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Repeated Measures Analysis on Determinant Factors of Enterprise Value

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Abstract

Enterprise value is the result of interaction between financial and nonfinancial factors. Financial factors represent important resources in production of goods but their contribution on enterprise has decreased with the development of knowledge-based economy. Acceptance of nonfinancial factors as elements generating future benefits imposed the application of European politicies concerning nonfinancial reporting for multinationals.

The objective of this article is the variation analysis of the most significant financial and nonfinancial factors of enterprise value. The analyzed sample consist of 400 european multinationals for the period 2009-2012.

The statistical tool used was SPSS 20 and work method was repeated measures ANOVA. The results showed several evolution of factors analyzed, providing support for developed of factors that increase enterprise value.

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Keywords: nonfinancial factors, repeated measures ANOVA, market value, book value

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1. Introduction

In the knowledge-based economy, non-financial factors are elements which create value, complementary to the financial and tangible capital. Today it is widely accepted by investors and managers that multinationals incorporates inimitable and non-substitutable resources with significant implications on the development of competitive advantages.

Both the role of multinational corporations in developing and effectively managing non-financial factors but also the lack of information released to the investors on these resources imposed the application of a European legislation on non-financial reporting.

2. Review of prior literature

In the knowledge-based economy, the company's market value is calculated by the following algorithm: *Market value (MV) = Book value (BV) + nonfinancial factors (IC)*, where MV represents the total value of the issued shares of the company, being equal to the share price times the number of shares outstanding, BV is the excess of all assets and debts of an entity on all their debts and IC - assembly of non-financial factors impacting enterprise results.

The classification of non-financial factors was developed by Stewart (1997) and presents the following structure: (a) human capital represents all the knowledge and competencies of the employees; (b) structural capital represents all policies and procedures that support human capital to create economic value and financial health (Bontis and Serenko, 2009) and (c) relational capital represents all external relationships that contribute to long-term performance of the company (Ittner, 2008).

Based on classification of Stewart, we selected the most important nonfinancial factors from the perspective of social responsibility (table 1).

Table 1. Types of non-financial factors

Variable	Explanation
	1. HUMAN CAPITAL
Compensation& Benefits (CB)	The company's ability to ensure the loyalty and productivity of the workforce through a fair and correct treatment and develop lasting relationships with employees through promotion procedures.
Training (TH)	Enterprise's ability to ensure optimal working conditions through professional development programs and labor protection.
Diversity (DI)	Enterprise ability to support workforce diversity and ensure fair and non-discriminatory treatment.
	2. STRUCTURAL CAPITAL
Product (PR)	Entity's ability to develop, design and effectively manage its impact on civil society
Resource management (RM)	Degree of optimization of resources in the production of goods and services as improving distribution channels and reduce water and energy consumption.
Leadership ethics	Entity's ability to treat his business partners fairly and maintain long-term collaborative relationships.
Transparency & reporting (TR)	Entity's ability to enforce corporate policies aligned with the objectives of sustainability and conducting a transparent management to the shareholders.

Environment policy (EP)	Entity's ability to implement effective policies for reducing the impact of its activities on the environment.
Energy climate (EC)	entity's ability to develop effective policies and strategies to reduce energy consumption and alternative environmental technologies
	3. RELATIONAL CAPITAL
Community development (CD)	The involvement of local action entity in the form of charity, donations of goods and services, public health protection activities and social impact management capacity of production activity
Human rights (HR)	Entity's commitment to respect fundamental human rights, supporting freedom of association and forced labor exclusion
Board (BD)	Entity's ability to comply with best practice on the management structure, independently decision -making and the application of best practices regarding the board.

Source: Own structure after csrhub.com and Sveiby classification (1997)

3. Research methology

The scope of this article is to analyze the influence of time variation on nonfinancial factors in correspondence with market value and book value by using repeated measurements.

3.1. Target sample and variables analyzed

The target population is represented by European multinationals which execute non-financial reporting based on the Global Reporting Initiative requirements.

