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Study of the relationship between human capital, productivity and market value in the manufacturing companies listed on the Stock Exchange of Iran

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ABSTRACT
The current form of human capital on economic ideas remained unknown, because been place has been considered for human capital in three-factor divisions of production factors. Such a division created a vacuum in the division of production factors of the tools necessary for suitable economic analysis, productivity and market value. Accordingly, this study aims to examine the relationship between human capital, productivity and market value in productive companies. For this reason, a number of 100 companies were selected through screening method during 2004-2011and then were tested through multiple regressions. Research hypotheses were divided into two branches in that components of human capital (wages and benefits, direct cost of laborers, indirect cost of laborers, administrative costs and staff sales) were examined in the productivity and market value. Results of research showed that there is a significant positive relationship between human capital and labor force productivity, but no relationship was observed between human capital and market value. Also, there was a significant positive relationship between components of human capital and indirect cost of laborers and labor force productivity. Moreover, there is a significant positive relationship between components of human capital and market value with wages and benefits.

Introduction

In competitive times, organizations are faced with an environment characterized by increasing complexity and dynamics of globalization, so organizations are facing new challenges for their induction and continuation that require more attention to developing and strengthening the skills and internal capabilities for getting out of these challenges in that this is accomplished through the principles and practices of organizational knowledge which are used by the organizations to achieve better performance in the business world. Due to the acceleration of social and economic changes and increasing competition in the industrial and service organizations, labor productivity has become the determining factor today, because life and survival is proportional to productivity.

However, in order for the organization to grow and improve their efficiency, it requires that the factors influencing in this context be identified and then the appropriate actions are taken according to their importance (Soltani, 2005). One of the most important factors affecting the productivity of the organizations is manpower. (Aboud et.al, 2002).

Therefore, the accumulation of knowledge and human capital has a direct impact on productivity. Accordingly, knowledge capabilities arise from organizational levels that includes employee's skills and abilities in individual level and technologies, organizational culture, network relationships, etc. in organizational level. Today, intellectual capital, especially human capital has become a vital source of competition among organizations more than ever. In today's knowledge-based economy, companies produce a product or service not only to survive but also to create value in the new economy (Luo et al, 2010). Therefore, due to the tremendous impact of human capital on performance and also the emphasis on creating added value as necessary for survival in the current era and direct relationship between value added and productivity and accordingly the impact on the market value, examining the relationship between human capital, productivity and market value is very important.

Studying the relationship between human capital, productivity and market value is very important. Productivity is one of the assessment measures of the organizations and enterprise's performance as well as an indicator to determine the rate of their success in achieving the desired goals of the resources consumed (Abboud et al, 2002).

The results of general research on various stock exchanges, including the U.S., Belgium, India, Pakistan and Turkey were virtually identical and indicated that there is a significant and notable relationship between various components of human capital, productivity and market value. Due to the increasing importance of intangible assets and human capital in the company's strategic process and that this issue has less been paid attention to in our country; therefore, this issue will be discussed at the Tehran Stock Exchange based on studies conducted in other countries and using the models and variables used in the research. Also with regard to the above-mentioned materials, this research seeks to answer this question that what difference exists between the explanatory powers of financial capital and human capital in determining the efficiency and market value of listed companies in Tehran Stock Exchange.

Research Theoretical Foundations

With the advent of large manufacturing companies in the 18th century and the formation of the separation of ownership from management, different groups with different reasons have paid particular attention to the issue of human capital firms and considered as important. Information development and rapid advancement of technology in recent decades caused great changes in all aspects of life and human activities and made a

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move towards knowledge-based economy that caused a paradigm shift on the industrial economy so that we can see today's knowledge-based economy centered on the basis of its intangible assets and human capital. In such circumstances, human capital of manufacturing companies has been taken into account as competitive advantage. Organization's emphasis on human capital is based on the view that market value of companies depend less on tangible assets, but more depend on intangible assets, especially human capital. Today, physical tangible assets alone is not the key to successful communities and organizations, but benefitting from intellectual assets and management of these assets that are considered as the key for success in today's challenging and turbulent environment (profitability and productivity and real increase of market value of the company (Chen et al, 2004).

