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The Effect of Structural Capital on Enterprise (Qualitative and Quantitative) Performance

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Abstract

Intellectual capital is a new managerial notion that is adaptive to changing environmental conditions and provides advantages in highly competitive marketplace. It is contextualized in the literature with the sub-elements: st*ructural capital, human capital and relation capital.* Even though this notion found wide interest in academia, the impacts of its sub-elements on business performance haven't been studied enough. In this study we aim to fill this gap. For this reason, the relationships between structural capital and qualitative and quantitative performance have been investigated. For analysis we preferred Structural Equation Model (SEM) using Lisrel 8.51. According to the findings, structural capital affects the qualitative performance positively and explains 82% of the change in qualitative performances of companies; while explaining 28 % of the positive change.

Keywords: intellectual capital (IC), structural capital (SC), quantitative performance, qualitative performance

1-Introduction

Enterprises are affected from the society which they come from. Today, the information society has changed the roles in business life dramatically. With the rapid advancement of information technologies there are radical changes in business environment like management, customers, market structures and competitors. This is followed by a new era in corporate governance and *Intellectual Capital (IC)* which has become the most valuable asset of a company (Edvinsson, 1997). Although the literature shows the importance of IC, there is no consensus on this concept. Adhering to the literature we consider that *Structural Capital (SC)* is one of the sub-dimensions of IC.

The purpose of this study is to define intellectual capital and its elements, and to measure their impact on quantitative and qualitative business performance. To accomplish this purpose, in the second part of the study –literature review and development of hypothesis- we define the intellectual capital and its sub-elements, structural capital, qualitative and quantitative performance and develop our hypothesis. In the third part – methodology- we analyze the data and test our hypothesis with the help of SEM. Data was collected from different chambers of commerce and industries throughout Turkey in addition to private company managers via e-mail. In the methodology part, reliability and validity tests have been done too.

In the context of structural capital, we considered organizational culture, corporate image and brand, information technology, R&D and innovation, intellectual property, management philosophy and process as sub-factors. According to Ergün (2003), to evaluate the enterprise performance, it is recommended to consider both qualitative and quantitative performances. In this study, the effects of SC on qualitative and quantitative performance have been investigated to fill the gap in the literature and lead for future research.

Finally, in the conclusion part, we discuss the results of the analysis and give recommendations for researchers.

2. Literature and Development of Hypothesis

2.1 Intellectual Capital

Intellectual capital (IC) is defined as a company's current knowledge, its relationship with environment, and its employees' knowledge, skills and experiences that provide competitive advantage (Bontis, 2001). (IC) is one of the most recent approaches for enterprises to adapt themselves to highly competitive, very dynamic and rapidly changing environmental conditions. It is defined as a sum of information, experience and skills which give advantage in competition and reveal

values. IC is existing within the structure and the relations of an enterprise with its environment and possessed by the employees (Bontis, 2001; Brooking, 1996; Edvinsson and Malone, 1997; Roos, G., and Roos, J., 1997; Stewart, 1991; Stewart, 1997; Sveiby, 1997).

Intellectual, as a word, stems from "interlectio" in Latin language. "Inter" means between and also relationship. On the other hand "Lectio" means knowledge that is derived (Arıkboğa, 2003). Researchers define intellectual capital, depending on the origin of their discipline, as a value increasing effect creator, or competitive advantage provider.

Thomas Stewart (1991) is the very first one to use intellectual capital concept in his study called "Brain Power" as "the sum of everything that employer knows that provides competitive advantage in the market place". Further in 1997 Stewart defined IC as gained knowledge about processes of organization, technologies, patents, skills of employees, customers, suppliers and other parties that the company is in relationship with in his book named "Intellectual Capital: The New Wealth Of Organizations" (Stewart, 1997).

Leif Edvinsson (1997), known as the first professional IC manager, defines IC as "info that would be converted into value". Karl Erik Sveiby (1997) approached IC through human capital dimension and claimed that know-hows and employees' skills are very important factors for evaluating companies. Brooking (1996) claimed that IC as intangible assets helps to sustain business and provides functionality to enterprise; On the other hand, Roos, J. and Roos, G. (1997) considered IC as the most valuable resource which helps to maintain company's competitiveness and is not apparent on the balance sheet. Consequently, from IC it is understood that any knowledge, experience and skill can create competitive advantage and values (Bontis, 2001; Brooking, 1996; Edvinsson and Malone, 1997; Stewart, 1991; Stewart, 1997; Sveiby, 1997; Roos, G., and Roos, J., 1997).

These classifications can be seen on the Table 1.

