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The Impact of Structural Capital on New Product Development Performance Effectiveness- The Mediating Role of New Product Vision and Competitive Advantage

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Abstract:
For organizations mostly, changes are faster than their speed in responsibility and the ability for adjustment. In this space, organizations face with opportunities and threats. Therefore each invention and innovation causes change that may create opportunity for organization. So having proper structural capital is very important. Organizations should develop their new products and share clear vision in order to improve the effectiveness of their new product development performance. Therefore, this research wants to investigate and model the relationship between structural capital (SC) and new product development performance (NPDP) effectiveness with regard to the mediating role of new product competitive advantage and vision. Automobile industry in Iran is elected as statistical society. In this study, results are obtained by structural equations and path model. Also for better description of results, we use other deducible statistic such as binamial test and one-Sample Kolmogorov-Smirnov Test. The results of this study bode that structural capital can improve

NPDP effectiveness by obtaining competitive advantage and providing clear and comprehensive vision. Also the provided model in this research is supported by data.

Keywords: Structural Capital, New Product Competitive Advantage, New Product Vision, New Product Development Effectiveness

1. Introduction

Nowadays in global marketplace, sustaining a competitive position is a permanent concern. Technological innovations and economic uncertainties have changed the face of the competitive arena. In other words, organizations' survival is relied on competitive advantage of their new products (Esper et al. 2007). Thus, organizations should ensure from their new products competitive advantage by improving their structural capital. In present age, firms are operating in markets that demand frequent innovation and higher quality whereas products have shorter lifecycles (Mc Lvor and Humphreys, 2004). Therefore firms are looking for ways to reduce product-development times while simultaneously improving quality and reducing costs (Yeh et al. 2010). Organizations must provide clear vision for their new Products ensuring that progress meets the development schedule (Chen and Lin, 2011). Only under product vision sharing that team members can integrate their professional skills with the development of products that will satisfy the needs of customers and obtain competitive advantage (Cox et al, 2003).

Studies often neglect new product competitive advantage and vision as a mediating role. Therefore, this study fills the research gap by investigating the impact of structural capital and new product competitive advantage and vision upon new product development performance effectiveness. In this study and by regarding the described relationship between structural capital, new product competitive advantage, new product vision and NPDP effectiveness, will provide the conceptual framework and examine the provided model by using structural equations method and path model. The results of present research can help governments or managers and contribute to future relevant researches.

2. Literature review

2.1. Definition of Structural capital

Edvinsson and Malone (1997) define structural capital as everything that gets left behind at the office when employees go home. In this sense, structural capital can be seen as the supporting framework and the glue of an organization because it provides the tools and architecture for retaining, packaging, reinforcing, and transferring knowledge along the business activities (Cabrita and Bontis, 2008). : Martin-de-Castro, G. et al. (2011) indicate that Structural capital as including process capital and innovation capital. Process capital is defined as workflow, operation processes, specific methods, business development plans, information technology systems, and cooperative culture, etc. Innovation capital is defined as intellectual property within an organization, including patents, copyrights, trademarks, and knowhow, etc.

2.2. Internal Structure of structural Capital

In order to advance in understanding the nature of structural capital, it is necessary to analyze its internal structure. Nevertheless, at this point, we must remark that its heterogeneous nature lets us to split this construct into two main 'capitals' or building blocks: (i) technological capital; and (ii) organizational capital.

Technological capital:

Technological or innovation capital refers to the combination of organizational knowledge which is directly linked to the development of the activities and functions of the operations technical system, responsible of obtaining new products and services, the development of efficient production processes, as well as the advancement of the organizational knowledge base necessary to develop future technological innovations. Technological capital includes the following elements:

– Efforts in research and development which includes R&D expenditures, personnel linked to these efforts, and the number and relative importance of R&D projects.

– Technological infrastructure, including the purchase of technology as well as the information and telecommunications infrastructure necessary to develop technological innovations.

– Intellectual and industrial property, as the volume of legally protected and unprotected technical and scientific knowledge of the firm. Includes patents, prototypes, trade secrets, design rights, registered trademarks, licenses, etc (Hsieh and Tsai, 2007).

