

# Human Capital and New Product Development Performance Efficiency- The Mediating Role of Organizational Learning Capability

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## **Abstract:**

Intellectual framework of today's organizations is full of pointing out of the information and participation of expert and innovative workforce instead of operational workforce. In this space, improving performance and sustaining competitive advantage are fundamental concerns for managers. Innovation and organizational learning are the best important bases for improving performance and obtaining competitive advantage. Therefore, this research wants to investigate and model the relationship between human capital (HC) and new product development performance (NPDP) efficiency with regard to the mediating role of organizational learning capability (OLC). 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 binomial test and one-Sample Kolmogorov-Smirnov Test. The results of this study bode that human capital can improve NPDP efficiency by organizational learning capability. Also the provided model in this research is supported by data.

**Keywords:** Human Capital (HC), New Product Development (NPD), Organizational Learning Capability (OLC), New Product Development Performance Efficiency (NPDPE)

## **1. Introduction**

Nowadays in global marketplace, sustaining a competitive position is an ever 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 learning and obtaining new knowledge from environment

(Winklen. 2010). The mission of Organization's existence is to create value that members cannot create individually at all. Organizations' success will be determined by the extent to which the knowledge and skills of its members can be used to provide goods and services. Organizations can minimise their costs, create innovative products, improve production procedures, improve quality, respond to dynamic market conditions, and improve customer service by their strategic human resources.

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).

New product development has become a core strategic activity in many firms that by which new products have significant contribution to sales and profits (Koufteros et al. 2005). Indeed, new products are critical factor for corporate success in the market (González and Palacios 2002). So managers must improve their companies' new product development performance (Nijssen and Frambach 2000). This requires more efficient and effective new product development processes specially by avoiding resources wastage on peripheral activities (Palacios and González 2002). Studies often neglect organizational learning capability as a mediating role. Therefore, this study fills the research gap by investigating the impact of human capital and organizational learning capability upon new product development performance efficiency. In this study and by regarding the described relationship between human capital, organizational learning capability and NPDP efficiency, 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 Human capital**

From a macroeconomic point of view, the OECD recognizes human capital as a primary basis of competitiveness, prosperity and economic wealth. Therefore, it can be considered the key element of IC and one of the most critical sources of firm's sustainable competitive advantages. Human capital makes reference to the knowledge explicit and tacit – that people possess, as well as their ability to create it, which is useful for the mission of the organization (Bontis, 2008). Edvinsson and Malone remark that human capital includes knowledge, skills, innovativeness and the ability to meet the task and showed a key characteristic: human capital cannot be owned by the firm (Cabrita and Bontis, 2008).

### **2.2. Internal Structure of Human Capital**

In order to understand the nature of human capital, it is essential to analyze its internal structure, providing coherence for it. In this way, we could consider three main dimensions:

- **Knowledge.** Makes reference to the knowledge which employees have about things, to success-fully do their tasks. Includes the following variables: (i) formal education, (ii) specific training, (iii) experience, and (iv) personal development.
- **Abilities.** Makes reference to the type of knowledge related to 'the way of doing things' (know-how). Specifically, it gathers all the utilities, dexterity and talent which a person develops as a result of his/her experience and practice. Includes the following variables: (i) individual learning, (ii) collaboration-team work, (iii) communication, and (iv) leadership.
- **Behaviors.** Represent knowledge about the initial sources which lead individuals to do their tasks well. Includes mental models, paradigms, beliefs, etc. and refers to (i) feeling of belonging and commitment, (ii) self-motivation; (iii) job satisfaction, (iv) friendship, (v) flexibility, and (vi) creativity.

Therefore we can remark three basic components of human capital: (i) knowledge, embedded in the organizational employees that may include education and training; (ii) experience and

abilities, or the employee's know-how; and (iii) personal behaviors, willingness or attitudes, towards its task, jobs and organizations.

### **2.3. Organizational Learning Capability**

The concept of learning has received scant attention within extant theories. Where learning has been applied, different terms have emerged, which have generated confusion and prevented a full understanding of its complex and processual nature (Mariotti, 2012). Organizational learning generally defined as the process by which organizations learn. Consequently, organizational learning capability, considered as the organizational and managerial characteristics that facilitate the organizational learning process or allow an organization to learn, plays an essential role in this process (Chiva, Alegre and Lapiedra, 2007).

