunitta and Dino (2022) performed a study entitled "The effect of intangible assets on sustainable growth and firm value– Evidence on intellectual capital investment in companies listed on the Bucharest Stock Exchange." This study used computational models to discern the sustainable growth rate and value of firms, and utilized the mean squared roots model through a linear regression to investigate the relationship between dependent variables and expenditure on intangible items such as research and development, IT programs, and patents. A sample of 42 firms out of the 78 firms listed on the Bucharest Stock Exchange was collected based on disclosed information on financial reports between 2016 and 2019. Results suggested that intangible assets classified as innovative merits left no significant impact on firm value and sustainable growth in the case of Romanian firms. Moreover, the study revealed that research and development affected firm value negatively and significantly, while IT programs left significant and positive effects on firms' value and no significant effect on sustainable growth rate. Indicators classified as economic merits (brands, stocks in the dependent firms, and jointly controlled units) and indicators specific to the structure of the firm (firm performance, leverage) appeared to leave significant impacts on firm value and sustainable growth. Shares held in subsidiaries and jointly controlled units were the variables that can have the greatest influence on firm value.

Osama Al-Ansari et al. (2021) conducted a study entitled "The Underlying Mechanisms of the relationships between corporate financial policies and firm value: flexibility and agency theory perspectives. Asia-Pacific Journal of Business Administration." In this study, they sought to discover the primary mechanisms through which firm financial policies, liquid assets, capital structure, and dividend payout affected firm value in Middle Eastern and North African emerging markets. The authors employed a novel integration of path modeling and parallel multiple mediation analysis to test the hypothesized indirect effects through mechanisms represented by the value of financial flexibility and agency costs. The authors found no evidence of an association between liquid assets, dividend payouts, and firm value through the mechanisms of financial flexibility and agency costs. Meanwhile, the two forces of financial flexibility and agency left balanced mediating impacts on the relationship between liquid assets and firm value, which

indicated equivalent and complementary mechanisms through which dividend payouts affected firm value positively. Moreover, they found a significant negative partial mediation effect of agency costs on the relationship between leverage and firm value. Still, the authors found no evidence to support the mediating effect of financial flexibility in this relationship. This study provided novel insight into the forces governing the nature of the relationship between firm value and financial policies.

Servaes and Tamayo (2019) conducted a study entitled "The Impact of Corporate Social Responsibility on Firm Value: The Role of Customer Awareness." Their results suggested that social responsibility was positively associated with firm value in firms whose customer awareness or public awareness was increased through advertisement, whereas the same relationship was insignificant or inverse in firms whose customers' awareness or public awareness was low. Results also revealed that the awareness of the relationship between social responsibility and firm value had a negative influence on firms that were less reputable in the community.

Guo and Zhang (2018) investigated the relationship between firm value and profit smoothing and the quality of reported profits in firms listed on the Tehran Stock Exchange between 2000 and 2007 seeking to discover whether profit smoothing was enough to increase firm value or profit smoothers would also need to consider the quality of the reported profits. For this purpose, they tested the relationship between stock price and profit smoothing and quality at the two levels of profit and profit variations.

Nikbakht et al. (2021) proposed a multi-criteria assessment model for intellectual capital. The current age is the age of knowledge governing firms. Authors believed that intellectual capital was the most significant factor involved in the creation of added value in firms and their performance, leading to the prominent significance of intellectual capital in measuring firm performance. This study adopted multi-criteria decision-making techniques and implemented them based on the information environment in Iran and previous research to propose a multi-criteria assessment model for intellectual capital in five industries on the stock market. The sample collected through judgmental sampling and data availability comprised a total of 81 firms using financial and non-financial information. The study adopted a hybrid research method, using value (qualitative) judgments to present the model and a combination of qualitative and quantitative methods to test the hypotheses. Results of the Freidman test on the expert questionnaire revealed that the 22 experts familiar with the field of intellectual capital considered a greater advantage for the proposed model compared to other models. Moreover, Spearman test results suggested a significant and positive relationship between the intellectual capitals calculated based on the proposed model and firm profitability in all industries (except investment). Firms operating in the studied industries can use the results of this model in their annual intellectual capital assessment to make annual plans and assess

the performance of management to accomplish goals and adapt them to the firm's general strategies in terms of intellectual capital.

Hassah Yeganeh et al. (2020) examined the relationship between social responsibility reporting and firm value. Corporate responsibility reporting is associated with economic, social, environmental, and ethical aspects of the firm. This increases the significance of whether shareholders use social responsibility reporting information to value stocks. This study used the modified Olsan model by Hessel et al. to examine the role of social responsibility reporting in determining firm value by shareholders. Results of the test performed on the information of 41 firms (a total of 205 firm-years) suggested a positive correlation between firms' value and their social responsibility reporting score. Moreover, results suggested that considering annual financial report information and social responsibility information would explain stock value variation better than considering financial information alone.