Organizational capital:

The second group of structural assets is linked to the organizational infrastructure. Organizational capital results from the combination of intangible assets that are formal as well as informal, which in an effective and efficient way, give structure and organizational cohesion to the different activities and business processes developed into the firm (Alama 2008). Organizational capital includes the following main elements:

– Organizational culture, values and attitudes includes the level of cultural homogeneity, or level of coherence, acceptance and general commitment to cultural values, business philosophy and ethics, social climate, or managerial commitment towards some concrete cultural values and attitudes.

– Information and telecommunications capability. Refers to the firm's ability, commitment and effective use of information and telecommunications technologies to ensure storage, disseminate, absorb, transfer, and refine useful information and knowledge across the firm.

– Organizational structure. Refers to the formal organizational design, and it includes formal mechanisms for structuring the firm (Alama, 2008).

2.3. New product competitive advantage and vision

Globalization of markets, dynamic technologies development, product life cycles ever shorter and the fast changing of customer demand have meant that company's competitiveness is related to the ability to satisfy customer's wants and needs by creating higher value into products and services. This obliges companies to improve their capability to create and

deliver value to stakeholders and customers (Linzalone, 2008).

2.3.1. New product competitive advantage

In today's dynamic global markets, firms must struggle to surmount the varying degrees of competition. Rapid technological change, shortened product life cycles, and increased technological complexity increasingly force firms to outsource technological development (Bannert and Tschirky, 2004). In a high technology product development environment, due to large uncertainty and complexity, decision-making becomes very difficult.

Competitive advantage is comprised of the strategies that firms utilize to perform better than their competitors (Ma, 2004). The measurement of competitive advantage may be observed from three indices, which are (1) meeting basic requirements at the best price; (2) providing the best product features and quality; and (3) focusing on each customer's needs and providing special services (Chen and Lin, 2011). Competitive advantage requires firms to exercise significant manufacturing cost control in order to ensure that products can be priced competitively. Dunk (2004) demonstrated that competitive advantage has a positive role in affecting the extent to which organizations use product life cycle cost. Product competitive advantage is associated with integration and firms have a competitive advantage when producing goods or services superior to those of its competitors. In this study, new product competitive advantage is measured by seven items according to Sing and Song's study.

2.3.2. New product vision

Vision requires explication of future markets, the sector and industry within which a company competes, and how an enterprise will create value for customers in the future. All of these factors differentiate a company from its competitors (Abell, 2006). In a new organization, the psychological differences between two parties affect NPD performance. Product vision creates a psychologically safe working environment for teams and clearly articulates developmental goals to members (Chen and Lin, 2011). Lynn and Akgün (2001) define product vision as inter-coordination and inter-support, with clear and stable group objectives. Internal organizations and departments with specific insight into market conditions and customers typically need to coordinate and communicate with external marketing trends, especially when sourcing highly sophisticated products or systems requiring significant customization.

All team members must have the same product vision to create synergies between diverse organizations and departments. In modern business environments, the success of NPD depends on cooperation between suppliers, R&D, production, sales, marketing, and sales channels, as well as management support (Chen and Lin, 2011). In this study, new product vision is measured by three items according to Tessarolo's study.

2.4. New product development performance (NPDP)

The rate of NPD is considered as a critical factor in a company's success. At the same time, the home-based resources that have long enabled organizations to compete effectively in international markets are no longer adequate to ensure competitiveness of companies. As competition is now global, companies must harness knowledge from sources in multiple

countries to generate new products, as well as to build operational know-how and technological strength. This involves quickly identifying changing customer needs; developing more complex products to satisfy those needs worldwide; and providing better customer service, while also utilizing the power of technology in managing performance and reliability (Rogers, Ghauri and Pawar, 2005). Acur et al (2012) indicate that strategic alignment and new product development have relationship with each other.

The improvement of NPD performances, aimed to increase the value incorporated into products is related to several organizational and managerial features of the process. Particularly important seem to be those features concerning the role and dynamics played by knowledge assets in the process (Linzalone, 2008).