Knowledge management is one of the most important success factors for firms in competitive conditions and the information age. The importance of this issue is to the extent that a number of organizations are measuring their knowledge today and reflect it as an intellectual capital of the organization and also an indicator for the company's ratings in their reports (Anvari Rostami and Seraji, 2005).

It is believed in these institutes that the establishment of knowledge management in the organization is necessary a part of organization's strategy. Knowledge management as an essential component of organizational success includes an extensive range of organizational ideas (strategic, economic, behavioral and managerial innovations). In today's world which the production of goods and services have become increasingly knowledge-based, knowledge is a key asset for competitive advantage (Young, 2009). In today's knowledge-based society, the efficiency of intellectual capital employed is much important than that of financial assets. This means that the role and importance of financial assets has been decreased dramatically in determining the ability of stable financial capital compared with intellectual capital. In other words, it can be imagined that there is a direct relationship between the companies' benefit from intangible assets and knowledge in one hand and the real value of intellectual assets on the other (and finally, company's stock market value) (Anvari Rostami and Seraji, 2005: 50). In modern times, it could not be reached efficiency and productivity with only emphasis on physical capitals and tangible assets, but intellectual capitals should also be taken into account in the most pessimistic mode of production in order for the company's competitive benefits will be increased Bradley (1997) argues that the companies that invest in innovative activities tend to have a clear and specific division of market values and office. On the other hand, Rous, Edison and Dragounti (1998) argue proposed that market value is determined by traditional physical, financial and intellectual capitals. Also, Lou (2001) maintained that physical and financial assets only create normal profits, but abnormal profits are created through developing intangible assets. If intellectual capital is not properly taken into account in the financial statements, cost of capital increases and the systematic evaluation will lower firm value. Accordingly, intellectual assets manifest the concept of knowledge which make help managers identify and categories components of knowledge in an organization. Successful organizations get to know that investment on intellectual capitals to create invaluable products and services is necessary. In a recent decade, organization's management have identified that human sources is of primary importance in achieving effective and sustainable competitive advantage in a world where knowledge and communication with customers becomes more and more important. Human capital, which reflects the amount of knowledge, technical skills, creativity and experience of the organization become important and similarly labor force regards not as a costly assets, but as productive assets (Hendricson, 2002, 25).

Manpower in each organization should be reported as assets in the context of financial statements that it is expected that it brings out the organization's future productivities by improving the production of goods and services (Noel, 2001).

Financial constraints in explaining value market indicates the fact that the economic value of resources is not limited to material goods value, but it includes intellectual capital (especially human capital). Given the importance of human capital, it can be obvious that measuring intellectual capital of organizations is an important indicator in determining for competitive survival and growth in the new economy (Lu, 2001). In today's global economy, knowledge becomes as the most important replacing capital in financial capitals (Chen et al, 2004). And knowledge-based business environment requires an approach that comprises productivity and market value (Abboud et al, 2002).

Human capital is defined as people's acquired knowledge that is achieved during one's lifetime and is used in the production and providing better goods and services (Efuini, 2007). New approach to human resources is one of the most effective agents in creating income and productivity of organizations. Human Capital is the investment in human resources to increase their efficiency. Since these costs are consumed with the aim of productivity in the future, it is thus called "investment in human resources". Human capital is the only institution that not only changes himself but adjust other institutes of production and provide a basis for innovation and profitability of firms and is led to economic growth in a large scale (Menzis, 2003).

Here, as in other cases of investment, the main question is whether these investments are economically profitable or not? Is it contributed to the company's productivity? How much do the resources spent on human capital increase market value?

Review of Literature

Most research has been conducted on the relationship between human capital and financial measures. However, few of these studies surveyed the productivity and market value as a financial measurement. Given that none of these studies examined the relationship between human capital of productivity and market value, a summary of the conducted research will be given.