Table 1. Classifications in Intellectual Capital

Author	**Country**	**Classification**
Edvinsson& Malone (1997)	Skandia Value Scheme (Sweden)	Human Capital Structural Capital
Bontis (1998)	Canada	Human Capital Structural Capital Customer Capital
Stewart (1997)	America	Human Capital Structural Capital Customer Capital
Saint – Onge (1998)	Canadian Imperial Bank of Commerce (Canada)	Human Capital Structural Capital Relational Capital
Sveiby (1997)	Intangible Assets Monitor (Australia)	Employees' Competence Internal Structure External Structure
Van Buren (1999)	American Society for Training and Development (America)	Human Capital Innovation capital Process Capital Customer Capital
Roos et al. (1998)	England	Human Capital Structural Capital Relational Capital
O'Donnell and O'Regan (2000)	Ireland	Employees Internal Structure External Structure

(Source: C. TSENG and Y. J. GOO, "Intellectual Capital and Corporate Value in an Emerging Economy: Empirical Study of Taiwanese Manufacturers", R & D Management, Volume: 35:2, 2005, pp. 187 – 201)

In order to understand and evaluate better, components of IC should be known (Huang, Luther and Tayles 2007) and for this purpose different IC models have been developed. European Union launched MERITUM (Measuring and reporting intangibles to understand and improve innovation management), which is a consensus project, to avoid different understandings of intellectual capital and to reach a common definition. In the MERITUM project, intellectual capital is defined as "combination of human, structural and relationship capitals" (MERITUM, 2002) and this definition is adopted in this study. According to this it can be said that tangible assets can be analyzed in three main headings.

2.2 Structural Capital

Structure is the framework of an enterprise and concept is created to have a more successful and more effective businesses (Nordström and Ridderstrale, 2000). Structural capital (SC) helps enterprises to have both employees' and relationship

knowledge considered as permanent (Stewart, 1997).

IC is founded and developed over SC. If the content of SC is weak, it will not provide relative advantage to enterprise (Bontis, 1998). Only if business structure provides a relative advantage then we can talk about SC (Kurşunmaden, 2007). The other elements of IC would be useful only via SC. When human capital (HC) and relationship capital (RC) are high and SC is not sufficient, it will be impossible to attain sustainable performance. It is not surprising to loose employees and customers in some cases. However, SC is a property of the enterprise and SC makes info from employees and info from customer relationship stay in the enterprise (Akpınar, 2003; García-Álvarez, Mariz-Pérez, Álvarez, 2011; Seetharaman, Low, Savaranan, 2004).

SC is a sum of hardware, software, database, organizational structure, patents, brands, strategies that increases productivity, system and the processes. In general, SC is considered as methods, policies, databases, records, documentations, organization philosophy and culture, financial relationships, patents and all other elements' mixture. (Bontis, 1998; Çıkrıkcı and Daştan, 2002; Edvinsson and Malone, 1997; Edvinsson and Sullivan, 1996; Lynn, 2000; Oh,Nga,Ho, 2011; Ortiz, 2006; Roos, Bainbridge, Jacobsen, 2001).

Maditinos and others (2011) claim that SC is organizational culture, management philosophy, processes, intellectual properties, R&D and innovative abilities' institutional state. From this definition, we consider that

SC consists of the components of: a) Organization Culture, b) Corporate image and brand, c) Information Technologies, d) R&D and innovativeness, e) Intellectual property, f) Process and g)Management Philosophy.

İpçioğlu (2007) claims that SC helps enterprises' quantitative and qualitative performance. Therefore enterprises should improve their SC to have a sustainable competitive advantage (Bontis, Keow, Chua, Stanley, 2000; Saint-Onge, 1998). Subsequently;

H1: Structural Capital affects the Quantitative Performance positively.

H2: Structural Capital affects the Qualitative Performance positively.

2.3 Performance

Performance would be considered as realizing the targets as a result of all activities. Samir and Subrata (2006) argue that, performance is a measure of organizational activities' efficiency and effectiveness. Performance would be quantitative or qualitative. Complex competition structure demands qualitative measures as well as quantitative measures (Kennerly and Neely, 2002).

Measurement of quantitative performance requires use of objective scales. Yıldız (2011) states that both objective measures and subjective measures are used to measure performance. Meanwhile, objective measurement scales may contain false information since companies adopt inconsistent data recording methods for different time periods. Ergün (2003) claims that perceived performance measurement requires respondents to have a wide perspective and collect the data consistently. In addition, difficulty in access to objective resources makes use of perceptual data inevitable (Yıldız, 2011). (Alpkan, Ergün, Bulut, Yılmaz, 2005) used managers' perceptual evaluations to measure corporate performance. Depicting these approaches from the literature, SC, quantitative and qualitative performance questions are to compare companies with other companies from their industry.

Qualitative performance: innovativeness, adaption, operational performance, human resources performance are used as measures in this study.

Quantitative performance: general performance, turnover profitability, assets' profitability and general profitability are used as measures in this study.

3. Method

Marr (2004) claims that measuring and recording IC is difficult due to its nature. The IC is measured in two patterns; on the basis of enterprise and on the basis of its elements (Luthy, 1998). There is a transformation among sub-elements of IC. HC is there in the beginning of this transformation process. Investment in HC will result in improvement in SC and as a result, enterprises increase their performance (Bayer, 2003; Ertuğrul, 2000; Kaplan and Norton, 1992; Moon, Kym, 2006; Saint–Onge, 1998; Shih, Chang, Lin, 2010).