2.5. New product development performance (NPDP) effectiveness

In theory and in practice, the definition of new product has been widely discussed among experts and scholars from different angles, including the viewpoint of producers, consumers, and the product life cycle (Yeh, Pai and Yang, 2010). Levitt suggested that the new part of most new products is not pure innovation, but rather an imitation or improvement. Therefore, his definition of new product includes pure innovation and imitation (Chang and Chen, 2010). Souder defined new product from a producer's viewpoint: a new product is a product that the enterprise has never owned before. In practice, the assessments of NPD performance may vary according to the manufacturer's industry, business strategy, or design strategy. For example, NPD performance is presented to show the degree to which goals of markets, time, costs, and quality were attained in a particular NPD project (Song & Montoya-Weiss, 2001). Thus, NPD performance effectiveness is related to corporate image, target market share, and customer satisfaction, and emphasizes a long-term outcome (Chen and Lin, 2011).

3. Framework and hypotheses

Fig. 2 shows the conceptual framework, indicating the impact of structural capital on new product development performance effectiveness with regard to the mediating role of new product competitive advantage and vision. Without new product competitive advantage and vision, structural capital per se cannot achieve new product development performance effectiveness.

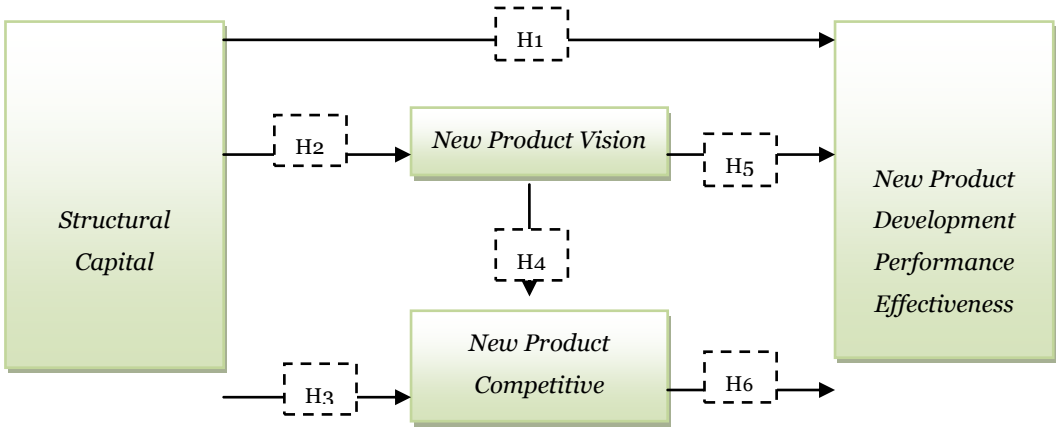

Figure 2. Conceptual Framework

3.1. Structural capital and new product development performance effectiveness

Structural capital may improve new product development performance because it is the context of transforming knowledge to value (Edvinsson and Sullivan, 1996). Selimi and Bontis (2013) indicate that national intellectual capital and economic performance have relationship with each other. Chen et al. (2006) indicates while companies have proper structural capital, indeed they have more innovative competencies for improving and raising their new product development performance. Based on the discussion above, this study offers the following hypothesis.

Hypothesis 1: Structural capital affects new product development performance effectiveness.

3.2. Structural capital and new product vision and competitive advantage

The structural capital includes the intangible assets that form a part of the structural design of the company, facilitating the flow of knowledge and bringing as consequence an improvement in the effectiveness of the organization and by which cause to provide proper vision and obtain competitive advantage for new product (Alama, 2008). Structural capital can help to create clear vision, competitive advantage and business values (Mc Elroy, 2002). Based on the discussion above, this study offers the following hypotheses.

Hypothesis 2: Structural capital affects new product vision.

Hypothesis 3: Structural capital affects new product competitive advantage.

3.3. New product vision and new product competitive advantage

NPCA can be seen as holistic conceptualizations of design quality, encompassing the superiority or uniqueness of product features, and its fitness for use; it is also representational of the user's social position. A number of studies indicate that organizational culture, total quality management, specialized supplier networks (, information technology, and product quality are sources of NPCAs. In the meantime, Langerak et al. (2004) referred to the process of providing high-quality products, both unique and superior to those of competitors; they also referred to the market dominance of new products over similar items of competitors, based on newness, productivity, reliability, compatibility, uniqueness, ease of use, and functionality.