Foreign Studies

Having been studied the processes of productivity and wages in America, Kenigham (1996) came to this conclusion that productivity has increased dramatically during the 1990s and this reduces the cost of businesses and their income has been increased. But labor force has not much benefit from productivity achievement and in fact, the real purchasing power of labor has been fallen. On the other hand, profits and salaries of top executives have been mutated. Hilston et.al (1999) estimated final production differences among different groups of workers. Then these results were compared with the estimate of real wages and it has been concluded that higher paid workers in the age groups 54-35 and above 55 years is a reflection of their relative marginal product. Of course, a relatively lower intake for some women does not reflect their relative final intake. These researchers came to the conclusion that productivity is the main determinant of wages and labor productivity.

Regarding the effective communication of accounting information of human resources of organization on the structure of development and learning, Turner (2000) gave a theoretical article. He concluded that human resources information is effective in monitoring on the personnel's performance as well as the evaluation and developing human resources by managers. Results of Koumenon studies (2000) suggested that the cost of sales and labor productivity in manufacturing companies have more impact on other variables. Odonel et.al (2003) concluded that 60% of company's values depend on intellectual capital in that over 50% of the company's value depends on human capital and also 20% and 30% of company's value is influenced by internal and external structural capital.

Having been estimated wage function, that are affected by external variables such as experiences of public work, value of durability in the regarded job and education level as well as using panel data between the years 1986-1996, Cannula and Gatschalk (2006) raised the usual question of the impact of education level on wages. Their experimental results show that overall wage growth is higher for workers with higher education. This makes more efficient overall experience of college graduates and working experience for high school graduates. Less investment in human capital can also explain moving more jobs for workers with low education. Results of this study show very different efficient in human capitals for different academic groups.

By estimate the wage in an article entitled "wage elasticity of productivity in advanced economies", Carter estimated some theoretical discussions and production flexibility of wages. Ha indicated that the discussion of constant share of wages has been always one of the highlights in the competitive theory of income distribution among productive agents. Carter came to the conclusion that real wages show less flexibility in comparison to the productivity and the share of wages in national income has been negative.

Lu et.al (2010) have conducted a research on the impact of human capital on productivity and market value of manufacturing companies and concluded that in addition to indicating real values of companies, human capitals cause competitive advantages between manufacturing companies.

Dong and colleagues (2011) showed that human capital has a significant positive effect on a company's performance and productivity. Wang and colleagues (2011) showed that human capital has a significant relationship with productivity.

Domestic Research

Nasarpour (2003) maintained that human labor productivity is the most important criteria of productivity and put it that manpower productivity is related to most organizational analyses and also manpower is the easiest measurable data. He came to the conclusion that manpower is the most important criteria of improving productivity. Anvari Rostami and Seraji (2005) examined the relationship between intellectual capital and market value of companies listed on the Stock Exchange of Tehran which are thus faced with high correlation of intellectual capital and market value of Tehran Stock Exchange companies.

In their article entitled "analysis of the relationship between wages and labor productivity in Iran industry" using time-series data of 1971-2001 and auto-regression distribution lag (ARDL) technique as well as Error Correction Model (ECM), Azvaji and Amini (2008) established a relationship between short-term fluctuations of wage and productivity variables with their long-term equilibrium values. They came to the conclusion that labor force productivity, education years and minimum real wages have important roles in determining wage level of industrial sector and this relationship has been approved in the long run. Another noteworthy result of this study is the higher increase of labor force productivity growth rate than the average growth of real wages in the period under study.

Etemadi et.al (2009) examined manpower productivity and stock market value. These chose companies in the period of 2001-2005 as a sample for this regard and the results achieved from regression and correlation of their research suggested lack of relationship between manpower productivity, market value and stock market output.

Goudarzi and Attaie (2009) examined the relationship between manpower (wage) and productivity in college. For this reason, these researchers tested the statistical community including Azad university branches of unit 4 during a five-year period and with a 142-sample. Their results showed that there is a significant positive relationship between manpower (wage) and productivity.

