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## **INVESTIGATING THE ROLE OF INTELLECTUAL CAPITAL IN IMPROVING ENTREPRENEURIAL COMPETITIVE ADVANTAGE (CASE STUDY: THE CEMENT INDUSTRY)**

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### **ABSTRACT**

Nowadays, intellectual capital is used for creating and increasing organizational value and the success of an organization depends on its capability in managing this rare resource. This important organizational capability care engenders entrepreneurial competitive advantage in comparison to other organizations. On the other hand, qualified and knowledgeable human resources are the most advantage of an organization and is considered as the least resources in knowledge-based economy of today. The present study is to investigate the role of intellectual capital in improving entrepreneurial competitive advantage in cement industry. The method of the study is descriptive-analytical and in order to collect data, Bontis's standard intellectual capital questionnaire (1997) was used. The reliability coefficient of the questionnaire was 0.92 and its concurrent validity was reported equal as 0.79. To analyze the data, the statistical methods of correlational analysis and regression analysis were used. The results of the research indicate that intellectual, human, customer (relational), and structural capitals, in separate and independent investigations, have significant correlation with competitive advantage. In other words, as intellectual capital increase, entrepreneurial competitive advantage increases as well.

**Keywords:** *Intellectual Capital, Human Capital, Structural Capital, Customer (Relational) Capital, Entrepreneurial Competitive Advantage*

### **INTRODUCTION**

In recent two decades, in business environment which firms and firms have been competing with each other, there have occurred significant changes. Nowadays, many influential firms take their entrepreneurial competitive advantages which are different from the traditional resources of making wealth (Faghihi and Feizi, 2006). During the Industrial Revolution, firms, to make wealth, were dependent on physical properties such as lands, natural resources, buildings and machinery, but the advent of knowledge-based organizations and industries transformed the nature of making wealth in an outstanding way (Stewart, 2004). Intellectual capital is a set of knowledge-based properties which belong to an organization and are the characteristics of that organization, while through adding value to the key shareholders of the organization, it results in improving the competitive state of the organization (Marr, 2001). In this line, the knowledge-based business environment needs an approach which covers the new intangible organizational properties such as knowledge and capabilities of human resources, innovation, relations with customers, organizational culture, systems, organizational structure and etc. in addition, the results of the research indicate that intellectual capital is effective in increasing the performance of an organization. For example, Bontis's studies in Canada and also those of Bontis *et al.*, in Malaysia indicate that there is both positive and negative correlations between the elements of intellectual capital (human capital, structural capital and customer capital) and business performance (Bontis, 1998). Furthermore, the results of the research of these researchers indicate that human capital is important regardless of considering the type of industry; the customer capital has a significant influence on structural capital regardless of the industry; and at last, developing structural capital has a positive correlation with business performance. These results implicitly signify the efforts of organizations for compiling organizational knowledge and through it, more development of structural capital results in sustainable entrepreneurial

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competitive advantage. This advantage per se results in improving more business performance (Bontis *et al.*, 2000). In addition, other researches indicate that intellectual capital as the most important intellectual capital of a firm has a significant effect on its performance (Zack, 1999). A main feature of the knowledge-based school is that it explicates the resources of entrepreneurial competitive advantage a firm based on a comprehensive approach. It means that the entrepreneurial competitive advantage originates basically from a firm and its knowledge (Cater, 2001). The knowledge-based school, when some articles were published about the knowledge-based theory of firms (Grant, 1997), knowledge was considered as an important factor of the performance of firms and being competitive (Riesenberger, 1998), until 1980's, the focus of most management theories has been on the business environment and the structure of industry (as a basis for perceiving entrepreneurial competitive advantage). Three assumptions of Neo-classics in economy were as follows:

1. The available resources are distributed homogenously within an industry and;
2. Competing firms easily can have access to these resources and;
3. Knowledge is the information which is available for the public and easily.

Therefore, Neo-classics believed that the role of management is to find a path for combining products and markets optimally (in the environment of bargaining among providers and customers) and to remove the barriers to the entrance of potential and alternative goods and technologies. The final message of this attitude can be summarized in the necessity of attention and focus on the environment (instead of focus on the inside of the firm) to access entrepreneurial competitive advantages.