Hypothesis of IC's and its sub-elements' positive effects on performance has been tested in the IC literature (Akpınar, 2003; Bontis, 1998; Chen, Cheng, Hwang, 2005; Firer and Williams, 2003; Huang and Hsueh, 2007; Karacan and Ergin, 2011; Mavridis, 2004; Roos, G., and Roos, J., 1997). Bontis (1998) showed positive effect of IC's sub-elements on the other sub elements and performance in his study.

Studies on sub-element level revealed that different factors become prominent in terms of affecting performance. Among these, Bozbura and Toraman (2004) carried out their study on Turkish Managers and found out that SC has no direct

impact on performance; however, it affects performance through affecting HC and customer capital. Meanwhile İraz and Özgener (2005) carried out a study in manufacturing small businesses and found out that SC has positive effect on performance. Consequently, İpçioğlu (2007) found that SC has positive effect on performance. These impacts are very much industry depended (Bontis et al., 2000). However, literature review yielded no significant study on SC's effect on qualitative and quantitative performance and this study will fill this gap.

In this study, measurement will be performed on the basis of the elements. Performance is a balanced combination of quantitative and qualitative results (Eren M. Ş., Yücel,Eren S. S., 2010). Performance measurement and analysis play an important role on determining organizational results. Popova and Sharpanskykh (2010) argue that performance should be analyzed by considering both quantitative and qualitative organizational targets. The qualitative and the quantitative performances of the enterprise can be compared to similar companies (Moon and Kym, 2006). Bontis (1998) recommends Likert-type scale for intellectual capital measurement and we adopted 5 likert scales in the study.

Structural equation modelling provides advantage to reveal all relationships of variables at one time; the relations between observed and latent variables can be tested in terms of direct and indirect effects comprehensively; researchers can measure complex models in order to evaluate direct and indirect effects of variables in univariate or multivariate studies (Dursun and Kocagöz, 2010). Consequently, the intellectual capital model has been tested by the structural equation modelling (SEM).

Since no previous study in the same format has been performed, it is preferred to constitute a new scale. For this purpose, the studies contributed essentially in the formation of the literature and having a consensus upon their expertise have been considered.(Bontis, 1998; Bontis, 2001; Brooking, 1996; Dzinkowski, 2000; Edvinsson, 1997; Edvinsson and Malone, 1997; Marr, 2004; Moon and Kym, 2006; Nahapiet and Ghoshal, 1998; Petty and Guthriel, 2000; Roos G. and Roos J,, 1997; Saint-Onge, 1998; Stewart, 1997; Sullivan, 2000; Sveiby, 1997; Yang, Wang, Wong, Lai, 2008)

Gorsuch (1983) claims that a sample size of 200 is sufficient for such a study and we have distributed our questionnaire to 127.418 subjects and got responses from 1050 with the return rate of 0.824%. In the questionnaire, the scale developed by (Yılmaz, Alpkan, Ergun, 2005) is used to measure qualitative and quantitative evaluations. The Lisrel 8.51 program has been utilized for the analysis.

In the research, theoretical frame of the work is mentioned as it is given in Figure 1.

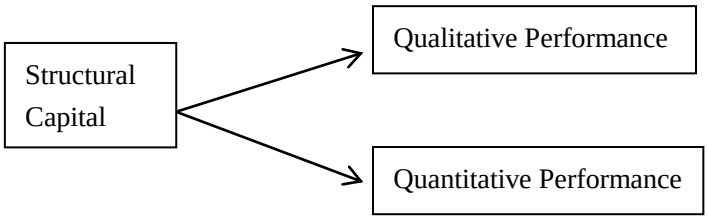

Figure 1. Model of the Study

Table 2. Sub-factors of SC

Structural Capital (SC)
Organizational Culture
Information Technologies
Organizational Image
Management Philosophy
R&D and Innovation
Process
Intellectual Ownership

3.1 Analysis and Findings

Structural equation modeling was used to examine data. Baseline characteristics of the respondents are examined by Frequency Analysis. Position of participants, number of employees and sectors of firms subjected to the survey are given in Table 4.

Table 3. Baseline Characteristics of the Respondents

Parameters	Frequency (n)
Duty	
Shareholder	407
Senior manager	267
Manager	316
Other	60
Number of employers	
10000 + workers	21
1000 – 10000 workers	90
500 – 1000 workers	39
250 – 500 workers	65
100 – 250workers	106
50 – 100 workers	87
10 – 50 workers	330
0 – 10 workers	275
Not answered	37
Sectors of the firms	
Informatics	42
Consultancy	64
Education	57
Energy	18
Finance	34
Food	73
Production	88
Building	86
Public	23
Chemistry	33
Medical / Health	43
Media Advertisement	59
Metal	49
Forestry and furniture	36
Automotive	60
Technology	53
Textile	73
wholesale and retail	48
Tourism	35
Logistic	46
Other	30

According to the table, it can be argued that sample of the research is sufficient to demonstrate current economical state of Turkey. Rates of firm sectors, firm sizes (based on the number of employers according to enterprise surveys) were in accordance with macro-economic structure of Turkey.