### **2.4. Categorization of Organizational Learning Capability**

The concept of organizational learning capability (OLC) seems to stress the importance of the facilitating factors for organizational learning or the organizational propensity to learn. Organizational learning capability is defined as the organizational and managerial characteristics or factors that facilitate the organizational learning process or let an organization to learn (Jerez- Gomez et al, 2005).

Organizational learning capability is really the product of individual and group learning applied to achieve the organization's vision and performance goals; certain management practices and internal conditions can either help or hinder this process. Thus, if these internal conditions and management practices that cause learning can be identified, then we can evaluate the organization's learning capability. This information can also help managers to focus on specific interventions required to improve learning (Goh, 2003).

DiBella has identified what is called the normative approach of organizational learning capability. He contended that learning is a collective activity that takes place under certain conditions or circumstances. Thus, organizations need to create the conditions that foster learning. Finally we can define organizational learning capability as an intrinsic ability of an organization because of which the organization creates, enriches, and utilizes knowledge to perform better than its competitors in terms of its competitiveness and performance. Operationalizing organizational learning capability is a very complex task (Limpibunterngr and Johri, 2009).

The OLC concept stresses the importance that facilitators have for organizational learning. We can explain a set of actions that ensures learning capability: effective generation of ideas by implementing a set of practices such as experimentation, continuous improvement, teamwork and group problem-solving, observing what others do, or participative decision making (Jerez-Gomez et al, 2005).

Chiva (2004) analyzes both literatures in order to determine the facilitating factors of organizational learning. Based on this comprehensive analysis, Chiva et al. (2007) developed an OLC measurement instrument that understands OLC as a multidimensional concept, the dimensions of which are: experimentation, risk taking, interaction with the external environment, dialogue and participative decision making. On the one hand, these five dimensions are necessary enablers of the organizational learning process.

In "experimentation", we have included factors such as support for new ideas, continuous training or workers that want to learn and improve. In "dialogue", we considered communication, diversity, teamwork, or collaboration. In "participative decision making", we incorporated delegation, flexible organizational structure, or knowledge of the organization. Several factors were considered to be implicit in all the five underlying dimensions: commitment to learning, involved leadership or learning as an essential element in the strategy. The five underlying dimensions sum up the facilitating factors for organizational learning proposed by Chiva (2004). Figure 1 shows the conceptual model of organizational learning capability. The figure includes the dimensions of the model and definitions of each one of them.

The five conceptual dimensions of organizational learning capability (Figure 1) are described below, together with an explanation of their links with other conceptual categories and with organizational learning capability itself.

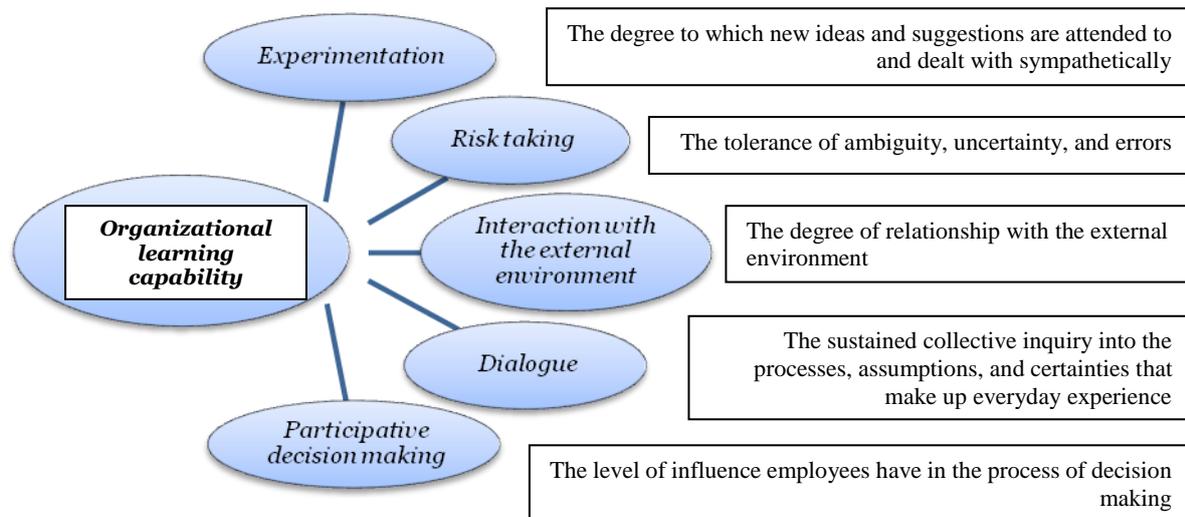


Figure 1. The conceptual model of organizational learning capability (OLC)

**Experimentation.** Experimentation is defined as the degree to which new ideas and suggestions are attended to and dealt with sympathetically. Nevis et al. (1995) state that experimentation involves trying out new ideas, being eager to know about how things work, or carrying out changes in work processes. It includes the search for innovative solutions to problems, based on the possible use of distinct methods and procedures.