In a study entitled "surveying "the effect of intellectual capital on firm market value", Asadi et.al (2009) came to the conclusion that there is a direct impact of intellectual capitals on the firm value and a unit change in independent variables of efficiency coefficients of physical, human and structural capitals has an effect of 118% on the changes of market value to company's office value.

Jabbarzade and Bayazidi (2011) examined the impact of intellectual capitals in determining market value of Tehran Stock Exchange. In this study, they tested 66 companies during 2005-2009 using EViews econometrics and concluded that financial assets are less efficient in determining companies' market value compared with intellectual asserts (especially human capitals).

Research Objectives

The main objective of this study was to investigate the relationship between human capital, productivity and market value of manufacturing companies listed on the Tehran Stock Exchange an since human capitals is the interest of various groups such as shareholders, managers, researchers and politicians, the importance of this study is thus to highlight the role of human capital in measuring the productivity and value market of the companies listed in stock market in order to have the utmost operation of human capital. Also, the findings of this study contribute to better manage human capital which briefly are as follows:

1) Revealing the relationship between human capital and productivity

2) Revealing the relationship between human capital and market value

Research Hypotheses

Hypotheses for this study were obtained from a theoretical construct. For this reason, before designing the hypotheses, internal and external texts were first examined and then variables of each structure was exactly determined to design secondary hypotheses.

Main hypotheses 1: there is a significant relationship between human capital and labor productivity in manufacturing companies

Sub-hypotheses 1:

1. There is a significant relationship between wages and benefits and labor productivity.
2. There is a significant relationship between direct labor cost and labor productivity.
3. There is a significant relationship between indirect labor cost and labor productivity.

4. There is a significant relationship between administrative costs and employees sales and labor force productivity.

Sub-hypotheses 2:

1. There is significant relationship between wages and benefits and market value.
2. There is a significant relationship between direct labor cost and market value.
3. There is a significant relationship between employees' indirect costs and market value.
4. There is a significant relationship between administrative costs and employees sales and market value.

Statistical Community

In this study, we have a main statistical community and then a secondary statistical community which is the result of limitations. The primary statistical community is all listed companies in Tehran Stock Exchange. By applying some constraints, the study population has decreased. These limitations include:

1. Their end of financial year is 29 March.
2. They should be accepted in Tehran Stock Exchange before the year 2004.
3. They should not be part of investment companies and financial intermediaries.
4. They should not have financial year change during the period under study (2004-2011).
5. The investigation case should not be led to loss and also the rights of their stock owners should not be negative.

After applying the above-mentioned limitations and using screening method, 110 companies were chosen as secondary statistical community in that all of them were used as the final sample.

Research Variables

Measuring Human Capital Indicator

In accounting studies and research, to assess and measure human capital, various criteria have been used in that wage PR (premium and salary), workers direct cost, workers indirect cost and employee sale administrative cost have been used as human capital index (Abboud et.al, 2002, Hajiha and Hasanlou, 2011) that have been extracted from gains and losses. This variable is considered as independent variable in this study.

Measuring Productivity Index

In this study, job productivity (JP) has been used as an index to measure productivity. The method of calculation is as follows:

Job Productivity=number of workers/added value

Added value

Added value is calculated for the aim of avoiding from double counting. This means that the value of goods and services that are used as intermediate input of an activity is by itself an output of an activity and it is required that the output of this activity is subtracted to obtain added value (Nouel, 2001).

Methods to calculate added value

Added value in each level of economic unit is class (consisting of a number of economic units with similar activity), Group (consisting of several floors), part (consisting of a group), part (consisting of several parts) and eventually the entire economy (including all parts of the economy) (Carter, 2007; Sadeghi and Shaval pour, 2007).