3.1.1 Structural Equation Modeling Application

The preliminary validity and reliability analysis of models and hypotheses created in the research has been performed, they are shown in every table respectively.

Model Compliance Criteria

Model fit can be summarized as "determining the significance of differences between observed data matrix and expected data matrix". In this case, the desired one is that there is an absence of difference between both matrices or that the difference that occured is not significant; in other words it is accidental. For this purpose, various fit indices were improved and different fit indices were used in the statistical packages. In this study 8:51 Lirsel software package is used and the used disclosures of fit indices are given below.

Chi-Square Goodness of Compliance (X^2)

With the simplest definition, test X^2 is obtained by multiplying the adjustment value between two covariances by the number of subjects in the sample using the minus one. The result obtained is calculated as distribution of x^2. If fit between the model and data is perfect, the value obtained needs to be close to 0 and significance value (p) needs to be insignificant.

Test X^2 is a hypothesis testing. In this respect, the hypothesis "H1 = there is no difference between Observed and expected variance-covariance matrices" is tested. The fact that the result is meaningful ($p<0,01$) means there is difference and this is an undesirable situation (Çokluk, Şekercioğlu, Büyüköztürk, 2010).

According to Hu and Bentler (1998), insignificant differences between expected covariance matrix and observed covariance matrix often cause to significance of X^2 in large samples. Thus, when assumptions in large samples are taken on the basis of the test statistics X^2, incorrect interpretations might occur.

Chi-Square / Rate Degrees of Freedom (X^2/sd)

In large samples, Rate Degrees of Freedom to x2 can be used for qualification as a criterion. Therefore, 3 and lower rates are accepted as good; rates to 5 as sufficient fit (Çokluk et al., 2010).

Goodness of Fit Index (GFI) and Arranged Goodness of Fit Index (AGFI)

These indexes were developed in order to evaluate model fit regardless of sample size. It indicates at what rate the model measures covariance matrix in the sample and it is also accepted as the sample variance in which the model describes. GFI is similar to R2 in multiple regressions (Çokluk et al., 2010). It gets a value between 0 and 1 and it is good to be close to 1.

Root Mean Square Error of Approximation (RMSEA)

It refers that there is no difference between the universe and the sample covariances. It gets a value between 0 and 1 and it is good to be close to 0.

Square of Standardized Residual Mean (S-RMR)

They are the residual average covariances between predictive covariance matrix of the universe and covariance matrixes of sample. It changes between 0 and 1 and it is good to be close to 0.

Comparative Fit Index (CFI)

It gives model fit or adequacy of the model by comparing with a base model that is generally called as independence model or absence model and that assumes there aren't any relations among variables. It values between 0 and 1 and it is good to be close to 1.

Not Normed Fit Index (NNFI)

It compares X2 value of Independence model to X2 value of the model taking account of degree of freedom. It gets value between 0 and 1 and it is good to be close to 1.

Path Coefficient (Standardized β)

Direct causal effects in Structural Equation Modelling are called as path coefficients or structural coefficients.

Standard Error (S.E.)

It is standardized as a stated measuring error or error variance. Measuring error or error variance refers to all other sources of unexplained variance. It can be seen as unmeasured exogenous variables (Çokluk et al., 2010).

Validity and reliability test results of data analyzed in the study are presented in the table below.

Table 4. Measures of Goodness of Fit for Model

Measure	Good fit	Acceptable fit
$\chi^2 / (sd=287)$	2	5
RMSEA	0<RMSEA<0,005	0,05< RMSEA<0,10
p values for fit test $(RMSEA < 0.05)$		
NFI	0,95<NFI<1	0,90<NFI<0,95
NNFI	0,97<NNFI<1	0,95<NNFI<0,97
CFI	0,97<CFI<1	0,95<CFI<0,97
GFI	0,95<GFI<1	0,90<GFI<0,95
AGFI	0,90<AGFI<1	0,85<AGFI<0,90

It is expected that error variances are low, factor loadings are high, but lower than 0.85 in a measurement model. CFA analysis results of the data for structural capital are given in Table 6.