**Risk taking.** Risk taking is understood as the tolerance of ambiguity, uncertainty, and errors. Hedberg proposes a range of activities to facilitate organizational learning, amongst which is stressed the design of environments that assume risk taking and accept mistakes. Accepting or taking risks involves the possibility of mistakes and failures occurring. Sitkin states that failure is an essential requirement for effective organizational learning, and to this end, examines the advantages and disadvantages of success and errors. If the organization aims to promote short-term stability and performance, then success is recommended, since it tends to encourage maintenance of the status quo. According to Sitkin, the benefits brought about by error are risk tolerance, prompting of attention to problems and the search for solutions, ease of problem recognition and interpretation, and variety in organizational responses. Since the appearance of this work, many authors have underlined the importance of risk taking and accepting mistakes in order for organizations to learn (Chiva, Alegre and Lapiedra, 2007).

**Interaction with the external environment.** It is defined as the scope of relationships with the external environment. The external environment of an organization is defined as factors that are beyond the organization's direct control of influence among others. It includes industrial agents such as competitors, and the economic, social, monetary and political/legal systems. Environmental characteristics play a critical role in learning (Bapuji and Crossan, 2004). Relations and connections with the environment are very important, since the organization attempts to evolve simultaneously with its changing environment. Hedberg considers the environment as the prime mover behind organizational learning. More turbulent environments generate organizations with greater needs and desires to learn (Popper and Lipshitz, 2000).

**Dialogue.** Particularly, authors from the social perspective highlight the importance of dialogue and communication for organizational learning. Dialogue is defined as a sustained collective inquiry into the processes, assumptions, and certainties that make up everyday experience. Dialogue is considered as a basic process for building common understanding, in that it allows one to see the hidden meanings of words, first by disclosing these hidden meanings in our own

communication. The vision of organizational learning as a social construction implies the development of a common understanding, starting from a social base and relationships between individuals. In fact, learning is a function of the spontaneous daily interactions between individuals. The chance to meet people from other areas and groups increases learning. By working in a team, knowledge can be shared and developed amongst its members (Chiva, Alegre and Lapedra, 2007). Oswick et al. (2000) claim that authentic dialogue fosters organizational learning because it creates, rather than suppresses, plural perceptions. Individuals or groups with different visions who meet to solve a problem or work together create a dialogic community

**Participative decision making.** Participative decision making refers to the level of influence employees have in the decision-making process. Organizations implement participative decision making to benefit from the motivational effects of increased employee involvement, job satisfaction and organizational commitment (Scott-Ladd and Chan, 2004). Scott-Ladd and Chan (2004) provide evidence to suggest that participative decision making gives better access to information and improves the quality and possession of decision outcomes.

### **2.5. New product development**

There are various benefits of technology transfer such as long-term economic growth, innovative capabilities and performance, enhanced technological capabilities, competitive advantage, increased productivity and development of local industries (Liao and Hu, 2007). Similarly, new technologies enable firms to develop innovative new products (Taylor, 2010). New product development (NPD) has thus become a key strategic activity in many firms as new products make an increasingly significant contribution to sales and profits. New product development (NPD) is central to business prosperity. However, new product success remains an elusive goal for many firms. For survival and growth, enterprises need to persistently develop successful products. In recent decades, new product competition has changed significantly. Enterprises have come to realize that traditional standards like high product quality, low costs, and differentiation are not enough to guarantee the success of new products. In most industries, successful development and commercialization of new products are the foundation of a company's survival and growth. In other words, new products represent a hidden source of competitive advantage (Ching- Hu et al., 2008).

The effectiveness of NPD depends both on the integration of information and knowledge within the organization and on a suitable combination of hard and soft organizational resources. In particular, the NPD is described as a sequence of problem-solving cycles strongly interrelated and overlapped, based on the interaction among different knowledge resources (Sun and Wing, 2005).