During 1980's, the mentioned assumptions and beliefs were challenged by the Resource-based belief. According to Pen Rose's statements, the entrepreneurial competitive advantage cannot be accessible merely by different combinations of products and markets in an industry, but mainly originates from different organizational resources. Since the resources are not always transferable, followed or replaceable, it seems necessary that to identify the real and sustainable resources, instead of considering the outside, a considerable attention be paid to the inside of firms.

Barney introduces four determining criteria in creating entrepreneurial competitive advantage as follows:

1. Creating value for customers
2. Scarcity of resources
3. The capability of being followed
4. Replaceability

The only resources enjoying these characteristics are intangibles resources (Barney, 1991). These resources are referred to by different names such as knowledge, intangible properties, strategic properties, absorbcency, main advantages, main capabilities and even organizational memory. An important approach for explaining entrepreneurial competitive advantage of a firm in the late 90's was the news intellectual capital-based classification of the firm with the elements of human capital and structural capital (Edvinson, 1997). The real entrepreneurial competitive advantage of a firm are founded mainly based in its structural capital. It means that one of the most important challenges of knowledge management is the change of human capital of a firm to its structural capital (Lank, 1997).

Modern economy which originates from the phenomenon of information and knowledge has had a great role in outstanding increase in the importance of intellectual capital in the issue of research and business. Regarding the amount of our knowledge of intellectual capital there is no significant consensus (Hornery, 1999). However, intellectual capital was unknown in the past, now, it plays roles in the process of economic, management, technological and social development in different forms. The revolution originating from information technology and the advent of information societies, the increasing importance of knowledge and knowledge-based economy are the most important factors determining entrepreneurial competitive advantage which pave the path for the increase in the importance of intellectual capital in firms more and more.

In other words, intellectual capital consists of non-physical resources of value creation of a firm which is related to the staff's capabilities, organizational resources and operational method as well as relationship with shareholders (Lonnqvist, 2004), and determines the value of each firm in the market environment. In

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other words, intellectual capital includes that part of the total capital or property of the firm which is based on knowledge and the firm is its owner. According to this definition, intellectual capital can both includes the knowledge itself (which has changed into intellectual property of a firm) and be the final result of its transference process. The definition of Intellectual Property Law includes only cases such as the right of the ownership of things such as inventions, brands and copyrights. These properties include only intellectual capitals which are more appropriate for accounting aims. The elements of intellectual capital consist of three main parts which have interaction with each other for creating value. These three parts are human capital, structural (organizational) capital and relational capital.

**a. Human Capital:** human capital refers to the capabilities, skills and expertise of the human members of an organization (Malcom, 2002). Human capital enjoys intellect. The primary objective of human capital is innovation in goods and services and also improvement in business processes (Mouritsen, 2001). The most important characteristics of human capital are as follows: professional and specialized competence of key staff, education, experience, the number of the members of the firm with prior related background, and the exact distribution of responsibilities in relation to customers.

**b. Structural Capital:** structural capital includes all non-human resources of knowledge in an organization which includes databases, organizational charts, operating procedures of processes, strategies, executive program and in general, whatever whose value is more than its material value for the organization (Roos *et al.*, 1997). In clearer words, Roos *et al.*, believe that structural capital refers to what remains in the firm when the personnel get home in nights. This kind of capital is created by entrepreneurial competitive advantage of a firm plus its staff's capabilities and includes cases such as fame, experience, products and services or its production modes. Structural capital depends on human capital as well. Therefore, structural capital and human capital in interaction with each other, contribute to shape, develop and apply coordinately customer capital.

**c. Customer (Relational) Capital:** the origin of relational capital is considered to be the relation among individuals present in a group or a particular sect. while the relation among individuals are introduced as a key factor, the level in which this relation is considered is different considerably with other studies. Relational capital includes extra-organizational dependencies such as customers' loyalty, good fame and the firm's relationships with its resource suppliers. This issue is defined through customers' value received from conducting trades with the organization (Malcon, 2002).

Customer capital includes cases such as the value of advantages owned by the firm, its relationship with people and organizations related to customers, the market share, the rate of keeping or losing customers and also pure profitability per each customer (Mouritsen, 2001).