Shamsi (2020) investigated intellectual capital as a means to create value for organizations in the knowledge-based economy considering that the contemporary role of intellectual capital in creating value for firms, organizations, and trade units is much greater than the role of financial capital in this regard. Many scholars in the field of management believe that intellectual capital and high-quality and knowledge-oriented human forces are the main factors involved in organizational creativity and productivity. These capitals are believed to be capable of creating new procedures and encouraging organizational entrepreneurship in organizations, which will ultimately improve competitive advantage. This study offered a definition of the concept and terms used in the field of intellectual capital as well as the importance of assessment, intellectual capital theories, and assessment methods for intellectual capital through secondary research performed on domestic and international books and articles.

Cheraqi et al. (2019) investigated the factors challenging sustainable economic growth from the perspective of social capital in the Iranian economy. This study examined why sustainable economic growth was not realized in the Iranian economy from a social capital aspect. For this purpose, the provinces of the country were first classified into three regions through clustering and diagnostic analysis and based on the six key indicators of trust-sensitive economy (including entrepreneurship, educational level, employment, real production per capita, labor force productivity, and cooperation of women in the job market). The impact of five social capital indicators (including social, moral, acute social, and family harms) that reflected a lack of trust and thus declining social capital on each of the six economic indicators was examined between 2004 and 2016 using panel data. Results suggested that social capital decline significantly explained economic performance as all six economic indicators declined under the influence of at least one of the mentioned harms. The two variables of entrepreneurship and labor force productivity, which are significant factors in economic growth sustainability, suffered the most considerable negative impact. Results also suggested the synergistic effect

of reducing social capital on economic performance in the next period. Hence, reducing social capital undermines social efficiency in the relations of many factors contributing to production in the Iranian economy through impact on key economic indicators that are the most important quantitative and qualitative activities in the economy, which prevents sustainable economic growth over time.

Dalirian et al. (2019) performed a study titled "Ending the Conventional Method of Intangible Asset Reporting: The Need to Start a New Approach." the role of intangible assets in firms' market value has been on a steady rise over recent years, which has highlighted the need to consider its consequences. The inclination of companies towards investing in intangible assets and forming, encouraging, and pledging to create technology-oriented and knowledge-based suggests a shift in business models and strategies, heralding a movement toward a more mature economy. Still, it would appear that the accounting standards associated with intangible assets are far behind this movement and resist a shift toward complying with the economic changes. This study mentioned the reasons behind such resistance and its consequent damages inflicted upon the economy and investors and suggested that conventional financial reporting on intangible assets was the main culprit in this regard. Eventually, the study proposed suggestions to alleviate the current conditions of intangible asset financial reporting by performing a pathological study on it.

Sarraf et al. (2018) conducted a study entitled "Profit Smoothing, social responsibility, and firm value". Profit smoothing refers to management's effort to deliberately reduce profit fluctuations. Recent literature suggests that firms with social responsibility act differently in terms of profit smoothing and financial reporting. This study aimed to examine how social responsibility and smoothing affected the Q-Tobin index as a representative of the company's value and adopted the two indicators of smoothing through total accrual items and optional accrual items to grasp the extent of smoothing. Through a close study of the literature, two hypotheses were designed and a statistical sample comprising 120 firms listed on Tehran Stosch Exchange between over 2010-2013 was selected. This study employed the data pooling technique to estimate research models test the hypotheses and examine coefficient and model significance using t and F tests. Results suggested that smoothing and social responsibility were significantly associated with Tobin’s Q in smoothing firms listed on the Stock Exchange with high social responsibility. This would mean that smoothing firms with higher social responsibility were more valuable than smoothing firms with low social responsibility.

Nikkar et al. (2018) examined the role of intangible asset investments in explaining the impact of financial health and agency problems on firms’ market value. Their results revealed that appropriate intangible assets help firms successfully achieve the roots of value creation. In other words, intangible assets were the main driver of growth and value creation in many economic sectors. Moreover, results

suggested that intangible assets had a significant effect on explaining the impact of financial health (firm performance index) and agency costs (profit distribution policy) on firms' market value.

Hejazi and Alipour (2016) examined the significance of assessing intellectual capital. Although intangible assets and intellectual capital are currently among the most influential factors in firm success and profitability, accounting has yet to address the challenges of measuring and reporting in knowledge-based entities. Intellectual capital assessment and reporting problems are internationally challenging as intellectual capital is intangible and cannot be accurately measured. However, firms still need to implement measures to increase shareholder value. The inclination to manage intangible assets has led to the proposal of various methods to measure intellectual capital. Many researchers have found that effective intellectual capital management is directly associated with organizational success in developed countries. The intellectual capital theory suggests that the most imperative role of intellectual capital is to produce and provide services with added value through active management of intangible resources that contribute to organizational performance. This study initially discussed the concept of intellectual capital and then delved into the significance of intellectual capital and the models used to measure it.

Bayat et al. (2016) studied the influence of investment in intangible assets on the future operational cash flows of firms listed on the Tehran Stock Exchange. Their results indicated that investment in research and development had an inverse impact on future operational cash flows, while investment in advertising, training, and computer software did not affect them.

Noravesh et al. (2015) investigated firm value and profit quality based on evidence from Iranian firms. This study provided evidence on the relationship between firm value and profit quality and how investment opportunities affected the relationship. For this purpose, the authors used a composite indicator based on the decimal rank of six quality characteristics of profit, quality of accruals, stability of predictability, timeliness, relevance to value, and conservatism (profit) to assess profit quality. Research hypotheses were tested using a sample of 79 firms listed on the Tehran Stock Exchange over 2008-2012 by implementing multiple regression based on the data pooling techniques. Results suggested that the firm's value was positively and significantly correlated with profit quality and investment opportunities. Moreover, results indicated that investment opportunities significantly affected the relationship between firm value and profit quality.