Linzalone analyses NPD process and highlights how different organizational capabilities, such as technological, marketing, external and internal integrative capabilities affect process efficiency and product effectiveness. In addition, some recent NPD managerial approaches like concurrent engineering and multi project management stress the importance of knowledge and its management for performing a successful NPD process (Linzalone, 2008). Nevertheless, product development has relatively long timeframes and is considered more volatile, unstructured and is hard to measure and manage. There are four main stages of NPD:

- (1) Idea generation and conceptual design;
- (2) Definition and specification;
- (3) Prototype and development; and
- (4) Commercialization (Sun and Wing, 2005).

### **2.6. New product development (NPD) process**

In the present age of rapid change, firms in many industries are operating in markets that demand more frequent innovation, shorter product lifecycles, and higher quality product. These developments affect product performance, quality costs, and frequency of new product

launches. As a result, firms are seeking ways to decrease product-development times while simultaneously improving quality and reducing costs. New product development (NPD) has thus become a key strategic activity in many firms as new products make an increasingly significant contribution to sales and profits (Koufteros et al. 2005). Indeed, new products are increasingly cited as being the key to corporate success in the market. Managers are thus under pressure to improve their companies' NPD performance. This requires more efficient and effective NPD processes—principally by avoiding wastage of resources on peripheral activities, changes, and reworks (Yeh, Pai and Yang, 2010). Furthermore, even within the NPD process, several activities (or phases) can be distinguished (concept design, engineering, testing and prototyping, production rump up, commercialization) which are different in terms of the above characteristics (time, level and type of risk, relevance of intangibles, distance from the market, etc.). This implies the need to have, at the same time, different techniques and methods for performance measurement in the different NPD phases and a synthetic view that is able to evaluate performance of the overall NPD project (Bassani et al., 2010). Practitioners and scholars alike have thus become increasingly interested in how to organize and manage the NPD process effectively. Although many firms have become aware of the importance of the NPD process in long-term business development, and although many have been putting more effort into the management of NPD, the failure rate of new products has been high—with rates of up to 40% having been reported (Cooper and Edgett, 2003). There are several reasons for these high failure rates. One of the most significant is the under-utilization of contemporary tools and techniques to aid NPD. Numerous tools and techniques have been developed over the years to make the NPD process more manageable and successful (Thia et al. 2005).

### **2.7. New product development performance (NPDP)**

The rate of NPD in particular is considered a crucial 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).

The improvement of NPD performances, aimed to increase the value incorporated into products, is strictly 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).

### **2.8. New product development performance (NPDP) efficiency**

In theory and in practice, the definition of new product has been widely discussed among experts and scholars from different angles, including the view point 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 efficiency is related to cost, quality, schedule, and speed, and emphasizes short-term outcomes.

### 3. Framework and hypotheses

Fig. 2 shows the conceptual framework, indicating the impact of human capital on new product development performance efficiency with regard to the mediating role of organizational learning capability. Previous studies only emphasize the relationship between intellectual capital and new product development performance efficiency; however, the whole process should include organizational learning capability. Without organizational learning capability, intellectual capital per se can not achieve new product development performance efficiency.



Figure2. Conceptual Framework

#### 3.1. Human capital and organizational learning capability

A core factor to creating value from human capital may be the ability to operate knowledge, bringing it out into the collaborative arena (Qureshi and Keen, 2005). Qureshi et al. (2002) express that an organization's potential to create value through its human capital is bounded by the extent to which its knowledge resources can be made accessible. These intangible resources are knowledge creation factors and organizational learning is a method for creating knowledge. Also recent studies are shown that the human capital is the result of dinomic business practices and has close relationship with knowledge management and organizational learning (lynn. 1999). Based on the discussion above, this study offers the following hypothesis.

Hypothesis 1: Human capital affects organizational learning capability.

#### 3.2. Human capital and new product development performance (NPDP) efficiency

Human capital may improve new product development performance because it brings about the transformation of knowledge to value (Edvinsson and Sullivan, 1996). Chen et al. (2006) indicates while companies have more human capital, in fact 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 2: Human capital affects new product development performance.