Stewart states that the main position of customer capital is the available knowledge in marketing channels and relations with customers, customer capital indicates the potential capability of an organization due to its invisible external factors (Stewart, 1997).

The considerable pint in capital-oriented approach is that thinkers such as Ostram believe that physical capital are removed due to overuse, while intellectual and social capital are destroyed due to not using (Edvinson, 1997).

In this line, knowledge management can be defined as part of the management process which focuses on the systematic analysis, planning, accumulation, creation, development and application of knowledge in the firm and tires to transform human capital to structural capital to a great extent in order to create its own entrepreneurial competitive advantage (Fornell, 1992).

### **Entrepreneurial Competitive Advantage**

Entrepreneurial competitive advantage includes a set of factors which always make a firm capable in indicating a better performance than its competitors (Bourgeois *et al.*, 1995). Entrepreneurial competitive advantage is a combination of factors which in a competitive environment make an organization much better than other organizations and its competitors cannot imitate it easily (Ghlichli, 2006).

As indicated in these two definitions, and indicated in any other definition, we observe the common aspects among them. These common aspects say that to access a competitive entrepreneurial, an organization should both rely on its external state (Porter, 1985) and consider its internal capabilities

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(Barney, 1992). It should be noted that an organization should think about the internal capabilities and the competitive state of markets not separately, but in an interactional way, as the resources of access to entrepreneurial competitive advantage and codification of marketing strategies (Hooley *et al.*, 2003).

Regarding that the concept of entrepreneurial competitive advantage originates from the concepts of strategic management, it can be said that entrepreneurial competitive advantage is the result of a dynamic and continuous process which by considering external and internal state of the organization, originates from the resources of the firm and through the ability of appropriately applying these resources, capabilities are created by which entrepreneurial competitive advantage is brought to the organization (Gholichli, 2006).

There is two important issue in the path of creating entrepreneurial competitive advantage: first, this path is a continuous process which results in a supreme performance of competitiveness. In other words, in case that an organization can create, via its efficacy, sustainable entrepreneurial competitive advantage which are valuable for customers, and are better than other competitors, in fact, they indicate decent performance and bring competitiveness (Fahy and Smithee, 1999; Liu *et al.*, 2003; Shurchuluu, 2002; Smith, 1995). Second, due to the increase in environmental increase and severity of competition, entrepreneurial competitive advantage are imitated easily by competitors or are faded by customers soon and should be replaced by new advantages (Saloner *et al.*, 2001). Accordingly, an organization should think of making sustainable its own entrepreneurial competitive advantage (Sharkie, 2003). Creating and keeping entrepreneurial competitive advantage requires competencies which by relying on the capabilities of an organization, creates value for customers (Brazell *et al.*, 1998).

Firm resources include properties, capabilities, organizational processes, information, knowledge, and ... which the firm controls them in such a way that it develops and executes value creating strategies. These resources can be observed in three classifications of tangible and intangible resources and organizational capabilities (Dess and Lumpkin, 2003).

Firm capabilities is a combination of skills, knowledge and behaviors which are available in all over the organization and are reflected in individuals, systems, processes and structures. In another definition, skills which a firm apply for transforming data to outputs to use the combination of tangible and intangible resources for achieving desired objectives like servicing customers, capability of developing superior products, being innovative in services and goods in the form of organizational processes (Dess and Lumpkin, 2003). Competencies are a complete combination of properties, resources and processes which allow a firm to respond the requirements of customers. Those competencies enjoy strategic value which can create value for customers.

As stated above, the main objective of an organization for creating entrepreneurial competitive advantage by relying on the resources and capabilities available for it, is competitiveness and access to a privileged situation in terms of performance in markets. The key to this issue, i.e. access to competitiveness, is sustainability of entrepreneurial competitive advantages of the organization.

In other words, the origins of entrepreneurial competitive advantage related to intellectual capital can be explicated in the domains of human, organizational and environmental resources:

**a. *Entrepreneurial Competitive Advantages of the Domain of Human Forces*:** the reasons of need to changes and transformations in organizations and the role of human forces for the capability of organizations with the objective of more compatibility with new environmental requirements are as follows:

- The pressures which are imposed by the domain of world completions on organizations force them to do continuous and systematic changes and transformations.
- Customers' expectations about quality, prices, services and responding have increased. Economic firms always pursue two objectives of surviving and making profit, necessarily, it should be acted in way that besides surviving, profit making remains and this issue requires efficacy and efficiency of human resources in the organization.