To calculate added value, there are three methods as follows:

1 - Production or fractionation method
2 - Distribution and collection methods
3 - Consumption (expenditure)

It is noteworthy that production and distribution methods are calculated at different levels of economic units, but the consumption method is measured only at the macroeconomic level. The way to calculate added value in each method are presented in detail below:

Calculation of added value according to production method

Added value is obtained by subtracting the total cost of goods and services used in the production process of the firm's output value during a financial period. In other words,

Added value=value of intermediate consumption/output value

Calculation of added value according to collection method

A conventional method in institutions to calculate added value is its distribution to production factors. In this method, added value is obtained by adding up compensation costs of services, depreciation, taxes and operating surplus. In the cases that pay not only direct, but indirect taxes related to produced goods units or provided services or that they receive subside from the government in order to keep the level of prices down. The other indirect taxes minus subside should be added to the above four elements.

It is noteworthy that to obtain added value in this study, production (subtraction) for providing appropriate information as well as the studies conducted by Abboud et.al (2002), Knowli and Goutschalek (2006), Rebecca et.al (2011), Soltani (2005), Goudarzi and Attaie (2010) will be used.

Also, since expenditure method is for macroeconomic approach, it will not be calculated.

Added value=output value-intermediate consumption value

Output value

Output value is the goods and services that are produced in a manufacturing unit and ids made available to be used outside of that unit (Kheilian and Rahmani: 2008). Goods and service that are produced in a specific accounting period and then is consumed in that period in other processes of that unit does not constitute its output (Etemadi et.al: 2009). Thus, the concept of output is different from the concept of product that is the result of production.

Output value constituents

Output value of a manufacturing institution during a given period is the value of all produced goods and services by the institution in the financial period (Behbahani and Kharaghani, 2006). Output value is obtained by the sum of algebraic sum of the items described below:

- Sales
- The sales of by-products
- The difference between the purchase and sale of commercial operations (it is the value of untransformed goods value to sold goods minus the value of its purchase.
- Average of goods made + average of the goods during the process of construction.
- Established fixed assets + construction repairs + machineries and production equipment

Value of intermediate consumption

Consumption is an activity that institutional entities, goods and services are used. Intermediate consumption is the value of goods and services that are consumed as the data of a production process in that process except from consuming fixed assets that are recorded as fixed asset consumption. Goods and services may be transformed in a production process completely consumed. Some data are re-entered in another production process after being transformed and forming an output and some others such as electricity and most services are completely consumed in the production process (Andan et.al: 2002). Consuming the goods such as raw materials, electricity, water,

fuel, stationery, communications, transportation, minor repairs of building, machineries and the like are considered as intermediate consumptions.

Constituents of intermediate consumption value

Constituents of intermediate consumption value is the sum of unstable and low stable goods and services that are used during the process of producing institution's products (Kenowli and Gotschalek, 2006) and includes the following elements:

• Cost of direct materials
• Cost of indirect materials
• Supplies
• Insurance
• The cost of renting
• split costs (electricity, water and gas)
• Transportation costs
• Bank fees (charge credit facilities)

Measuring the index of market value

It is the price of selling an item of property (if it is purchased). If a company's securities are traded on the stock exchange, the transaction price usually reflects its market value. Accordingly, the administrative value of the properties of stock owners are obtained (to calculate the administrative value of a common stock, the value of common stock owner's properties are divided by the number of shares that is in the hands of shareholders) and then the market value of a common stock are divided on the administrative value of a common stock for a company's value is achieved (Jahanhani and Parsian, 2008, Anvari Rostami and Seraji, 2005, Hemati et.al, 2010).

Company's market value=$\frac{MV}{BV}$

Stock market value: MV

Stock administrative value: BV

Information analysis method

To analyze the information obtained from the study, the statistical method of correlation analysis in order to determine the kind and amount of relationship among the variables and regression analysis in order to determine the impact of independent variables on dependent variables. To review the hypotheses, a confidence level of 95% and significance level of 5% has been considered. Therefore, if the Sig statistics is less than 5%, zero hypothesis of the lack of correlation between dependent and independent variables are rejected and the current hypothesis regarding the relationship among the variables is accepted.