Research hypotheses

Hypothesis I: Intangible assets affect sustainable growth.

Hypothesis II: Intangible assets affect firm value.

Hypothesis III: Intellectual capital affects the relationship between intangible assets and sustainable growth.

Hypothesis IV: Intellectual capital affects the relationship between intangible assets and firm value.

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Methods and Methodology

The present work is a correlational descriptive study. This is a descriptive piece of research as it seeks to describe the studied conditions or phenomena and aims to better understand the current circumstances and a correlational work since it examines the correlations between the variables. The present study is also a retrospective causal study as the authors examined the events after their occurrence, and is an applied piece of research in terms of goal. Eviews 9.5 was used and panel data regression to test the hypotheses.

The statistical sample included all firms listed on the Tehran Stock Exchange over 2015-2021 considering the following criteria.

1. All firms concluded their fiscal year on March 19th so their data would be comparable.
2. Their shares were traded in the market.
3. The firms were not financial, investment, or banking institutions.

A total of 138 firms were included in the sample considering the above criteria.

Modeling research indicators

The first model

$$\text{Sustainable growth}_{it} = \beta 0 + \beta_1 \text{Intangible assets}_{it} + \beta_2 \text{Size}_{it} + \beta_3 \text{Loss}_{it} + \beta_4 \text{LEV}_{it} + \beta_5 \text{MTB}_{it} + \beta_6 \text{ROA}_{it} + \varepsilon_{it}$$

The second model

$$\text{Firm value}_{it} = \beta 0 + \beta_1 \text{Intangible assets}_{it} + \beta_2 \text{Size}_{it} + \beta_3 \text{Loss}_{it} + \beta_4 \text{LEV}_{it} + \beta_5 \text{MTB}_{it} + \beta_6 \text{ROA}_{it} + \varepsilon_{it}$$

The third model

$$\text{Sustainable growth}_{it} = \beta 0 + \beta_1 \text{Intangible assets}_{it} + \beta_2 \text{Intellectual Capital}_{it} + \beta_3 (\text{Intangible assets}_{it} * \text{Intellectual Capital}_{it}) + \beta_4 \text{Size}_{it} + \beta_5 \text{Loss}_{it} + \beta_6 \text{LEV}_{it} + \beta_7 \text{MTB}_{it} + \beta_8 \text{ROA}_{it} + \varepsilon_{it}$$

The fourth model

$$\text{Firm value}_{it} = \beta 0 + \beta_1 \text{Intangible assets}_{it} + \beta_1 \text{Intellectual Capital}_{it} + \beta_1 (\text{Intangible assets}_{it} * \text{Intellectual Capital}_{it}) + \beta_4 \text{Size}_{it} + \beta_5 \text{Loss}_{it} + \beta_6 \text{LEV}_{it} + \beta_7 \text{MTB}_{it} + \beta_8 \text{ROA}_{it} + \varepsilon_{it}$$

Dependent variable

Sustainable growth

Sustainable growth is used to evaluate firm sustainability according to Robert (2017), suggesting that firms can be sustainable depending on their profits.

The criteria used to assess profit sustainability include current and next year operational profits. The current year profit (Earn it) is obtained by dividing the operating income by the average total assets in the current year. The next year's profit (Earn it+1) is obtained by dividing the operating income by the average total assets

in the following year. Dicho and Jay's (2006) model captures stability as follows.

EARNING (t +1) = α+ β*EARNINGS (t) + ε(t)

Firm value

Literature indicates that firm value is calculated through Tobin's Q, which is the sum of equity market value (Mve) and debts' book value (bvd) divided by total assets' book value (bva).

$$Q = \frac{Mve+Bvd}{Bva}$$

Independent variable

Intangible assets

Intangible assets refer to the total value of intangible assets reported on the balance sheet divided by the firm's total assets at the beginning of the period.

Moderating variable

Intellectual capital

The present study employed the intellectual added value model proposed by Palick (2005) to assess intellectual capital. Said model has been used conventionally in many studies (e.g. Shiu, 2006; Chang, 2007; Kamath, 2008 Sarovalia and Jahanshahi, 2016).

1. The basis of assessment in this method is standard and fixed so large samples across varied industries can be compared.
2. All data used in the intellectual added value coefficient model are extracted from audited financial statements. As a result, the calculations are objective and amenable.

The intellectual added value coefficient model is a clear and transparent technique whose computational simplicity makes it suitable for extra-organizational stakeholders.

According to Palick's model, the added value from current-year resources is calculated as follows.

VAIC = OP + EC + D + A (Equation 1)

Where OP is operational profit, EC is labor costs, D is fixed asset depreciation, and A is intangible asset depreciation.

Palick suggests the criteria to assess firm intellectual capital to be the efficiency of employed capital (physical), human capital, and structural capital.