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- Contemporary human forces have been changed compared to the past. On the one hand, new labor forces have had extraordinary potentiality for growth and development and on the other hand, they require more trust creation from organizations (Ma, 1999).

**b. Entrepreneurial Competitive Advantages of Organizational Domain:** This type of competitive advantage is based on the resources, competencies and features which originate from previous and now experiences of an organization and is shared by the entire organization. Entrepreneurial competitive advantage of organizational level is of two types: the competitive advantage based on the resources which can be tangible and intangible and the entrepreneurial competitive advantage based on the capabilities and features which are usually intangible. Such an advantage is socially complicated; in terms of imitation, it is difficult; and in terms of transmissivity and mobility it is sedentary. This type of advantage can be searched in processes, structures, systems, organizational culture, technical knowledge, marketing knowledge, organizational strategies, and coordinated and motivational systems of organizations. Accordingly, the resources can be divided into four total basic, peripheral, competitive and strategic classes (Sadri and Lees, 2001).

**1. Main Resources:** these resources are necessary for organizations and organizations cannot have any operation without them. In other words, any organization has its own philosophy of existence which without proper and necessary for it, realizing organization of philosophy of existence and objectives are not is not possible.

**2. Peripheral Resources:** these resources are not vital or necessary and are easily accessible, purchasable and acquirable. These kinds of resources are efficient in most organizations which lack efficient management and surplus human forces, unnecessary equipment, extra processes, cumbersome systems, high management levels and .... These kinds of resources instead of helping entrepreneurial competitive advantage of organizations provide their inefficiency.

**3. Competitive Resources:** competitive resources are those resources that make an organization enable to produce and supply valuable competitive products in markets. Demand, scarcity, relations and relevance can be considered as the factors which cause competitiveness of these resources.

**4. Strategic Resources:** strategic resources includes that set of resources unique to an organization which cause the distinction and difference in the performance of the organization compared to its rivals and in terms of market performance, create an inaccessible distance for the organization which competitors cannot easily reach.

**c. Entrepreneurial Competitive Advantages of Environmental Domain:** organizations are active in environments and environmental factors surround them and influence their performance directly. In other words, organizations supply the required factors from the environment and for it, supply their products in the environments. Besides, they require environmental vital arteries for surviving like living things. In addition. As a resource of threats and opportunities, they have significant roles in the success or defeat of organizations (Dobni and Leffman, 2000). Achieving sustainable entrepreneurial competitive advantage is possible even from difficult environmental conditions. To access entrepreneurial competitive advantage, it is not necessary that the environment be calm and the conditions be favorable. But, even employers and innovators can create entrepreneurial competitive advantage from difficult and unfavorable conditions.

Since perceiving and utilizing the vital intangible resources in organizations contribute to the maintenance and access of entrepreneurial competitive advantage, in the present study, the investigation of the role of intellectual capital in improving entrepreneurial competitive advantage of cement industries is done.

## **MATERIALS AND METHODS**

### ***Instruments and Methods***

The present study is a descriptive one and in terms of aims, it is applied. The instrument of data collection was a questionnaire containing 46 questions in the form of Likert scales (seven scales). The basic questionnaire was designed by Bontis, and it was expanded and adapted for the needs of the present study. To estimate the reliability of the questionnaire, Cronbach's alpha was used (table 1). And to promote the validity, after identifying attentively the realizations of each component and studying similar

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questionnaires, articles, books and journals, the ideas of professors and experts were utilized. To test the hypotheses, the statistical methods of simple regression and multiple regression were used, to analyze the data and to determine the type and the amount of correlation between variables the statistical methods of correlation analysis was used, regression analysis was used for and determining the effects of dependent variables. To test the research hypotheses, SPSS software program was used.