#### 3.3. Organizational learning capability and new product development performance (NPDP) efficiency

Hunt and Morgan (1995) indicate that organizational learning capability is a very important and complicated resource which can cause competitive advantages. Organizational learning includes developing and using new knowledge to improve organizational performance. Organizational learning has an important impact on innovation. A firm has an ability to gain new knowledge and integrate extant knowledge with different methods will perform well in terms of product innovation and manufacturing processes. Juan et al. (2013) indicate that creation can cause business performance by the mediating role of organizational learning. Also Cai et al, (2013) show that methods of resource acquisition have positive effects on new venture performance, that resource attraction and internal development have positive effects on learning capability in new ventures, and that learning capability mediates the relationship between these two resource acquisition practices and new venture performance.

Arora (2002) contends that growth and learning in the new product development process not only enhances knowledge innovation but also improves new product performance. In fact,

companies possessing stronger organizational learning capability can create more value added and finally lead to their better performance. This study offers the following hypothesis based on the above discussion.

Hypothesis 3. Organizational learning capability affects new product development performance efficiency.

## **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 human capital; learn and enhance its learning capability 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 newproduct 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 three standard questionnaires comprised human capital, organizational learning capability, and new product development performance efficiency. Each questionnaire includes two grouping variables: (i) sex, (ii) graduation level.

#### **4.2.1. Human capital**

Human capital measurement comprises the following four items:

- (1). Employee empowerment is high in my company;
- (2). Employees in my company have excellent professional skills;
- (3). The company provides well-designed training programs;
- (4). The employees of my company have unique and new ideas.

#### **4.2.2. Organizational Learning Capability**

Organizational learning capability measurement comprises the following thirteen items:

- (1). People here receive support and encouragement when presenting new ideas
- (2). People are encouraged to take risks in this organization
- (3). People here often venture into unknown territory
- (4). It is part of the work of all staff to collect, bring back, and report information about what is going on outside the company
- (5). There are systems and procedures for receiving, collating and sharing information from outside the company
- (6). People are encouraged to interact with the environment: competitors, customers, technological institutes, universities, suppliers etc.
- (7). Employees are encouraged to communicate
- (8). There is a free and open communication within my work group
- (9). Managers facilitate communication
- (10). Cross-functional teamwork is a common practice here
- (11). Managers in this organization frequently involve employees in important decisions

(12). Policies are significantly influenced by the view of employees

(13). People feel involved in main company decisions

#### 4.2.3. New product development performance (NPDP) efficiency

In this study NPDP efficiency includes financial performance, product performance and time efficiency. These sub-components comprise the following eight items:

- (1) The overall profitability of this new product is high
- (2) This new product generates a high investment return
- (3) Completing the project successfully in budget
- (4) This new product launched on time
- (5) The senior managers satisfy the new product development project results
- (6) In general, we have difficulty adhering to time dead-lines in our new product projects.
- (7) We get our products to market on or ahead of schedule.
- (8) We perform better than our objectives on speed of new product development.

## 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 H0 hypothesis. In this test, cut point is 3. In this study we use binomial test for investigating whether the principal variables includes HC, OLC and NPDP efficiency 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  $\alpha$  for measuring reliability. If values exceed the 0.7 criteria, indicating that the measurement has good reliability. Table 1 shows Cronbach's  $\alpha$  coefficients for human capital, organizational learning capability and NPDP efficiency questionnaire.

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

	Human Capital	Organizational Learning Capability	New Product Development Performance Efficiency
Cronbach's Alpha	0.851	0.874	0.803

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

		Human Capital	Experimentation	Risk Taking	Interaction with the external environment	Dialogue	Participative decision making	organizational learning capability	Financial Performance	Time Efficiency	Product performance	NPDP efficiency
N	Valid	42	42	42	42	42	42	42	42	42	42	42
	Missing	0	0	0	0	0	0	0	0	0	0	0
Mean		4.2262	3.8571	2.9048	4.0397	4.5119	2.5794	3.7927	4.6270	4.0635	3.9921	4.2275
Std. Error of Mean		.07067	.13009	.13551	.05703	.07075	.10781	.04586	.06740	.09788	.06063	.05301
Median		4.3750	4.0000	3.0000	4.0000	4.5000	2.0000	3.8889	4.8333	4.0000	4.0000	4.2222
Mode		4.50	4.00	2.00	4.00	5.00	2.00	4.01	5.00	4.00 <sup>a</sup>	4.00	4.22
Std. Deviation		.45802	.84309	.87818	.36959	.45850	.69866	.29721	.43681	.63433	.39295	.34352
Variance		.210	.711	.771	.137	.210	.488	.088	.191	.402	.154	.118
Skewness		-.228	-.487	.192	.205	-.024	.849	-.148	-.589	-.309	-1.078	-.385
Std. Error of Skewness		.365	.365	.365	.365	.365	.365	.365	.365	.365	.365	.365
Kurtosis		-.883	-.108	-1.70	4.268	-1.872	-.446	-1.324	-1.467	.025	1.362	-.762