Table 2. Territorial and sectoral distribution of multinationals

Sectorial distribution	%	Territorial distribution	%
Utilities	5,25	United kingdom	19,75
Telecommunications	10,75	Switzerland	7,25
Technology	7,00	Sweden	9,25
Industrials	14,50	Spain	6,00
Healthcare	9,50	Finland	4,50
Financials	14,25	Netherland	5,50
Energy	7,75	Italy	6,60
Consumer staples	7,50	Germany	12,25
Consumer discretionary	11,75	France	13,75
Basic materials	11,75	Other	15,15

In order to ensure comparability of financial and non-financial data the following conditions were imposed: availability of data for the entire period under review and financial year to be completed on 31 December. Based on the restrictions applied, it was selected a sample consisting of 400 European multinationals, including 1600 records for the 2009-2012 period.

Sectorial distribution show multinationals concentration in industry, financial and basic materials, this phenomenon being generated by homogeneous products and the existence of a large number of buyers and sellers. In the opposite side, we find the sectors of utilities, energy and information technology which present a small number of sellers, but with a high degree of innovation, specialized products and the use of advanced technologies. The territorial distribution highlights the location of large corporations in industrialized countries and supporters of research and development, such as the United Kingdom, France, Germany and Switzerland.

In order to achieve the objectives of the research were selected following variables: market value, book value and non-financial factors presented in the table 1. Data regarding book value and market value were taken from the financial statements of the multinational analyzed while non-financial factors were extracted from the csrhub.com database and shows scores between 0 and 100.

3.2. Method

A repeated one–way ANOVA is testing the differences of mean scores for one dependent variable across two or more within-group conditions of independent variabile (Mayers, 2013) The aplication of this method requires the following restrictions: dependent variables must be reasonably normally distributed, every individual must be present in all conditions, independent variable must be categorical, with at least two conditions and it need to account for sphericity of within-group variances (Mayers, 2013).

Fisher statistics is being used to test significant differences for the dependent variables generated by repeated measurements (Jaba, 2013). Total variation (SST) is partitioned into three components: variation among individuals (SSI), variation among test occasions (SSO) and residual variation (SSRES) (Hinkle, Wiersma & Jurs, 2003)

Table 3. Anova summary

Source	SS	df	MS	F
Individuals	SSI	n-1	SSI /(n-1)	
Occasion	SSO	K-1	SSO/(K-1)	MSo/MSRES
Residual	SSRES	(K-1)(n-1)	SSRES/(K-1)(n-1)	
Total	SST	N-1		

Source: Hinkle, Wiersma and Jurs, 2003

Depending on the number of levels of within-subjects factor, it is necessary different interpretation of the results:

- If the within-subject factor has only two levels, a standard univariate F test is conducted for testing the differences of mean scores.
- If the within-subject factor has more than two levels, we need to check for sphericity of variances. If this assumption is violated, the p values associated with the standard within-subjects can not be trusted and we need to use alternative univariate tests. These tests employ the same calculated F statistic, but its associated p value potentially differs and an epsilon statistic is calculated based on the sample data to assess the degree that the sphericity assumptions is violated (Howell, 2007)

Repeated measures ANOVA tests the hypotheses of differences between within-group conditions, but does not determine which groups are different from the other. In order to identify groups showing significant differences it is used multiple comparisons by using tests such as Bonferroni, LSD or Sidak.

In this study, the statistical analysis was performed by 14 dependent variables and one independent variable. In the detection of significant differences between groups we used the Bonferroni test and data processing analysis was performed using SPSS 20.

4. Results

Analysis of non-financial factors based on repeated measurements is useful for making comparisons to the entity in the same sector of activity or identify those inimitable resource that helps to create added value.

We chose Greenhouse-Geisser test for testing the differences of mean scores for each variable analyzed because the assumption of sphericity variance was violated. Results of testing significant differences based on repeated measurements are presented in Table 3. A repeated measures one way ANOVA indicated that there was a significant difference of mean scores for all the variables analyses.