Efficiency of employed capital (physical): Implemented capital efficiency demonstrates the relationship between the added value created by each unit and physical capital as follows.

$$\text{physical capital efficiency} = \frac{added\ value}{employed\ capital}$$

Human capital efficiency: Human capital efficiency demonstrates the relationship between added value and human capital and indicates how many units of added value are created per unit of expenditure on the employees. Human capital is the sum of direct salaries, indirect salaries, and wage expenditures in sales, marketing, and office sectors.

$$\text{human capital efficiency} = \frac{added\ value}{human\ capital}$$

Structural capital efficiency: This index demonstrates the amount of structural capital required to create one unit of added value and introduces it as the indicator of

structural capital success in the value creation process.

Structural capital = added value – human capital

The smaller the share of human capital in value creation, the more the share of structural capital. Structural capital efficiency is calculated as follows.

$$\text{structural capital efficiency} = \frac{structural\ capital}{added\ value}$$

Intellectual capital added value coefficient: This ratio is the sum of the aforementioned coefficients and demonstrates the firm's intellectual capital. Palick's model uses this coefficient as a measure of intellectual capital.

VAIC = CEE + HCE + SCE

Where SCE is structural capital efficiency, HCE is human capital efficiency, and CEE is physical capital efficiency.

Control variable

Firm size (size): the natural logarithm of the book value of a firm i's total assets in year t (Huo et al., 2016; Mashayekhi & Farhadi, 2013). This variable is used to control the size of the firms.

Loss (Loss): Is equal to one if the firm declares financial loss by the end of the fiscal year and zero otherwise.

Financial leverage: LEV): the ratio of long-term debts' book value to the book value of total assets of firm i in year t. This variable is used to control firms' debt coverage.

Growth opportunity (MTB): equals the ratio of equity market value (market price of each share at the end of each year multiplied by the number of shares) to its book value in firm i and year t. This variable is used to control growth opportunities in the market.

Return on assets (ROA): equals operating profits divided by total assets (Huo et al., 2016; Abdullahzadeh, 2002).

Results

Descriptive statistics of research variables

Central indices such as mean and dispersion indices including standard deviation, skewness, and kurtosis are generally examined for a descriptive analysis of the collected data on each research variable.

Table 1. Descriptive statistics and normality tests for research variables

Variable	Mean	Standard deviation	Median	Skewness	Kurtosis	Minimum	Maximum	Shapiro Wilk	Shapiro Wilk significance
Sustainable growth	-6.820	0.282	-6.860	0.414	2.090	-7.244	-6.214	8.475	0.000
Firm value	-0.486	0.142	-0.499	0.333	2.705	-0.808	-0.034	4.969	0.0000
Intangible assets	0.137	0.069	0.125	1.109	4.410	0.013	0.41	9.339	0.000
Intellectual capital	4.333	2.236	4.396	-0.819	5.026	-7.664	9.327	7.644	0.000
Firm size	14.329	1.535	14.129	0.684	3.761	10.226	20.183	6.966	0.000
Loss	0.082	0.275	0	3.027	10.165	0	1	6.488	0.000
Financial leverage	0.538	0.226	0.544	0.538	6.186	0.012	2.077	7.262	0.000
Growth opportunity	2.033	1.705	1.533	4.955	39.167	0.147	20.560	13.848	0.000
Return on assets	0.169	0.142	0.151	0.388	3.340	-0.325	0.639	5.475	0.000

Frequency distribution of loss

Title	Frequency	Frequency percentage
0	886	91.72
1	80	8.28
Total	966	100

Disruption sentence normality test

Model	Statistic	Significance	Result
I	11.608	0.507	Normal distribution
II	10.638	0.432	
III	9.281	0.965	
VI	9.910	0.304	

Mean is the primary centrality index that indicates the distribution's balance point and the center of gravity and is a good indicator of data centrality. For instance, the mean firm size is 14.329, suggesting that most of the data are concentrated around this figure.

Examining unit root in research variables

One of the points that should always be noted before fitting models is the stationarity of research variables.

Table 2. Results of stationarity tests for variables

Variable	Harris		
	Statistic	**Significance**	**Result**
Sustainable growth	-24.908	0.000	Stationary
Firm value	8.657	0.000	Stationary
Intangible assets	-7.153	0.000	Stationary
Intellectual capital	-15.936	0.000	Stationary
Firm size	8.985	1	Non-Stationary
Loss	-20.09	0.000	Stationary
Financial leverage	-7.185	0.000	Stationary
Growth opportunity	8.938	1	Non-Stationary
Return on assets	-13.140	0.000	Stationary
Con-integration test (Disruption sentence stationarity)			
Model	**Statistic**	**Significance**	**Result**
I	-17.830	0.000	Stationary
II	-25.928	0.000	Stationary
III	-20.959	0.000	Stationary
VI	-17.668	0.000	Stationary

As demonstrated, all variables (except firm size and growth opportunities) have a significance level of less than 0.05 and are therefore stationary. The study of disruption sentences suggests that the errors are at a significance level of less than 0.05. The models are thus stationary and there is no need for all variables to be stationary.

F-Limer test

A significance level of less than 0.05 in the F-Limer test suggests the use of the panel data model, while a significance level larger than 0.05 suggests the use of the pooled data model. The following table demonstrates the results of the F-Limer test for the first through fourth models.