**Table 1: reliability coefficient of the questionnaire**

Research variables	Scale type	The number of the questions of each variable	Cronbach's alpha coefficient
Human Capital	point Likert-7	12	0.92
Customer (relational)capital	point Likert-7	12	0.92
Structural capital	point Likert-7	12	0.94
Entrepreneurial Competitive Advantage	point Likert-7	10	0.89

### Population

The common attribute of the population of the study is the staff who works in cement industries. Regarding that for answering the questions, it was necessary that individuals be experts and familiar with the industry, the central managers of cement industries composed the sample. Due to the extent of the cement industry in Iran and the lack of access to all related firms and companies, simple random sampling was conducted.

### Research Findings

Regarding the objective of the study, the research hypotheses were designed as follows:

The main hypothesis: there is a significant correlation between intellectual capital and entrepreneurial competitive advantage of cement industry.

Regarding that intellectual capital is divided into three parts of human capital, customer (relational) capital and structural capital, the main hypothesis is divided into three independent sub-hypothesis:

1. There is a significant correlation between human capital and entrepreneurial competitive advantage of cement industry.
2. There is a significant correlation between customer (relational) capital and entrepreneurial competitive advantage of cement industry.
3. There is a significant correlation between structural capital and entrepreneurial competitive advantage of cement industry.

Therefore,  $H_0$  and  $H_1$  were designed as follows:

$H_0$ : there is no significant correlation between human capital and entrepreneurial competitive advantage.

$H_1$ : there is a significant correlation between human capital and entrepreneurial competitive advantage.

$H_0$ : There is no significant correlation between customer (relational) capital and entrepreneurial competitive advantage.

$H_1$ : there is a significant correlation between customer (relational) capital and entrepreneurial competitive advantage.

$H_0$ : there is no significant correlation between structural capital and entrepreneurial competitive advantage of cement industry.

$H_1$ : there is a significant correlation between structural capital and entrepreneurial competitive advantage.

$H_0$ :  $\rho_{XY} = 0$

$H_1$ :  $\rho_{XY} \neq 0$

The results of hypotheses testing using simple regression are presented separately in table 2:

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**Table 2: the results of regression calculations**

Variables	The regression equation	$\beta_0$	Standard error	$\beta_1$	t	significance number	Pearson correlation
Fixed value Human Capital	Y= 1.251X+1.243	1.243	0.721		1.524	0.123	
		1.251	0.178	0.567	5.345	0.000	0.459
Fixed value Relational capital	Y=1.213X+ 0.977	0.977	0.653		1.342	0.131	
		1.213	0.156	0.621	6.346	0.000	0.587
Fixed value Structural capital	Y=1.316X+0.451	0.451	0.549		0.981	0.234	
		1.316	0.135	0.751	8.786	0.000	0.732
Fixed value Intellectual capital	Y= 1.534X-0.342	-0.342	0.665		-0.581	0.453	
		1.543	0.164	0.719	8.256	0.000	

Regarding that the significance level for intercept 0.000 is less than 0.05 and for the slope of the line is more than 0.05, the null hypothesis is not rejected for the intercept, but is rejected for the slope of the line. Using multiple regressions, the concurrent effects of independent variables (human capital, relational capital and structural capital) on the dependent variable of entrepreneurial competitive advantage were investigated. The hypotheses were designed as follows:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = 0$$

$H_1$  = at least one of them is contrary to zero.

And

$H_0$  = none of the three variables are effective on improving entrepreneurial competitive advantage.

$H_1$  = at least one of the three variables is effective on improving entrepreneurial competitive advantage.

And to investigate the effect of human capital, structural capital and relational capital on entrepreneurial competitive advantage of firms, statistical methods were used and the results are indicated in table 3:

**Table 3: the results of statistical tests of effects of intellectual capital variables on the dependent variable of entrepreneurial competitive advantage**

Independent variable	Dependent variable	Spearman correlation coefficients	F-statistic	significance number	B Standard	T	Significance number
Human capital	Entrepreneurial competitive advantage	0.0543	20.065	0.0001	0.22	2.134	0.04
Relational capital					0.16	1.651	0.12
Structural capital					0.23	2.345	0.01

According to the table 3, and using statistical techniques of Spearman correlation coefficients and the coefficient of determination, partial regression coefficient ( $\beta$  Standard) of the direct effects of human capital, structural capital and relational capital variables were tested on the variable of entrepreneurial competitive advantage.