Table 5. Structural Capital CFA Results

Parameters		T	*p*	Alpha	SCR	AVE
Organizational culture				0,91	0,90*	0,61**
Org1	0,77		0,00			
Org 2	0,76	25,81	0,00			
Org 3	0,81	27,97	0,00			
Org 4	0,77	25,88	0,00			
Org 5	0,83	28,40	0,00			
Org 7	0,76	25,93	0,00			
Organizational image				0,76	0,79*	0,55**
IMG1	0,85		0,00			
IMG2	0,66	19,75	0,00			
IMG4	0,71	20,25	0,00			
Information technologies				0,84	0,80*	0,58**
KNW1	0,74		0,00			
KNW2	0,79	25,79	0,00			
KNW5	0,75	22,41	0,00			
R&D and innovation				0,91	0,89*	0,66**
RD2	0,85		0,00			
RD3	0,76	29,79	0,00			
RD4	0,83	31,08	0,00			
RD5	0,81	27,19	0,00			
Intellectual ownership				0,78	0,75*	0,51**
OWN1	0,74		0,00			
OWN3	0,69	18,90	0,00			
OWN6	0,70	19,13	0,00			
Management philosophy				0,90	0,89*	0,73**
MPHL1	0,84		0,00			
MPHL2	0,87	34,95	0,00			
MPHL3	0,86	34,57	0,00			
Procedure				0,90	0,92*	0,78**
PROC1	0,90		0,00			
PROC2	0,93	48,28	0,00			
PROC3	0,82	36,69	0,00			

X^2=988,71; sd=253; X^2/sd=3,91;p=0,00; RMSEA=0,05; SRMR=0,03; NNFI=0,96; CFI=0,96; GFI=0,93; AGFI=0,91

*>0, 70, **>0,50

When the model fit of structural capital scale is analysed, it is seen that P value for X^2 value is significant (p<0,05) but model fit is appropriate because X^2/sd<5, other fit indices support model fit (RMSEA=0,05; SRMR=0,03; NNFI=0,96; CFI=0,96; GFI=0,93; AGFI=0,91) (Table 6)

There are 7 factors and 25 observed parameters for these factors.

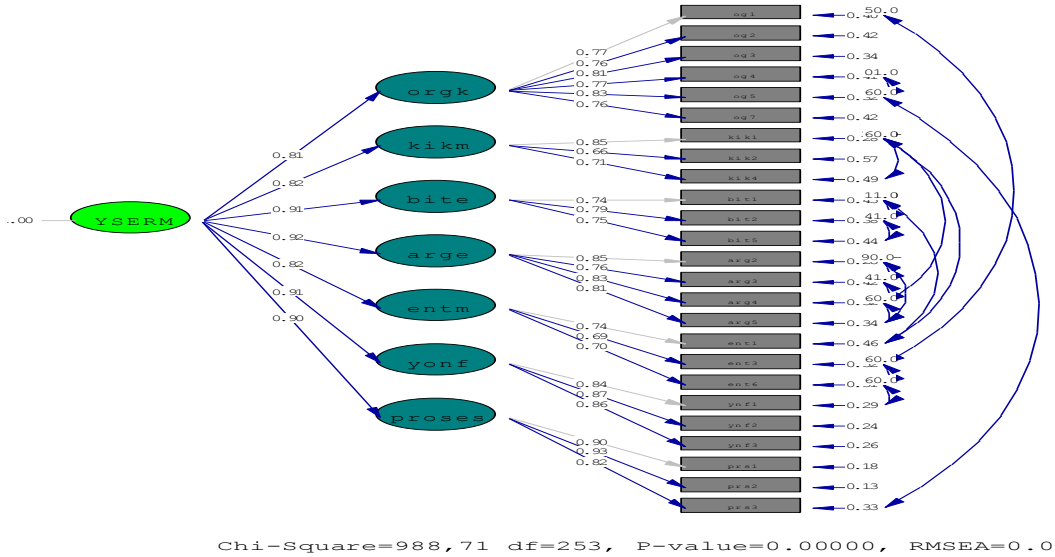

Figure 2. Structural Capital CFA Results

There are 7 latent variables and 25 observed variables belonging to these indicators in structural capital scale. Reliability coefficients of latent variables (α) are between 0,76-0,90. Process variable (ρ=0,92) has the highest composite reliability coefficient (SCR); Process variable (AVE=0,78) has the highest average variance explained (AVE). Coefficient SCR of all latent variables have occurred as >0,70; AVE values as >0,50.

When latent variable to which observed variables belong and structural coefficients (factor loadings) between them are analyzed, it is seen that structural coefficients for all observed variables are (>0,60); Kik2 index (=0,66) of which corporate image and identity are involved in latent variable has the lowest structural coefficient; Prs2 index (=0,93) involved in Process latent variable has the highest structural coefficient.

Qualitative performance CFA results are given in the Table 8.

Table 6. Qualitative Performance CFA Results

Parameters		**T**	***p***	**Alpha**	**SCR**	**AVE**
Innovation				0,94	0,93*	0,59**
QUALPRF1	0,77		0,00			
QUALPRF 2	0,72	27,34	0,00			
QUALPRF 3	0,78	27,22	0,00			
QUALPRF 4	0,76	26,09	0,00			
QUALPRF 5	0,83	28,91	0,00			
QUALPRF 6	0,75	25,63	0,00			
QUALPRF 7	0,78	26,88	0,00			
QUALPRF 8	0,78	26,82	0,00			
QUALPRF 9	0,74	25,08	0,00			
Adaptation				0,75	0,82*	0,70**
QUALPRF 15	0,76		0,00			
QUALPRF 16	0,91	20,19	0,00			
Operational performance				0,85	0,86*	0,67**
QUALPRF 17	0,80		0,00			
QUALPRF 18	0,83	28,51	0,00			
QUALPRF 20	0,82	28,29	0,00			
Human resources performance				0,90	0,90*	0,76**
QUALPRF 22	0,90		0,00			
QUALPRF 23	0,94	46,54	0,00			
QUALPRF 24	0,76	31,27	0,00			
X^2=508,68, sd=111, X^2/sd=4,58, p=0,00, RMSEA=0,06, SRMR=0,03, NNFI=0,96, CFI=0,97, GFI=0,95, AGFI=0,93						