Also, correlation coefficients and determination coefficients are used to measure the intensity of correlation and the direction of relationship among variables. If the sign of correlation is positive, it indicates a direct relationship among the variables and if the sign of coefficients is negative, it indicates an inverse relationship between the variables.

In addition, determination coefficients showed what percentage of the variable's changes are the result of independent variable changes. Correlation coefficients (t) and determination coefficients (R^2) are obtained using the following equations (Azar and Momeni: 2006):

$$r = \frac{\sum xy - nxy}{\sqrt{\sum x^2 - nx^{-2}} - \sqrt{\sum y^2 - ny^{-2}}}$$

$R^2 = r^2$

Testing the hypotheses

Testing first class secondary hypotheses

Hypothesis 1-1: there is a significant relationship between premium and salary and job productivity.

H_0: there is no significant relationship between premium and salary and job productivity.

According to the table, the significance level (Sig) is greater than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis) is rejected. In other words, slope of the regression line is zero and there is no significant relationship between the two variables.

Hypothesis 2-1: there is a significant relationship between workers direct costs and job productivity.

H_0: there is no significant relationship between workers direct costs and job productivity.

According to the table, the significance level (Sig) is greater than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis) is rejected. In other words, slope of the regression line is zero and there is no significant relationship between the two variables.

Hypothesis 1-3: there is a significant relationship between workers indirect costs and job productivity.

H_0: there is no significant relationship between workers indirect costs and job productivity.

According to the table, the significance level (Sig) is less than 0.05 error level, thus it is not placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis) is accepted. In other words, slope of the regression line is not zero and there is a significant relationship between the two variables.

Given the significance level, regression mode coefficients and correlation coefficient are significant and due to the fact that the sign of independent variable coefficient is positive (workers indirect costs), it can be concluded that there is a direct relationship between the two variables of workers indirect costs and job productivity as follows:

JP=2.398 + 3.454 (WIC)

Also, given the value of determination coefficients (R^2=0.069), it can be concluded that 6.9 percent of job productivity changes are resulted from changes in workers indirect costs (WIC).

Hypothesis 1-4: there is a significant relationship between administrative costs and employees sales and job productivity.

H_0: there is no significant relationship between administrative costs and employees sales and job productivity.

According to the table, the significance level (Sig) is higher than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis) is rejected. In other words, slope of the regression line is zero and there is no significant relationship between the two variables.

Results of statistical analysis of first class secondary hypotheses are summarized in the following table:

Second class secondary hypotheses test

Hypothesis 1-2: there is a significant relationship between premium and salary and market value

H_0: there is no significant relationship between premium and salary and market value.

According to the table, the significance level (Sig) is less than 0.05 error level, thus it is not placed in the acceptance area (H_0) and zero hypothesis is rejected and the opposite hypothesis (claim hypothesis) is accepted. In other words, slope of the regression line is zero and there is a significant relationship between the two variables.

Table 1: results of first class secondary hypotheses

Correlation		Indication power		Variance analysis		Regression model			
Significance level	*R*	R^2 adjusted	R^2	Significance level	F (test)	Significance level	Coefficient	Variables	Hypothesis 1
0.778	0.027	-0.008	0.001	0.0778	0.079	0.000	4.346	Fixed component	Hypothesis 1-1
						0.008	0.288	PS	
0.0501	0.064	-0.005	0.004	0.456	0.456	0.000	5.02	Fixed component	Hypothesis 2-1
						0.778	-0.793	*WDC*	
0.005	0.0262	-0.06	0.069	0.005	8.271	0.008	2.398	Fixed component	Hypothesis 1-3
						0.005	3.454	WIC	
0.280	0.102	0.002	0.010	0.280	1.180	0.000	4.170	Fixed component	Hypothesis 4-1
						0.280	1.450	*ESAC*	