In order to attain the level of coordination necessary for the effective, efficient processing of information, as well as to align functional perspectives with developmental goals, all those involved must share a strong vision (Tessarolo, 2007). Product vision is generally a clear statement of goals; with mechanisms providing direction for the rapid develop of new products, ensuring that progress meets the development schedule. Without product vision, a NPD team responsible for target markets may lose direction. The efforts of integration may eventually be offset by chaos caused by inefficient and ineffective management. The effect of a well-articulated product vision on NPCA becomes greatest when the vision is clearly shared by all team members. Only under a common product vision can team members integrate their professional skills with the development of products that will satisfy the needs of consumer markets (Chen and Lin, 2011). Therefore, the following hypothesis is developed:

Hypothesis 4: Product vision affects new product competitive advantage.

3.4. New product vision and new product development performance effectiveness

In terms of task allocations in product development, Cox, Pearce, and Perry (2003) defined shared vision as a common mental model associated with the future state of a team, or as tasks that provide the basis for action within a team. In terms of interdepartmental cooperation for product development, Lynn and Akgün (2001) asserted that a clear vision is only one component of an effective project vision, and in practice, a product vision must be shared and supported by all those involved, including project team members and senior management.

According to the above literature, product vision plays a major role in the integration of these resources and provides a specific direction for NPD. When a team responsible for integration has a clear understanding of product vision for a specific product development, it is likely to set reasonable product development targets. When all team members understand the order of tasks and deadlines, they are enabled to enjoy increased new product success. To improve NPD performance, a firm must disseminate a clear product vision and instill that vision in all those involved in the integrated NPD. Thus, the integration mechanisms would generate synergy and enhanced NPD performance. In practice, persons involved in NPD activities, including project team members and senior management must share and support the product vision; otherwise, participants may continually question development direction and attempt to alter the vision. On the basis of the above discussion, the following hypotheses are developed:

Hypothesis 5: Product vision affects the effectiveness of NPD performance.

3.5. New product competitive advantage (NPCA) and new product development performance effectiveness

NPCA significantly correlates with product success and market performance. NPCA is positively correlated with NPD, and is markedly affected by the external and internal competitive environments of the NPD processes (Zhan et al, 2000). Swink and Song (2007) asserted that product competitive advantage is positively correlated with project returns on investments, which, in turn, are affected by the marketing-manufacturing integration of NPD, and is thought to generate particular advantages. Although these studies utilize different indices and contexts, all identify the positive influence of performance on NPD. The influence of NPCA on NPD performance is not reversed by different situations. Products with a greater competitive advantage are typically those with innovative features, superior quality, good service, more competitive pricing, and rapid response to market demands. NPCA captures a product's desirability, quality, associated marketing, and consumer's and manufacturer's concerns, all in terms of performance, conformance, and reliability. Enterprises should attempt to generate competitive advantages through well-organized integration, which subsequently enhances NPD performance (Chen and Lin, 2011). Therefore, the following hypotheses are proposed:

Hypothesis 6: NPCA affects the effectiveness of NPD performance.

4. Method

4.1. Sample and data collection

Statistical society in this research is automobile industry in Iran. The reason of this selection is that automobile industry in Iran cannot satisfy customers' needs but it tries to identify and

improve its structural capital; learn and through which launch products that have competitive advantage and higher performance in order to meet their customers' needs well. Sampling in present research does in two stages. In first stage, manufacturing companies in automobile industry which launch at least one new product is selected then in second stage product managers, project managers and R&D engineers are selected so they are the key informants in this study. This study relies on these managers to answer questionnaire items because they typically participate in new product development. In present research, Iran Khodro and Saipa are elected as manufacturing companies. They have 51 managers in all. These managers comprise 28 managers in Iran Khodro and others belong to Saipa. Number of managers in each company is downer of 30 people thus we don't sample and use census.

4.2. Measures

For consistency, all responses were measured using a Likert-type scale, with 1="strongly disagree," 3="neutral," and 5="strongly agree." In this study we use four standard questionnaires comprised structural capital, new product competitive advantage, new product vision and new product development performance effectiveness. Each questionnaire includes two grouping variables: (i) sex, (ii) graduation level.