*>0,70**>0,50

When model fit of qualitative performance scale is analysed, it is seen that P value for X^2 value is significant (p<0,05) but model fit is appropriate because X^2/sd<5, other fit indices (RMSEA=0,06, SRMR=0,03, NNFI=0,96, CFI=0,97, GFI=0,95, AGFI=0,93) support the model fit(Table 8). There are 4 factors and 17 observed parameters for given factors.

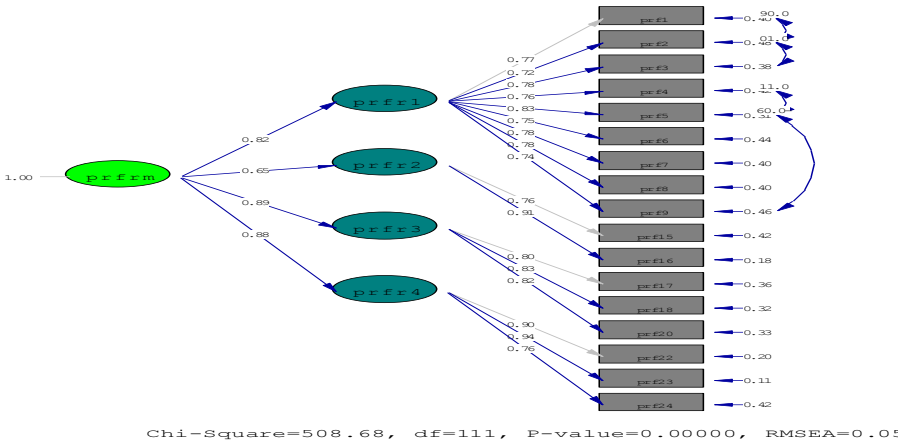

Figure 3. Qualitative Performance CFA Results

In qualitative performance scale, there are 4 latent variables and 17 observed variables belonging to these indicators. Reliability coefficients of latent variables (α) are between 0,75-0,94. Qualitative performance1 variable (ρ=0,93) has the highest composite reliability coefficient (SCR); Qualitative performance2 variable (AVE=0,70) has the highest average variance explained. Coefficient SCR of all latent variables have occurred as >0,70; AVE values as >0,50.

When latent variable to which observed variables belong and structural coefficients (factor loadings) between them are analyzed, it is seen that structural coefficients for all observed variables are (>0,70) ; fprf2 index (=0,72) involved in qualitative performance1 latent variable has the lowest structural coefficient; Fprf23index (=0,94) involved in qualitative performance4 latent variable has the highest structural coefficient.

Quantitative performance CFA results are given in the Table 9.

Table 7. Quantitative Performance CFA Results

Parameters		**T**	***p***	**Alpha**	**SCR**	**AVE**
Quantitative performance				0,95	0,88*	0,64**
QUANPRF 25	0,81	28,32	0,00			
QUANPRF 26	0,78	28,39	0,00			
QUANPRF 27	0,86	31,01	0,00			
QUANPRF 28	0,75	26,81	0,00			
X^2=2,19, sd=1, X^2/sd=2,19, p=0,14, RMSEA=0,03, SRMR=0,01, NNFI=1,00, CFI=1,00, GFI=1,00, AGFI=0,99						

*>0,70**>0,50

When model fit of quantitative performance scale is analysed, it is seen that P value for X^2 value is insignificant (p<0,05) and model fit is perfect because X^2 /sd<3, other fit indices (RMSEA=0,03, SRMR=0,01, NNFI=1,00, CFI=1,00, GFI=1,00, AGFI=0,99) support the perfect model fit(Table 9).

In quantitative performance scale, there are 1 latent variable and 4 observed variables belonging to these indicators. Reliability coefficient of latent variables (α) is 0,95, that means they are very high. Composite reliability coefficient of the scale (ρ) has occurred as 0,88; explained variance (AVE) as 0,64.

When latent variable to which observed variables belong and structural coefficients (factor loadings) between them are analyzed, it is seen that structural coefficients for all observed variables are (>0,70); Fprf28 index (=0,75) has the lowest structural coefficient; Fprf27 index (=0,86) has the highest structural coefficient.

Table 8. Structural model results of the research are given in the Scheme below.