Period under study: 2004-2011 numbers of observations (year/company): 880

Correlation		Indication power		Variance analysis		Regression model			
Significance level	*R*	R^2 adjusted	R^2	Significance level	F (test)	Significance level Sig	Coefficient	Variables	Hypotheses
0.002	0.293	0.77	0.001	0.086	0.002	10.481	4.200	Fixed component	Hypothesis 1-2
						2.189	2.189	PS	
0.486	0.066	0.005	0.004	0.486	0.489	0.000	4.379	Fixed component	Hypothesis 2-2
						0.486	4.773	*WDC*	
0.309	0.096	0.000	0.009	0.309	1.044	0.000	0.630	Fixed component	Hypothesis 2-3
						0.309	3.454	WIC	
0.134	0.141	0.011	0.020	0.134	2.282	0.000	4.425	Fixed component	Hypothesis 2-4
						0.134	0.980	*ESAC*	

Period under study: 2004-2011 numbers of observations (year/company): 880

Table 3: results of first main hypothesis test

Correlation		Indication power		Variance analysis		Regression model			
Significance level	*R*	R^2 adjusted	R^2	Significance level	F (test)	Significance level Sig	Coefficient	Variables	Hypotheses
0.019	0.219	0.040	0.001	0.048	0.019	5.650	4.200	Fixed component	Hypothesis 1-2
							0.002	9.391	HC

Period under study: 2004-2011 numbers of observations (year/company): 880

Table 4: variance analysis of linear regression model of hypothesis 1:

Significance level	F statistics	Mean of second powers	Degree of freedom	Total of second powers	Model
0.019	5.650	294.994	1	294.994	Indicated by regression
		52.214	112	5848.0.23	Indicated
			113	6143.018	Total

Table 15.4: results of hypothesis test

Correlation		Indication power		Variance analysis		Regression model		
Significance level	*R*	R^2 adjusted	R^2	Significance level	F (test)	Significance level Sig	Coefficient	Variables
0.016	0.256	0.040	0.057	0.065	0.16	7.841	0.000	Fixed component
						0.016	5.775	HC

Given that significance level, regression coefficients and correlation coefficients are significant and that the sign of independent variable coefficient is positive (premium and salaries), it can be concluded that there is a direct relationship between the two variables of premium and salary and market value as follows:

MV=4.200+ 2.189 (SP)

Also, given that the amount of determination coefficients (R^2=0.086), it can be concluded that 8.6% of changes in market value (MV) are the result of changes in premium and salaries (SP).

Hypothesis 2-2: there is a significant relationship between workers direct costs and market value.

H_0: there is no significant relationship between workers direct costs and market value.

According to the table, the significance level (Sig) is higher than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is rejected and the opposite hypothesis (claim hypothesis, H_1) is accepted. In other words, slope of the regression line is zero and there is no significant relationship between the two variables.

Hypothesis 2-3: there is a significant relationship between workers indirect costs and market value.

H_0: there is a significant relationship between workers indirect costs and market value.

According to the table, the significance level (Sig) is higher than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis, H_1) is rejected. In other words, slope of the regression line is zero and there is no significant relationship between the two variables of workers indirect costs and market value.

Hypothesis 4-2: there is a significant relationship between administrative costs and employees sales and market value.

H_0: there is no significant relationship between administrative costs and employees sales and market value.

According to the table, the significance level (Sig) is higher than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis, H_1) is rejected. In other words, slope of the regression line is zero and there is no significant relationship between the two variables of administrative costs and employees sales and market value.

Results of statistical analysis of second class secondary hypotheses are summarized in the following table:

Main hypotheses test

Main hypothesis one and simple linear regression model is as follows:

There is a significant relationship between human capital and job productivity in manufacturing companies.

Significant test of regression model

In order to investigate the relationship between the dependent and independent variables (significant regression model), test (F) is used. Computer output of SPSS software and variance table (ANOVA) are used in this regard. Also, to evaluate the statistical significance of the regression model, the following assumptions were considered:

H_0= α_1=0 (Slope of the regression line is zero).

H_1: $\alpha_1\neq0$ (Slope of the regression line is not zero).

According to the table, the significance level (Sig) is less than 0.05 error level, thus it is not placed in the acceptance area (H_0) and zero hypothesis and the opposite hypothesis (claim hypothesis, H_1) is accepted. In other words, slope of the regression line is not zero and there is a significant relationship between the two variables of human capital and productivity.