Table 3. F-Limer test results

Model	Statistic	Significance
I	0.89	0.800
II	0.91	0.748
III	0.89	0.796
VI	0.89	0.789
Pooled data are to be used as the significance level is higher than 0.05.		

Testing variance heterogeneity

The Breusch–Pagan test is used to identify variance heterogeneity in the model. In this test, the null hypothesis indicates variance homogeneity, which is rejected if the value calculated for "prob" is smaller than 0.05.

Table 4. Variance heterogeneity test

Model	Statistic	Significance
I	1463.55	0.000
II	1386.37	0.000
III	1622.47	0.000
VI	1287.92	0.000
As observed, the significance level is lower than 0.05, suggesting a variance heterogeneity problem. Note that this problem has been addressed in the final estimation of the hypotheses (through data weighing using the gls command)		

Model residuals autocorrelation test

A correlation between a variable and its previous period is called first-order autocorrelation. Serial autocorrelation refers to the relationship between the variable with itself in intervals.

Table 5. Serial autocorrelation test

Model	Statistic	Significance
I	0.003	0.959
II	32.749	0.000
III	0.001	0.980
VI	33.742	0.000
As observed, the significance level is lower than 0.05 (except in the first and fourth models), suggesting a serial autocorrelation problem. Note that this problem has been addressed using the autocorrelation command in STATA.		

Results of the first hypothesis

Intangible assets affect sustainable growth. Hypothesis result: It was observed that intangible assets had a positive coefficient and a significance level lower than 0.05. It was thus confirmed that intangible assets affect sustainable growth.

Model fitness quality: An adjusted coefficient of determination of 78% demonstrates that explanatory variables have managed to explain 78% of the variation in the dependent variable. The parent statistic's significance is also less than 0.05, suggesting that the fitted model is sufficiently valid.

Table 6. Final estimation of the first regression model

Variables	Coefficient	Standard deviation	Z statistic	Significance level	Collinearity
Intangible assets	0.009	0.004	2.34	0.020	1.71
Firm size	-6.797	0.092	-73.62	0.000	1.35
Loss	0.000	0.091	0.00	0.999	1.32
Financial leverage	-0.021	0.009	-2.25	0.025	1.07
Growth opportunity	-0.007	0.003	-2.03	0.043	1.03
Return on assets	-0.718	0.053	-13.39	0.000	1.01
Intercept	0.679	0.165	4.12	0.000	
Other statistics					

Adjusted coefficient of determination	Parent statistic	Parent statistic's significance level
78%	52.03	0.000

The second hypothesis

Intangible assets affect firm value. Hypothesis result: It was observed that intangible assets had a positive coefficient and a significance level lower than 0.05. It was thus confirmed that intangible assets affect firm value.

Model fitness quality: An adjusted coefficient of determination of 77% demonstrates that explanatory variables have managed to explain 78% of the variation in the dependent variable. The parent statistic's significance is also less than 0.05, suggesting that the fitted model is sufficiently valid.

Table 7. Final estimation of the second regression model

Variables	Coefficient	Standard deviation	Z statistic	Significance level	Collinearity
Intangible assets	0.510	0.223	2.28	0.023	1.71
Firm size	-0.543	0.271	-2.00	0.045	1.35
Loss	2.142	0.587	3.64	0.000	1.32
Financial leverage	2.097	0.444	4.72	0.000	1.07
Growth opportunity	14.156	0.287	49.20	0.000	1.03
Return on assets	0.122	0.041	2.92	0.004	1.01
Intercept	-0.630	0.046	-13.64	0.000	
Other statistics					
Adjusted coefficient of determination		**Parent statistic**	**Parent statistic's significance level**		
77%		3.00	0.006		

The third hypothesis

Intellectual capital affects the relationship between intangible assets and sustainable growth. Hypothesis result: It was observed that intangible assets + intellectual capital had a positive coefficient and a significance level lower than 0.05. It was thus confirmed that Intellectual capital affects the relationship between intangible assets and sustainable growth.

Model fitness quality: An adjusted coefficient of determination of 53% demonstrates that explanatory variables have managed to explain 53% of the variation in the dependent variable. The parent statistic's significance is also less than 0.05, suggesting that the fitted model is sufficiently valid.

Table 8. Final estimation of the third regression model

Variables	Coefficient	Standard deviation	Z statistic	Significance level	Collinearity
Intangible assets	-0.575	0.284	-2.02	0.043	8.29
Firm size	0.001	0.004	0.27	0.789	5.35
Loss	0.073	0.036	2.01	0.044	4.77
Financial leverage	0.008	0.004	1.98	0.048	2.06
Growth opportunity	-0.495	0.070	7-.00	0.000	1.54
Return on assets	0.044	0.046	0.97	0.330	1.33
Intercept	-0.436	0.224	-1.97	0.053	1.07
Other statistics					
Adjusted coefficient of determination		**Parent statistic**	**Parent statistic's significance level**		
53%		64.56	0.000		

The fourth hypothesis

Intellectual capital affects the relationship between intangible assets and firm value. Hypothesis result: It was observed that intangible assets + intellectual capital had a positive coefficient and a significance level lower than 0.05. It was thus confirmed that Intellectual capital affects the relationship between intangible assets and firm value.