Hypothesis	Link		Estimate/ Std.Estimate	S.E.	t	P	Result
H3	Structural Capital	Quantitative Performance	0,53 (0,53)	0,72	15,68	0,00*	Supported
X^2=61,31; sd=37; X^2/sd=1,66; p=0,01; RMSEA=0,03; SRMR=0,02; NNFI=0,99; CFI=1,00; GFI=0,99; AGFI=0,98; R^2=0,28							

*p<0,01**p<0,05

When the model fit indices are analysed, it is seen that P value for X2 value is significant (p<0,05) but model fit is great because X^2 /sd<3 , other fit indices (RMSEA=0,03; SRMR=0,02; NNFI=0,99; CFI=1,00; GFI=0,99; AGFI=0,98) support model fit . There is 1 factor and 4 observed parameters for given factor.

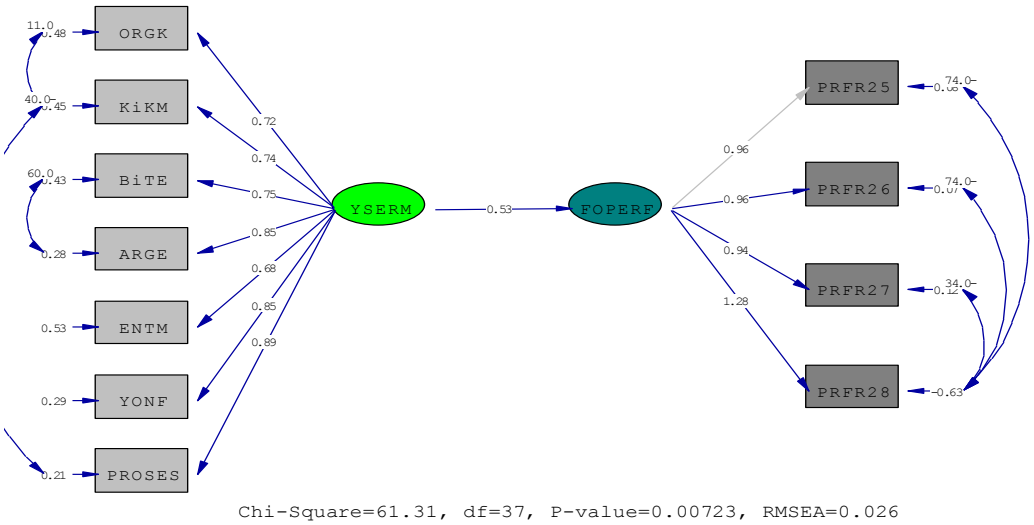

Figure 4. The Effect of Structural Capital on Quantitative Performance

When the effect of structural capital on quantitative performance is analysed, it is seen that path coefficient (standardized β=0,53) and the relation are significant(t=15,68; p<0,01). Structural capital affects quantitative performance positively.

Structural capital variable explains only 28 % of variance in quantitative performance. In other words, Structural capital explains 28% of the change of quantitative performance in the firm.

The equation belonging to Hypothesis H3 was confirmed as the following:

Table 9. Quantitative performance = 0.53*YSERM + ε:0.72

Hypothesis	Link		Estimate/ Std.Estimate	S.E.	t	p	Result
H4	Structural Capital	Qualitative Performance	0,96 (0,90)	0,18	32,61	0,00*	Supported
X^2=151,68; sd=37; X^2/sd=4,09; p=0,00; RMSEA=0,06; SRMR=0,02; NNFI=0,98; CFI=0,98; GFI=0,97; AGFI=0,97; R^2=0,82							

*p<0,01**p<0,05

When the model fit indices are analysed, it is seen that P value for X^2 value is significant (p<0,05) but model fit is appropriate because X^2/sd<5, other fit indices also (RMSEA=0,06; SRMR=0,02; NNFI=0,98; CFI=0,98; GFI=0,97; AGFI=0,97) support model fit.