			<b>4</b>								
<b>Std. Error of Kurtosis</b>	<i>.717</i>										
<b>Range</b>	<b>1.75</b>	<b>3.00</b>	<b>2.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.00</b>	<b>.92</b>	<b>1.00</b>	<b>2.33</b>	<b>1.67</b>	<b>1.11</b>
<b>Sum</b>	<b>177.50</b>	<b>162.00</b>	<b>122.00</b>	<b>169.67</b>	<b>189.50</b>	<b>108.33</b>	<b>159.29</b>	<b>194.33</b>	<b>170.67</b>	<b>167.67</b>	<b>177.56</b>

**a. Multiple modes exist. The smallest value is shown**

Table 3 clearly shows that HC mean exceed value test (3), indicating that HC of Iran Khodro and Saipa are in good level. Also we can deduce that the organizational learning capability is good. Between three components of NPDP efficiency, financial performance has highest mean. Although the mean value of all components of NPDP efficiency exceed threshold level (3), indicating that the products which are launched by Iran Khodro and Saipa are good to financial performance, product performance and time efficiency.

## 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 Efficiency	organizational learning capability	Human Capital	Partial Correlations
---	---	1	Human Capital
	1	---	organizational learning capability
1	.361 Control Variables: Human Capital	.346 Control Variables: organizational learning capability	NPDP Efficiency

### 5.5.2. Binomial Test

Table 4 shows the result of binomial test for human capital. Exact sig is downner 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, human capital exceed mean threshold.

Table 4: Binomial Test for Human Capital

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Human Capital	Group 1	<= 3	0	.00	.50	.000
	Group 2	> 3	4	1.00		
	Total		4	1.00		

Table 5 shows the result of binomial test for organizational learning capability. Exact sig is downner 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, OLC exceed mean threshold.

Table 5: Binomial Test for organizational learning capability

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
organizational learning capability	Group 1	≤ 3	0	.00	.50	.000
	Group 2	> 3	42	1.00		
	Total		42	1.00		

Table 6 shows the result of binomial test for NPDP efficiency. Exact sig is downer than 0.05% so H<sub>0</sub> is rejected; indicating the informants' proportion that elected value upper than 3 is more than 50%. Therefore the view point of informant, NPDP efficiency exceed mean threshold.

Table 6: Binomial Test for NPDP Efficiency

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
NPDP efficiency	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 follows.

Table 7 shows the result of One-Sample Kolmogorov-Smirnov Test for Human Capital. Exact sig is downer than 0.05% so H<sub>0</sub> is rejected; indicating that data distribution for human capital is not normal.

Table 7: One-Sample Kolmogorov-Smirnov Test for Human Capital

		Human Capital
N		42
Normal Parameters <sup>a,b</sup>	Mean	4.2262
	Std. Deviation	.45802
Most Extreme Differences	Absolute	.225
	Positive	.165
	Negative	-.225
Kolmogorov-Smirnov Z		1.458
Asymp. Sig. (2-tailed)		.028
a. Test distribution is Normal.		
b. Calculated from data.		

Table 8 shows the result of One-Sample Kolmogorov-Smirnov Test for organizational learning capability. Exact sig is upper than 0.05% so H0 is not rejected; indicating that data distribution for organizational learning capability is normal.

Table 8: One-Sample Kolmogorov-Smirnov Test for organizational learning capability

		organizational learning capability
N		42
Normal Parameters <sup>a,b</sup>	Mean	3.7927
	Std. Deviation	.29721
Most Extreme Differences	Absolute	.151
	Positive	.148
	Negative	-.151
Kolmogorov-Smirnov Z		.977
Asymp. Sig. (2-tailed)		.295
a. Test distribution is Normal.		
b. Calculated from data.		

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

Table 9: One-Sample Kolmogorov-Smirnov Test for NPDP Efficiency

		NPDP efficiency
N		42
Normal Parameters <sup>a,b</sup>	Mean	4.2275
	Std. Deviation	.34352
Most Extreme Differences	Absolute	.137
	Positive	.103
	Negative	-.137
Kolmogorov-Smirnov Z		.886
Asymp. Sig. (2-tailed)		.412
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 10.