Significance test of regression coefficients

T-test and calculated statistical figure have been used in variables coefficient table in surveying the significance of independent variable coefficients and fixed value of regression model as well as studying their determining role in dependent variable. In order to test the significance of regression coefficients, statistical assumptions were as follows:

H_0= α_1=0

H_1: $\alpha_1\neq0$

Table 5: variables coefficient in regression model

Significance level	T statistics	Standard error	Variables coefficients in the pattern	Model
0.000	7.504	2.915	21.875	Fixed component
0.019	2.377	3.951	9.391	Human capital

Results of regression coefficients tests showed that given the significance level (Sig) equals 0.000 in the fixed component of the model (intercept) and this amount is less than 0.05 error level, H_0 hypothesis is thus rejected and the fixed component of regression model (α_0) is significant.

Also, results obtained from the significance of independent variable coefficients (human capital) shows that given that the significance level (Sig) is less than 0.05 error level, H_0 hypothesis is rejected and its opposite hypothesis is accepted. In other words, the significance of human capital coefficients is confirmed. Thus, the basic model of linear regression in this hypothesis is as follows:

JP= 21/875 + 9/391 (HC)

Correlation analysis

Two important criteria in correlation analysis are coefficient of determination (R2) and correlation coefficient (R). The results of the correlation analysis between the dependent variable (productivity) and control variables (human capital), which were calculated by the software Spss18 are summarized in the table:

Table 6: correlation analysis

Assessment standard error	Mediated determination coefficient	Determination coefficient (R^2)	Correlation coefficient ®
7.22596	0.040	0.048	0.219

Given the significance level, regression model coefficients and correlation coefficients are significant and due to the fact that independent variable coefficient (human capital) is positive, it can be concluded that there is a direct relationship between the two variables of human capital and job productivity in that correlation coefficients equals 0.219 in this regard. Also, given the determination coefficient (R^2=0.048), it can be concluded that 4.8% of productivity changes are caused by human capital.

Hypothesis 2: there is a significant relationship between human capital and market value in manufacturing companies.

H_0: there is no significant relationship between human capital and market value in manufacturing companies.

Results of statistical analysis of the above hypothesis are summarized in the following table:

According to the table, the significance level (Sig) is higher than 0.05 error level, thus it is placed in the acceptance area (H_0) and zero hypothesis is accepted and the opposite hypothesis (claim hypothesis) is not accepted. In other words, slope of the regression line is zero and there is no significant relationship between the two variables of human capital and market value.

Conclusion

Human capital represents people's knowledge in an organization. Accordingly, the current study seeks to investigate the relationship between human capital (that is done through premium and salaries, workers direct costs, workers indirect costs, administrative costs and employees sale), productivity and stock market value in listed companies in Tehran Stock Exchange. For this reason, 110 companies were chosen through screening method is a period of 8 years (2004-2011) and then were tested through multivariate regression. The results indicate that there is a significant positive relationship between human capital and labor productivity and there is no correlation between human capital and stock market. Also, there is a significant positive relationship between workers indirect costs and job productivity and that there is no significant relationship between components of human capital and productivity. In the components of human capital on market value, there is a significant positive relationship between premium and salaries and the second dependent variable and the other components of human capital has a significant positive relationship with market value.

Suggestions for further Study

1) Modeling and prediction of human capital for future years based on econometric approaches such as ARIMA, ARMA to inform investors of future performance of companies.
2) The impact of labor productivity on firm value
3) The impact of labor quality and value of the company
4) The relationship between human capital, profits and market value

Research Limitations

Unavailability of the information required in this research for many companies in Tehran Stock Exchange, particularly in the case of manpower caused a reduction in the number of samples in this study and the generalizability of the findings. Also, the subtraction method was used to measure labor productivity, which in some cases increasing corporate value is not available. However, this measure provides a key indicator for the efficiency of production companies.

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