Model fitness quality: An adjusted coefficient of determination of 51% demonstrates that explanatory variables have managed to explain 51% of the variation in the dependent variable. The parent statistic's significance is also less than 0.05, suggesting that the fitted model is sufficiently valid.

Table 9. Final estimation of the third regression model

Variables	Coefficient	Standard deviation	Z statistic	Significance level	Collinearity
Intangible assets	0.055	0.022	2.46	0.014	8.29
Firm size	-0.061	0.099	-0.62	0538	5.35
Loss	0.024	0.003	7.61	0.000	4.77
Financial leverage	0.008	0.002	3.84	0.000	2.06
Growth opportunity	-0.098	0.014	-7.04	0.000	1.54
Return on assets	-0.187	0.015	-12.42	0.000	1.33
Intercept	0.010	0.001	5.65	0.000	1.07
Other statistics					
Adjusted coefficient of determination		**Parent statistic**	**Parent statistic's significance level**		
51%		128.07	0.000		

Conclusion and recommendations

The present study seeks to investigate how intangible assets affect firm value and sustainable growth with the role of intellectual capital in firms listed on the Tehran Stock Exchange. The statistical sample included the firms listed on the Tehran Stock Exchange between 2015 and 2021, among which 138 firms were selected after implementing exclusion criteria. After the research variables were measured, a

multivariate linear regression analysis based on the panel data technique was implemented to test research hypotheses. The results of testing the hypotheses suggested that intangible assets affected sustainable growth and firm value directly and significantly. Moreover, intellectual capital was revealed to impact the relationship between intangible assets and sustainable growth as well as the relationship between intangible assets and firm value.

In this regard, Lunitta and Dino (2022) performed a study entitled "The effect of intangible assets on sustainable growth and firm value–Evidence on intellectual capital investment in companies listed on the Bucharest Stock Exchange." This study used computational models to discern the sustainable growth rate and value of firms, and utilized the mean squared roots model through a linear regression to investigate the relationship between dependent variables and expenditure on intangible items such as research and development, IT programs, and patents. A sample of 42 firms out of the 78 firms listed on the Bucharest Stock Exchange was collected based on disclosed information on financial reports between 2016 and 2019. Results suggested that intangible assets classified as innovative merits left no significant impact on firm value and sustainable growth in the case of Romanian firms. Moreover, the study revealed that research and development affected firm value negatively and significantly, while IT programs left significant and positive effects on firms' value and no significant effect on sustainable growth rate. Indicators classified as economic merits (brands, stocks independent firms, and jointly controlled units) and indicators specific to the structure of the firm (firm performance, leverage) appeared to leave significant impacts on firm value and sustainable growth. Shares held in subsidiaries and jointly controlled units were the variables that can have the greatest influence on firm value.

The following recommendations for future research have been derived from our results.

- Investors are advised to pay more attention to financial cash flows in firms in their evaluations and compare their candidate firms with similar firms in the same industry.
- Managers are advised to adopt appropriate investment policies aimed at increasing firm efficiency for higher productivity and shareholder profits.
- The Stock Exchange is advised to rank stock exchange firms based on allocated efficiency and disclose the relevant information in a report that will be useful to operators.
- Accountants are advised to be more sensitive when reviewing the financial statements of firms with lower liquidity since reports may have been manipulated.

References

– Albertini, E. and Berger-Remy, F. (2019), “Intellectual capital and financial performance: a meta-analysis and research agenda”, AIMS Management, Vol. 22 No. 2, pp. 216-249.