Table 10: Inter-Item Covariance Matrix for constructs

	Human Capital	organizational learning capability	NPDP efficiency
Human Capital	.210	.021	.055
organizational learning capability	.021	.088	.003
NPDP efficiency	.055	.003	.074

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.

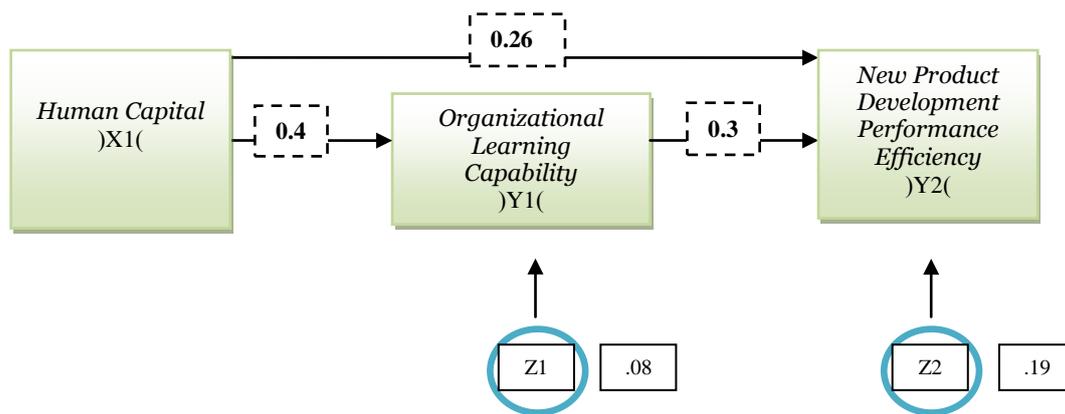


Figure3. Path model and coefficients for constructs

Results show that human capital affects organizational learning capability ( $\gamma = 0.4, p < 0.01$ ). Human capital affects NPDP efficiency ( $\gamma = 0.26, p < 0.01$ ) and organizational learning capability affects NPDP efficiency ( $\beta = 0.3, p < 0.01$ ). 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 11.

Table 11: Inter-Item Residual Covariance Matrix for constructs

N	42	Human Capital (X1)	organizational learning capability (Y1)	New Product Development Performance Efficiency (Y3)
Residual Covariance	Human Capital (X1)	0.000		
Residual Covariance	organizational learning capability (Y1)	0.000	0.000	
Residual Covariance	New Product Development Performance Efficiency (Y3)	0.000	0.000	0.000

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

## 6. Discussion and Conclusions

Knowledge innovation is a critical element in product value creation and economic growth in a knowledge-based economy. Knowledge innovation depends on organizational learning capability improvement. High-quality employees are the most important factor for a firm in this economy. Managers train their employees to be knowledgeable workers, improve their quality, and increase organizational learning capability. Organizations' attempt for retaining and training their best human resources is the most important competitive strategy within the knowledge economy context. Indeed, organizational learning depends on the exchange and integration of information, knowledge, and ideas exerted by organizational members. The better the employee quality is defined as the more knowledge which is generated to improve organizational learning capability. Based on the discussion above, we can say that human capital affects organizational learning capability.

Human capital may improve new product development performance because it brings about the transformation of knowledge to value (Edvinsson and Sullivan, 1996). Chen et al. (2006) indicates while companies have more human capital, in fact they have more innovative competencies for improving and raising their new product development performance. Ling (2012); Linzalone (2008); Chen et al (2006) and Chin (2001) contended that there is relationship between human capital and new product development performance. 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 human capital to guarantee their survival.

Organizational learning capability is a very important and complicated resource which can cause competitive advantages. Organizational learning includes developing and exerting new knowledge to improve organizational performance. Organizational learning has an important impact on innovation. In other words, better organizational learning capability is defined as better innovation capability. Companies with higher learning capability can generate more value added and finally have better performance (Hsu and Fang, 2008). Based on the discussion above can say that organizational learning capability affects NPDP efficiency. Matt and Razak (2011); Land et al (2011); Jabar et al (2010) and Huang; Chu (2009); Alegre and Chiva (2008) and Tsai and Huang (2008) contended that there is relationship between OLC and NPDP efficiency. 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 products that customers accept and have desirable performance by concentrating upon five OLC components.

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