Regarding the statistical results of the table, it can be claimed that in the significance level 0.05, human capital and structural capital have direct and significant influences equal as 0.22 and 0.23 respectively on entrepreneurial competitive advantage. While relational capital in the significant level 0.05 has no significant influence on entrepreneurial competitive advantage.

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And to investigate the effect of intellectual capital on entrepreneurial competitive advantage, regarding the results of the table 4, in the significance level 0.05, as much as 0.64 has positive and significant influence on the increase in the entrepreneurial competitive advantage of them.

**Table 4: the results of the statistical tests of the effect of the independent variable intellectual capital on the dependent variable entrepreneurial competitive advantage**

Independent variable	Dependent variable	Spearman correlation coefficients	F- statistic	significance number	B Standard	T	Significance number
Intellectual capital	Entrepreneurial competitive advantage	0.64	40.241	0.000	0.64	6.567	0.002

At last, to prioritize the components of intellectual capital and competitive advantage, Freedman's test was used. According to the table 5, human capital with the value of 23.43 was placed in the first rank, structural capital with the value of 2.89 in the second one and relational capital with the value of 2.56 was in the last place. Because this ranking is according to the table 6 with the significance level  $p=0.000$  and is below 0.05, it is valid.

**Table 5: ranks related to the variable of intellectual capital**

Row	Title	Ranking mean
1	Human capital	3.43
2	Relational capital	2.56
3	Structural capital	2.89

**Table 6: Freedman's test for ranking intellectual capital variable**

Number	<b>80</b>
Chi-square	<b>13.342</b>
Degree of freedom	<b>2</b>
Significance level	<b>0.000</b>

**Conclusion**

Intellectual capital is the result of the domain of science and knowledge. Human factor has a significant role in the process of knowledge management and knowledge-based organizations and it is the most important entrepreneurial competitive advantage of an organization and the rarest resource in the knowledge-based economy of today. The objective of the present study was to investigate the role of intellectual capital on improving entrepreneurial competitive advantage of cement industry. According to the results of the statistical tests, it can be claimed that the variables of human capital, relational capital and structural capital, when are investigated independently, have a positive correlation with entrepreneurial competitive advantage and regarding the statistical results conducted based on regression analysis, it can be said that human capital and structural capital has positive and significant influence on increasing their entrepreneurial competitive advantage, while relational capital has no significant influence on their entrepreneurial competitive advantage. Therefore, it is better that managers of firms, regarding research of intellectual capital and its components, pay more attention on human capital, structural capital and relational capital respectively. This attention can result in improving their entrepreneurial competitive advantage for their potential and real customers and at last it will lead to their satisfaction and loyalty.

Accordingly, to develop intellectual capital, the following suggestions are presented:

- Integrity in all business units to provide services to customers
- Preparing strategies of firms through the participation of all units



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- Removing the weaknesses related to competitiveness through responding the rivals' behaviors, identifying the rivals' strategies and identifying the opportunities of markets based on competitive capability
- Removing the weaknesses related to relation with customers in the field of marketing capabilities through paying attention to customers' ideas, close participation with customers and creating commitment and trust to customers from firms
- Increasing efficiency in the fields of human resources, the raw material of the firms and designing reward system based on them
- Evaluating the human resources productivity and planning their improvement in the level of firms
- Paying attention to efficient strategies to increase entrepreneurial competitive advantage of firms and effort to execute them practically and accurately
- Effort to create a supportive culture through designing reward and motivation systems for reinforcing creativity and innovation, learning and developing human resources of firms
- Managing human knowledge in firms
- Designing and establishing the process of managing the performance of human capital in the level of firms
- Improving supportive services through expanding the supportive services of products and services in different geographical regions of the country, stringent quality control procedures applied to the support services and increasing the capability of diverse service to customers
- Adopting the strategy of competitive distinction by firms to create distinctive products and services compared to the rivals.

In addition, it is suggested to policy makers that the proper ground for improving intellectual capital inside firms and organization should be provided and through this, they contribute to satisfaction customers and final consumers.

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