4.2.1. Structural capital

Structural capital measurement comprises the following seven items. The first three items belong to process capital, and the rest are part of innovation capital:
(1). my company emphasizes IT investment;
(2). company is willing to invest in business development;
(3). my company has an easily-accessible information system;
(4). my company invests a high proportion of its money in R&D;
(5). my company invests a high proportion of its money in patent maintenance;
(6). my company emphasizes new market development investment;
(7). my company has a high proportion of R&D employees

4.2.2. New product vision

New product vision measurement comprises the following three items:
(1).Where the projects had clear and formal definitions of development objectives, including, but not limited to, revenues, profits, market share, customer satisfaction. (2).Whether these objectives were clearly communicated to all involved in the product development.
(3).Whether an agreement existed and objectives shared among those involved in the product development.

4.2.3. New product competitive advantage

New product competitive advantage measurement comprises the following seven items:
(1).This product offered some unique features.
(2).This product was clearly superior to competing products in terms of meeting customer needs.
(3).This product had superior quality compared with that of competing products.
(4).This product had superior technical performance compared to that of competing products.
(5).Our products are difficult for competition to copy.
(6).Our product designs are unique.

(7).Our products do not have a significant advantage over those of competitors.

4.2.3. Effectiveness of New product development performance

In this study, NPDP effectiveness includes market and customer performance. Sub-components are measured by the following eight items:

(1) This new product meets revenue goals
(2) This new product meets market share goals
(3) This project team achieves high market forecast accuracy
(4) This new product contributes significantly to market leadership
(5) Customers are satisfied with the new product
(6) This new product generates high customer acceptance
(7) Many customers buy this new product
(8) New product has been caused the improvement of firm's image

5. Analyses

5.1. Binomial Test

This test is equal of one sample t-test and a kind of free distribution tests. In this research, confidence interval of the difference is 95%. All responses were measured using a Likert-type scale so, H0 hypothesis is proportion of under or equal 50% and H1 is proportion of upper 50%. Also $p<0.05$ is a base for reject or not reject of Ho hypothesis. In this test, cut point is 3. In this study we use binomial test for investigating whether the principal variables includes SC, NPCA, NPV and NPDP effectiveness are upper mean or not, in order to adopt proper strategies and policies.

5.2. One-Sample Kolmogorov-Smirnov Test

This test is used for investigating the normal distribution claim of data. Thus, statistical H0 hypothesis is normal distribution for data and H1 is abnormal distribution. In present study, this test is used for investigating the normal distribution claim of data for provided model variables.

5.3. Structural equations modeling and path model

Modeling helps researcher test and survey the theoretical pattern which consists of different components partially and wholly and whether data which is gathering from one sample supports codified theoretical pattern or not. Finally which one of codified theoretical pattern elements is confirmed and which one of those needs change, modification or better to be omitted. In this study, we use structural equations modeling (SEM) and path model (PM) for investigating research model and testing the hypotheses.

5.4. Reliability, validity, and descriptive statistics

In this research, content validity of questionnaires was confirmed. We use Cronbach's α for measuring reliability. If values exceed the 0.7 criteria, indicating that the measurement has

good reliability. Table 1 shows Cronbach's α coefficients for structural capital, new product competitive advantage, new product vision and NPDP effectiveness questionnaire.

Table 1: Cronbach's Alpha for questionnaire's Reliability

	Structural Capital	New Product Competitive *Advantage*	*New Product Vision*	New Product Development Performance Effectiveness
Cronbach's Alpha	*0.805*	*0.958*	*0.739*	*0.711*

Table 2 lists descriptive statistics including means, standard deviation, variance, skewness, kurtosis and std. error of mean for constructs.

Table 2: Descriptive Statistics for constructs

Statistics							
		New Product Competitive Advantage	**New Product Vision**	**Structural Capital**	**NPDP effectiveness**	**Process Capital**	**Innovation Capital**
N	Valid	42	42	42	42	42	42
	Missing	0	0	0	0	0	0
Mean		3.8027	3.9841	3.8760	4.3869	4.3889	3.3631
Median		4.0000	4.0000	3.6250	4.4375	4.3333	3.2500
Mode		4.86	4.00	4.50	4.00[a]	4.00	2.75
Std. Deviation		.94284	.32050	.45163	.37935	.48230	.51265
Variance		.889	.103	.204	.144	.233	.263
Skewness		-.219	-1.630	.624	-.183	.253	.277
Std. Error of Skewness		.365	.365	.365	.365	.365	.365
Kurtosis		-1.352	3.200	-1.363	-1.099	-1.579	-1.254
Std. Error of Kurtosis		.717	.717	.717	.717	.717	.717

a. Multiple modes exist. The smallest value is shown

Table 2 clearly shows that SC mean exceed value test (3), indicating that SC of Iran Khodro and Saipa are in good level. Also we can deduce that the new product competitive advantage and vision are good. Between three components of structural capital, process capital has highest mean. The mean value of all components of NPDP effectiveness exceed threshold level (3), indicating that the products which are launched by Iran Khodro and Saipa are good to market performance and customer.