- Al-Hamadeen, R., Alsharairi, M & Qaqish, H. (2014). Intangible Disclosure: Evidence from Annual Reports of the Jordanian Industrial Public Listed Companies.
- Andreeva, T. and Garanina, T. (2016), "Do all elements of intellectual capital matter for organizational performance? Evidence from Russian context", Journal of Intellectual Capital, Vol. 17 No. 2, pp. 397-412.
- Bayat Roghaieh Shabani Maryam, and Kalantari, Mohammad Hossein (2016) The impact of investment in intangible assets on future operating cash flows of companies listed on Tehran Stock Exchange, Management and Accounting Studies Quarterly, 97-85 (1) (In Persian)
- Boiko, K. (2021), "R&D activity and firm performance: mapping the field", Management Review Quarterly, Vol. 1, pp. 1-37.
- Canibano, L., Garcia-Ayuso, M. and Sanchez, P. (2000), "Accounting for intangibles: a literature review", Journal of Accounting Literature, Vol. 19 No. 1, pp. 102-130.
- Chander, S., & Mehra, V. (2011). A study on intangible assets disclosure: An evidence from Indian companies. Intangible Capital, 2011 – 7(1): 1-30.
- Chauvin, K.W. and Hirschey, M. (1993), "Advertising, R&D expenditures and the market value of the firm", Financial Management, Vol. 22 No. 4, Winter, pp. 128-140.
- Cheraghi Babak, Torabi Taghi, Mohammadi Taimur, and Taghavi Mahdi (2019). Investigating the obstacles to sustainable economic growth from a social capital perspective in Iran's economy. Journal: Economic Growth and Development Research Year: 2019, Volume: 9, Number: 34, Pages: 77-98. (In Persian)
- Cohen, J.A. (2005), Intangible Assets: Valuation and Economic Benefit, Wiley Finance, New York.
- Corrado, C.A., Hulten, C.R. and Sichel, D. (2005), "Measuring capital and technology: an expanded framework", in Corrado, C.A., Haltiwanger, J. and Sichel, D. (Eds), Measuring Capital in the New Economy, The University of Chicago Press, Chicago, Vol. 65, pp. 11-45.
- Dalirian Akbar, Meshki Mehdi, Mohammadi Nodeh Fazel, and Khordiar Sina (2019). Ending the conventional method of intangible asset reporting: the need to start a new approach. Journal: Knowledge of Accounting and Management Audit Year: 2018, Volume: 8, Number: 32, Pages: 259-272. (in Persian)
- Dianti Deilmi Zahra, Moradzadeh Fard Mehdi, and Mazaheri Ali (2013). The influence of management tenure on firm value, agency costs, and information risk. Accounting experimental research, third year, fall 2013, no. 9. (In Persian)
- Fonseka, M.M., Tian, G.L. and Li, L.-C. (2014), "Impact of financial capability on firms' competitiveness and sustainability: evidence from highly regulated Chinese market", Chinese Management Studies, SI, Vol. 8 No. 4, pp. 593-623.
- Gamayuni, R.R. (2015), "The effect of an intangible asset, financial performance, and financial policies on the firm value", International Journal of Science and Technology Research, Vol. 4, pp. 202-212.
- Gao, Lei; Zhang, Joseph H. (2018). "Firms' Earnings Smoothing, Corporate Social Responsibility, and Valuation". Journal of Corporate Finance, doi:10.1016/j.jcorpfin.2015.03.004.
- Gelb, D.S., Zarowin, P., (2003). Corporate disclosure policy and the informativeness of stock prices. Review of Accounting Studies, Vol.7, No.1, pp.33-52.
- Guo, W.-C., Shiah-Hou, S.-R. and Chien, W.-J. (2012), "A study on intellectual capital and firm performance in biotech companies", Applied Economics Letters, Vol. 19 No. 16, pp. 1603-1608.
- Hassas Yeganeh Yahya, Sohrabi Hossein Ali and Ghawasi Kenari Mohammad (2020). The relationship between social responsibility reporting and firm value.

Volume 12, Number 45 - Serial Number 45 April 2019 Page 1-20. (In Persian)

- Hejazi Rezvan and Alipour Mohammad (2016). The significance of measuring intellectual capital. Accounting research, fifth term, spring 2016, number 4 (20 consecutive). (In Persian)
- 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, Vol. 18 Nos 5/6/7/8, pp. 562-575.
- Kafouros, M. and Aliyev, M. (2016), "Institutions and foreign subsidiary growth in transition economies: the role of intangible assets and capabilities", Journal of Management Studies, Vol. 53 No. 4, pp. 580-607.
- Kang, H. (2006). Reporting Intangible Assets: Voluntary Disclosure Practices of Top Emerging Market Companies.
- Khalique, M. and Bontis, N. (2015), "Intellectual capital in small and medium enterprises in Pakistan", Journal of Intellectual Capital, Vol. 16 No. 1, pp. 224-238.
- Lee, M. and Choi, M. (2015), "Analysis on the time-lag effect of research and development investment in the pharmaceutical industry in Korea", Osong Public Health and Research Perspectives, Vol. 6, pp. 241-248.
- Lev, B. (2001), Intangibles: Management, Measurement, and Reporting, Brookings Institution Press, Washington, DC.
- Lev, B. (2004), "Sharpening the intangibles edge", Harvard Business Review, Vol. 82 No. 6, pp. 109-116.
- Mashayekhi, Bita, Seyyedi Jalal, and Zargaran Yazd Hasti (2014). A study into the factors affecting intellectual capital disclosure in firms listed on the Tehran Stock Exchange, Accounting and Auditing Reviews, 4 (16) 121-95. (In Persian)
- Mashayekhi, Bita; Birami Haniyeh; and Birami Hani (2014) Determining the value of intangible assets using artificial neural network. Accounting Experimental Research 4 (2) 238-223. (In Persian)
- Mehrgan Nader and Salmani Younes (2014). Oil price fluctuations and sustainable economic growth: a case of Iran and Japan. Journal: Applied Economic Studies of Iran (Applied Economic Studies) Year: 2014, Volume: 3, Number: 10, Pages: 107-125. (In Persian)
- Mohammad Reza Nikbakht, Zahra Dianati, Deilmi Mansour, and Momeni Hossein Ahmadi (2021). A multi-indicator evaluation model of intellectual capital. Researches on financial accounting and auditing, year 13, spring 2021, number 1 (consecutive 49). (In Persian)
- Morariu, C.M. (2014), "Intellectual capital performance in the case of Romanian public companies", Journal of Intellectual Capital, Vol. 15 No. 3, pp. 392-410.
- Nadeem, M., Gan, C. and Nguyen, C. (2018), "The importance of intellectual capital for firm performance: evidence from Australia", Australian Accounting Review, Vol. 28, p. 86.
- Nazari, J.A. and Herremans, I.M. (2007), "Extended VAIC model: measuring intellectual capital components", Journal of Intellectual Capital, Vol. 8 No. 4, pp. 595-609.
- Nikkar Javad; Hammet Far Mahmoud; and Esami, Maryam (2018) The role of intangible asset investments in explaining the impact of financial health and agency problems on firms' market value, firm management and financing 6 (1) 11-28(In Persian)
- Nimtrakoon, S. (2015), "The relationship between intellectual capital, firms' market value, and financial performance. Empirical evidence from the ASEAN", Journal of Intellectual Capital, Vol. 16 No. 3, pp. 587-618.
- Noravesh Iraj, Momeni Yansari Abolfazl, Safari Graili Mehdi (2015). Earnings quality and firm value: Evidence from Iranian companies. Financial accounting