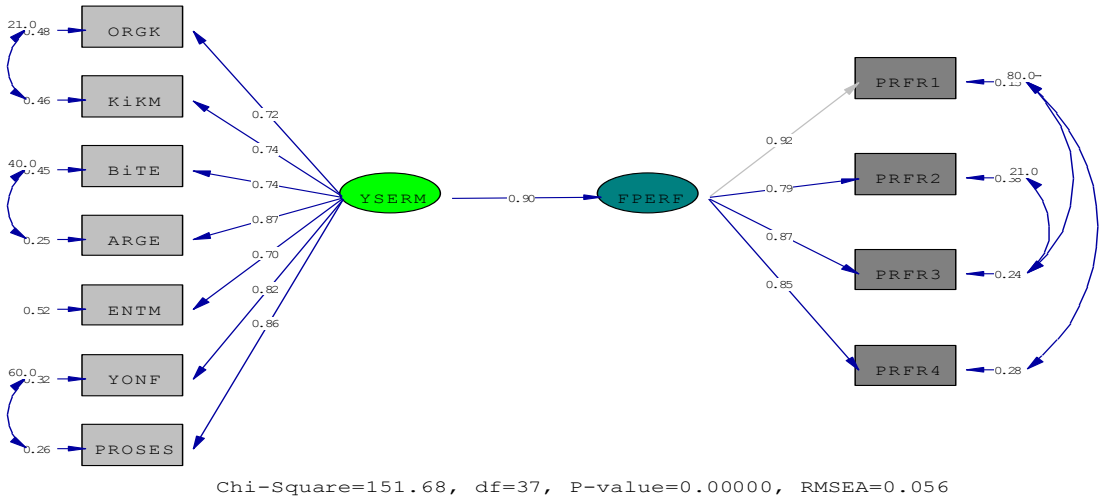

Figure 5. The Effect of Structural Capital on Qualitative Performance

When the effect of structural capital on qualitative performance is analysed, it is seen that path coefficient (standardized β=0,90) and the relation are significant (t=32,61; p<0,01) .

Structural capital affects qualitative performance positively.

Structural capital variable explains only 82 % of variance in qualitative performance. In other words, structural capital explains 82% of the change of qualitative performance in the firm.

The equation belonging to Hypothesis H4 was confirmed as the following:

Qualitative performance = 0.96*YSERM + ε:0.18

When the model compliance has been examined for all models, it has been observed that the model compliance is appropriate and the other compliance indexes have been found as supporting the model compliance.

There are 7 latent variables and 25 observed variables belonging to these indicators in the scale of structural capital. The reliability coefficients of the latent variables are between (α) 0, 76 and (α) 0, 90.

The structural capital affects the Qualitative performance positively. The structural capital explains the 82% of the change in the Qualitative performances of the companies.

The structural capital affects the Quantitative performance positively; this explains the 28% of the change in the Quantitative performances of the companies.

4. Conclusion

In this study, the effects of structural capital, a sub-element of intellectual capital, on quantitative and qualitative performance of enterprises are analyzed. It has been found that structural capital has positive significant effects on enterprises' quantitative and qualitative performance. Factor analysis yielded our proposal and it has been shown that SC is composed of the sub-factors: a) Organization Culture, b) Corporate image and brand, c) Information Technologies, d) R&D and innovativeness, e) Intellectual property, f) Process and g) Management Philosophy.

After testing the model it was founded that structural capital affects the quantitative and qualitative performance positively and together they cause an increase in performance both quantitatively and qualitatively.

In order to support SC, organizational image and brand become prominent. The most effective thing to increase SC is to have processes developed from organizational experience and these processes should be good for enterprise, industry, stakeholders etc.

Latent variables factor loadings of SC are corporate image and brand, intellectual property, information technologies, management philosophy, process-system-procedures, R&D and innovativeness, and organizational culture and their values are 0.76, 0.78, 0.84, 0.90, 0.90, 0.91, and 0.91 respectively. These findings show that lowest factor loading is for corporate image and branding while highest one is for R&D and innovativeness and organizational culture, and the values are 0.76, and 0.91 respectively. Meanwhile, Prs2 latent variable's factor loading is 0.93 and it is related with statement – our company develops better organizational structures, processes, and techniques depending on its experiences-. Therefore it can be speculated that corporate image and branding should be boosted in order to get a strong SC. Moreover, the most effective way to increase SC is to have company experiences lasting and deriving right system, organization, processes, and techniques suiting the industry, company, and all shareholders interest from those experiences.

SC affects qualitative performance with coefficient of 0.90, and quantitative performance with the coefficient of 0.53. From the highest to the lowest sub-elements of SC would be listed as enterprise image and brand, R&D and innovativeness, processes, managerial philosophy, organizational culture, intellectual property, and information technologies in terms of impact on qualitative performance. Similarly, the same list would be intellectual property, processes, R&D and innovativeness, managerial philosophy, enterprise image and brand, information technologies, and organizational culture in terms of quantitative performance.

SC helps companies to improve production abilities so that they may succeed to improve their quality while reducing their costs. As a result product value increases together with enterprise image and brand value.

Subsequently all the hypothesis analyzed in this study are confirmed.

It is helpful for managers to know about the effects of SC on qualitative and quantitative performance. This information will help managers take better managerial and organizational decisions. In addition, this study's model helps determine managerial strategies and policies in regard to competitiveness.

Even though study is carried out in many industries in Turkey, no industry specific analysis concluded here. Therefore, study results are more general rather than industry specific. Perhaps future studies would have distinct results on manufacturing and service industries as well as specific industries such as textile, banking and finance, etc. In this way, industry specific results may be obtained and presented to that related industry's stakeholders. In addition, perceptual measures used in this study, however, future studies would use financial data from companies' financial documents so that it would be verified whether the perceptual measures verify with numbers.

Data was collected between 2009 and 2012 via questionnaires send by emails. The results are influenced by the economic, politic and social circumstances during this period. Researchers may conduct a new survey for comparative study.

Finally, in this study we considered the relationships between SC and qualitative and quantitative performance. Further studies may include IC or its other sub-elements like human capital and relation capital. In this way, it can be more deepen on the relationships between sub-elements and their effects on enterprise performances to gain more comprehensive and more inclusive assumptions.

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