5.5. Results

5.5.1. Partial Correlations

While correlation between two variables is measured, the impact of other variables is not omitted whereas these influences may affect the relationship between two variables. Then it is better to be used the partial correlation so the impact of other variables is omitted. The partial correlations for constructs are provided in table 3.

Table 3: Partial Correlations for constructs

NPDP effectiveness	New Product Competitive Advantage	Product Vision	Structural Capital	Partial Correlations
.515 Control Variables: Product Vision	---	---	1	Structural Capital
.544 Control Variables: Structural Capital	.325 Control Variables: Structural Capital	1	---	Product Vision
.393 Control Variables: Structural Capital	1	.325 Control Variables: Structural Capital	---	New Product Competitive Advantage
1	.393 Control Variables: Structural	.544 Control Variables: Structural	.515 Control Variables: Product Vision	NPDP effectiveness

	Capital	Capital		

5.5.2. Binomial Test

Table 4 shows the result of binomial test for structural capital. Exact sig is downer than 0.05% so H0 is rejected; indicating the informants' proportion that elected value upper than 3 is more than 50%. Therefore the view point of informant, structural capital exceed mean threshold.

Table 4: Binomial Test for Structural Capital

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Structural Capital	Group 1	<= 3	0	.00	.50	.000
	Group 2	> 3	42	1.00		
	Total		42	1.00		

Table 5 shows the result of binomial test for new product vision. Exact sig is downer than 0.05% so H0 is rejected; indicating the informants' proportion that elected value upper than 3 is more than 50%. Therefore the view point of informant, new product vision exceed mean threshold.

Table 5: Binomial Test for New Product Vision

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
New Product Vision	Group 1	<= 3	2	.05	.50	.000
	Group 2	> 3	40	.95		
	Total		42	1.00		

Table 6 shows the result of binomial test for New Product Competitive Advantage. Exact sig is downer than 0.05% so H0 is rejected; indicating the informants' proportion that elected value upper than 3 is more than 50%. Therefore the view point of informant, New Product Competitive Advantage exceed mean threshold.

Table 6: Binomial Test for New Product Competitive Advantage

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
New Product Competitive Advantage	Group 1	<= 3	11	.26	.50	.003
	Group 2	> 3	31	.74		
	Total		42	1.00		

Table 7 shows the result of binomial test for NPDP Effectiveness. Exact sig is downer than 0.05% so H0 is rejected; indicating the informants' proportion that elected value upper than 3 is more than 50%. Therefore the view point of informant, NPDP Effectiveness exceed mean threshold.

Table 7: Binomial Test for NPDP Effectiveness

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
NPDP effectiveness	Group 1	<= 3	0	.00	.50	.000
	Group 2	> 3	42	1.00		
	Total		42	1.00		

5.5.3. One-Sample Kolmogorov-Smirnov Test

This test is used for investigating the normal distribution of data. The results of this test for constructs are shown as fallows.

Table 8 shows the result of One-Sample Kolmogorov-Smirnov Test for structural Capital. Exact sig is downer than 0.05% so H0 is rejected; indicating that data distribution for structural capital is not normal.

Table 8: One-Sample Kolmogorov-Smirnov Test for Structural Capital

		Structural Capital
N		42
Normal Parameters[a,b]	Mean	3.8760
	Std. Deviation	.45163
Most Extreme Differences	Absolute	.258
	Positive	.258
	Negative	-.178
Kolmogorov-Smirnov Z		1.675
Asymp. Sig. (2-tailed)		.007
a. Test distribution is Normal.		
b. Calculated from data.		