research, seventh year, number four, consecutive (26), winter 2015. (In Persian)

- Ocak, M. and Fındık, D. (2019), "The impact of intangible assets and sub-components of intangible assets on sustainable growth and firm value: evidence from Turkish listed firms", Sustainability, Vol. 2019 No. 11, p. 5359.
- Olarewaju, O.M. and Msomi, T.S. (2021), "Intellectual capital and financial performance of South African development community's general insurance companies", Heliyon, Vol. 7 No. 2021, doi: 10.1016/j.heliyon.2021.e06712.
- Osama El-Ansary & Hatem Fouad Hamza & Sheikh Zayed City, Egypt. (2021). The underlying mechanisms of the relationships between corporate financial policies and firm value: flexibility and agency theory perspectives. Asia-Pacific Journal of Business Administration © Emerald Publishing Limited 1757-4323 DOI 10.1108/APJBA-08-2021-0420.
- Ozcan, A. (2017). Analysis of value relevance of intangible assets under international financial reporting standards: evidence from Borsa Istanbul. Journal of Social Sciences Institute, 14 (40), 364- 377.
- Petty, R. and Guthrie, J. (2000), "Intellectual capital literature review. Measurement, reporting and management", Journal of Intellectual Capital, Vol. 1 No. 2, pp. 155-176.
- Petty, R. and Guthrie, J. (2004), "Intellectual capital literature overview: measurement, reporting and management", Journal of Intellectual Capital, Vol. 1 No. 2, pp. 155-176.
- Riahi-Belkaoui, A. (2003), "Intellectual capital and firm performance of US multinational firms: a study of the resource-based and stakeholder views", Journal of Intellectual Capital, Vol. 4 No. 2, pp. 215-226.
- Saraf Fatemeh, Barzegar Qodratollah, and Mohammadi Mahsa (2018). Smoothing profits, social responsibility, and firm value. Journal: Accounting and Audit Research (Accounting Research) Year: 2017, Volume: 10, Number: 39, Pages: 189-210. (In Persian)
- Sardo, F. and Serrasqueiro, Z. (2018), "Intellectual capital, growth opportunities, and financial performance in European firms. Dynamic panel data analysis", Journal of Intellectual Capital, Vol. 19 No. 4, pp. 747-767.
- Servaes, Henri. Tamayo, Ane. (2019). "The Impact of Corporate Social Responsibility on Firm Value: The Role of Customer Awareness". Management Science, Vol. 59, Issue 5, pp. 1045-1061.
- Shamsi Somayyeh (2020). Intellectual Capital. Journal: Advertising and Sales Management (an approach in business management) Year: 2019, Volume: 1, Number: 2, Pages: 15-22. (In Persian)
- Smriti, N. and Das, N. (2018), "The impact of intellectual capital on firm performance: a study of Indian firms listed in COSPI", Journal of Intellectual Capital, Vol. 19 No. 5, pp. 935-964.
- Tahat, Y.A., Ahmed, A.H. and Alhadab, M.M. (2018), "The impact of intangibles on firms' financial and market performance: UK evidence", Review of Quantitative Finance Account, Vol. 50, pp. 1147-1168.
- Wang, J.C. (2008), "Investigating market value and intellectual capital for S&P 500", Journal of Intellectual Capital, Vol. 9 No. 4, pp. 546-563.
- Wang, X., Sadiq, R., Khan, T.M. and Wang, R. (2021), "Industry 4.0 and intellectual capital in the age of FinTech", Technological Forecasting and Social Change, Vol. 166 No. 2021, doi: 10.1016/j. techfore.2021.120598.
- Xu, J. and Sim, J.-W. (2018), "Characteristics of corporate R&D investment in emerging markets: evidence from manufacturing industry in China and South Korea", Sustainability, Vol. 10, p. 3002.
- Xu, J. and Wang, B. (2018), "Intellectual capital, financial performance and companies' sustainable growth: evidence from the Korean manufacturing industry", Sustainability, Vol. 10, p. 4651.

_ Yang, K.P., Chiao, Y.C. and Kuo, C.C. (2010), "The relationship between R&D investment and firm profitability under a three-stage sigmoid curve model: evidence from an emerging economy", IEEE Transactions on Engineering Management, Vol. 57, pp. 103-117.

_ Zhu, Z. and Huang, F. (2012), "The effect of R&D investment on firms' financial performance: evidence from the Chinese listed IT firms", Modern Economy, Vol. 3, pp. 915-919.