Table 4. ANOVA results

Variable	df	Mean Square	F	Sig.	Variable	df	Mean Square	F	Sig.
CD	2.146	8968.304	188.139	.000	EC	1.910	5260.010	115.090	.000
HR	2.352	1160.373	26.049	.000	EP	2.260	2160.502	56.890	.000
PR	2.413	17091.091	493.583	.000	RM	2.037	9871.693	224.092	.000
CB	2.177	11415.874	276.734	.000	BR	1.885	7429.559	299.488	.000
DI	1.690	3822.808	42.341	.000	LE	2.054	6030.740	166.060	.000
TH	1.564	9500.217	73.489	.000	TR	1.998	2149.413	42.459	.000
MV	2.034	3388926666	46.083	.000	BV	1.700	171230314.82	6.244464	0.004

Repeated Measures ANOVA allows us to create a hierarchy of non-financial factors in order to identify those resources with significant implications for creating added value. From this analysis, we can see that European multinationals do not concentrate on developing a fruitful relationship with the local community (community development) or on supporting policies to reduce energy consumption (energy climates) because their attention is focused on the development of specific non-financial factors human capital. These results confirm that human capital is an essential resource for value creation process as it is a constant source of creativity and innovation.

Analysis of variance on repeated measurements shapes significantly reduced values of non-financial factors in 2009 compared to other periods for all variables analyzed. These results are predictable due to management focus on solving economic difficulties specific to the analyzed period.

In the next period is highlighted an improvement of the recorded values of variables analyzed, showing interest in non-financial factors as creative resources and sustaining the competitive advantage

In 2010, a significant positive trend compared to the previous period is being observed for human rights, community development and energy climates, but their failure to maintain on an upward trend suggests that these values are purely accidental and these factors do not have a significant contribution for European multinationals.

Table 5. Descriptive statistics

Variable	Year			
	2009	2010	2011	2012
Community development	44.96 [234]	53.86 [134]	52.66 [124]	51.85 [123]
Human rights & Supply chain	53.94 [234]	57.55 [134]	56.39 [12]	55.77 [12]
Product	43.64 [234]	53.27 [134]	56.64 [124]	55.20 [124]
Compensation& Benefits	47.65 [234]	56.05 [134]	56.99 [12]	57.07 [12]
Diversity	54.34 [234]	58.57 [13]	59.52[12]	58.59 [13]
Training	54.30 [234]	60.16 [134]	62.07 [124]	61.24 [123]
Energy climate	49.66 [234]	56.14 [134]	54.79 [124]	52.00 [123]
Environment policy	54.67 [234]	58.85 [134]	59.01 [14]	57.90 [13]
Resource management	48.71 [234]	56.26 [134]	58.18 [124]	54.83[123]
Board	51.28 [234]	54.15 [134]	57.45 [124]	58.90 [123]
Leadership ethics	52.50 [234]	57.06 [134]	59.50 [12]	59.12 [12]
Transparency &reporting	54.26 [23]	56.85 [134]	58.50 [124]	55.07 [23]
Market value ($millions)	25773.71 [234]	28575.93 [134]	22903.25 [124]	26984.33 [13]
Book Value ($ millions)	14578.41 [23]	13901.43	13424.53 [14]	14234.02 [3]

Note: Pairwise comparaison (Bonferroni test) [1]-2009; [2]-2010; [3]-2011; [4]-2012

Setting values recorded some non-financial factors from 2011 identifies those resources that help create competitive advantages for European corporations. Based on this reasoning, we can say that non-financial factors that contribute significantly to value creation are: the relationship with business partners (human rights) policy on product quality (product), practices and policies for motivating employees, (compensation and benefits) discrimination procedures employees (diversity), training (training) and practice on organizational communication (leadership ethics).

Conclusions

In the new economy, the enterprise value maximization is the main concern of management. The positive non-financial factors shown by repeated Measures ANOVA method confirm the impact of non-financial factors on the creation of economic value and development of competitive advantages. The analysis results show that European multinationals develop policies and strategies in the development of human capital, skills and abilities of the employees being the most important non-financial resources in creating competitive advantages.

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