Table 9 shows the result of One-Sample Kolmogorov-Smirnov Test for New Product Competitive Advantage. Exact sig is upper than 0.05% so H0 is not rejected; indicating that data distribution for New Product Competitive Advantage is normal.

Table 9: One-Sample Kolmogorov-Smirnov Test for New Product Competitive Advantage

		New Product Competitive Advantage
N		42
Normal Parameters[a,b]	Mean	3.8027
	Std. Deviation	.94284
Most Extreme Differences	Absolute	.178
	Positive	.104
	Negative	-.178
Kolmogorov-Smirnov Z		1.152
Asymp. Sig. (2-tailed)		.140
a. Test distribution is Normal.		
b. Calculated from data.		

Table 10 shows the result of One-Sample Kolmogorov-Smirnov Test for New Product Vision. Exact sig is downer than 0.05% so H0 is rejected; indicating that data distribution for New Product Vision is not normal.

Table 10: One-Sample Kolmogorov-Smirnov Test for New Product Vision

		New Product Vision
N		42
Normal Parameters[a,b]	Mean	3.9841
	Std. Deviation	.32050
Most Extreme Differences	Absolute	.377
	Positive	.242
	Negative	-.377
Kolmogorov-Smirnov Z		2.443
Asymp. Sig. (2-tailed)		.000
a. Test distribution is Normal.		
b. Calculated from data.		

Table 11 shows the result of One-Sample Kolmogorov-Smirnov Test for NPDP Effectiveness. Exact sig is upper than 0.05% so H0 is not rejected; indicating that data distribution for NPDP Effectiveness is normal.

Table 11: One-Sample Kolmogorov-Smirnov Test for NPDP Effectiveness

		NPDP effectiveness
N		42
Normal Parameters[a,b]	Mean	4.3869
	Std. Deviation	.37935
Most Extreme Differences	Absolute	.156
	Positive	.156
	Negative	-.139
Kolmogorov-Smirnov Z		1.009
Asymp. Sig. (2-tailed)		.261
a. Test distribution is Normal.		
b. Calculated from data.		

5.5.4. Structural equations modeling and path model

Structural equations modeling is a technique for testing the hypotheses about the relationship between visual and hidden variables. Path model is the most infrastructural model in structural equations modeling that tests the direct and indirect impact of independent variable upon dependent variable. Covariance matrix between variables is shown in table 12.

Table 12: Inter-Item Covariance Matrix for constructs

	Structural Capital	New Product Competitive Advantage	New Product Vision	NPDP effectiveness
Structural Capital	.204	.188	.035	.006
New Product Competitive Advantage	.188	.889	.118	.067
New Product Vision	.035	.118	.103	.065
NPDP effectiveness	.006	.067	.065	.144

In path model, we consider error variables for internal variable. The value of these variables defined as zeta is one. Path model with standardized path coefficients in this research is shown in figure 3.

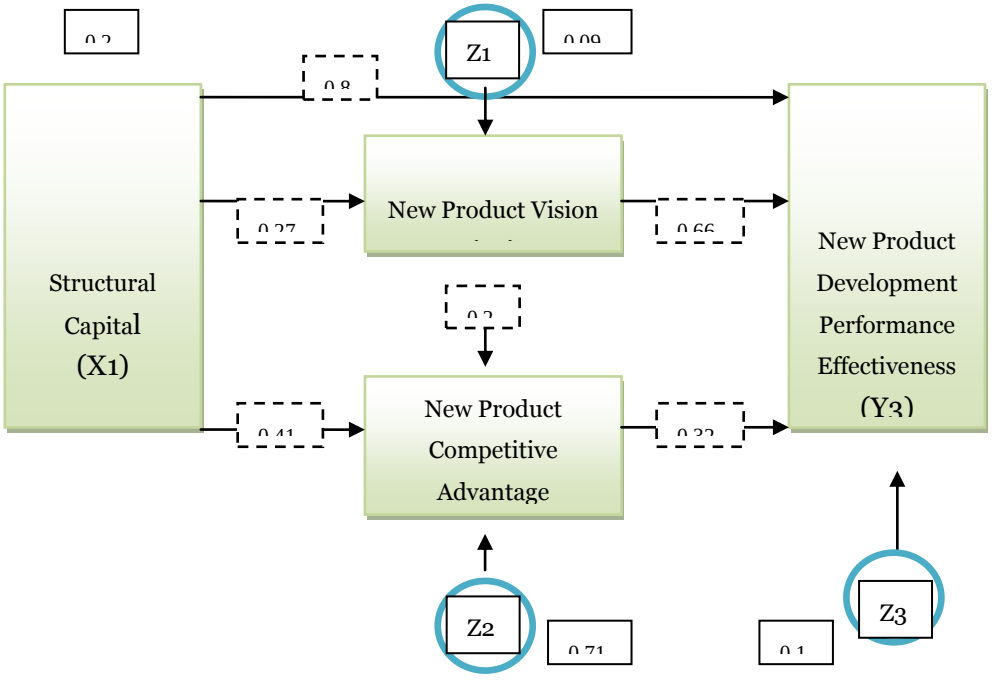

Figure3. Path model and coefficients for constructs

Results show that structural capital affects NPDP effectiveness ($\gamma = 0.8, p < 0.01$); new

product vision ($\gamma = 0.27, p < 0.01$) and new product competitive advantage ($\gamma = 0.41, p < 0.01$). New product vision affects NPDP effectiveness ($\beta = 0.66, p < 0.01$) and new product competitive advantage ($\beta = 0.2, p < 0.01$). New product competitive advantage affects NPDP effectiveness ($\beta = 0.32, p < 0.01$). Standardized path coefficients have significant distance with zero. Therefore there is a hope for existing similar impact not only in statistical sample but also in statistical society.

Path model estimates parameters through visual variance- covariance matrix. We can regenerate visual matrix by estimated parameters. If visual and regenerated matrixes are equal, data can support codified theoretical model. In this state, all values of residual variance- covariance matrix are zero. Standardized residual variance- covariance matrix is shown in table 13.

Table 13: Inter-Item Residual Covariance Matrix for constructs

N	42	Structural Capital (X1)	New Product Vision (Y1)	New Product Competitive Advantage (Y2)	New Product Development Performance Effectiveness (Y3)
Residual Covariance	Structural Capital (X1)	0.000			
Residual Covariance	New Product Vision (Y1)	0.000	0.000		
Residual Covariance	New Product Competitive Advantage (Y2)	0.000	0.000	0.000	
Residual Covariance	New Product Development Performance Effectiveness (Y3)	0.000	0.000	0.000	0.000

Finally results confirm all hypotheses and data supports research conceptual framework.

6. Discussion and Conclusions

Structural capital may improve new product development performance because it is the context of transforming knowledge to value (Edvinsson and Sullivan, 1996). The results of data analysis in present study confirm discussion above. Based on this hypothesis acceptance, active companies within automobile industry in Iran should launch high-performance products and satisfy customers' needs by using their structural capital to guarantee their survival. Structural capital can help to create clear vision, competitive advantage and business values (Mc Elroy, 2002). So we can say that if an organization has proper structural capital then it can provide clear and comprehensive vision and obtain competitive advantage. Results show the impact of new product vision upon new product competitive advantage. Therefore automobile companies in Iran must provide clear and comprehensive vision for their new products by structural capital to gain competitive advantage. Only under the sharing of product vision, team members can integrate their professional skills with products development (Cox et al, 2003). Chen and Lin (2011) proved that new product vision influences new product competitive advantage. Results of this research confirm the discussion above. If automobile companies don't define the vision well and share it between each level, they can't obtain competitive advantage. Swink and Song (2007) asserted that product competitive advantage is positively correlated with project returns on investments of new product. So organizations should try to create competitive advantage by integration in order to improve NPDP. Results of this study show that NPCA influences NPDP. Therefore, active companies within automobile industry in Iran should launch the products that have competitive advantage to improve NPDP. This will lead to constant competitive advantage. Cox, Pearce and Perry (2003) defined new product shared vision as a basis for activity within new product development team. Lynn and Akgun (2001) contend that new product vision must be shared between all people involved in NPD process so product vision has significant role in integrating resource, determining path for NPD and improving NPDP. People who involved in NPD process should continuously inquiry development path and modify vision. Results of this research confirm the discussion above. Therefore, active companies within automobile industry in Iran should first define clear and comprehensive vision and then share it between each level in order to facility NPD path.

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