The Role of Intellectual Property in the Success of Knowledge Management: A Case Study

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Abstract: Due to the specific economic conditions dominating corporations, their competitive advantage is no more based on their physical assets. The factor that, nowadays, makes these companies competitive in the current economy is the effective management of knowledge and also continuous emphasis on the key factors in knowledge resources such as intellectual properties. Accordingly, the present study investigates the role of intellectual assets in knowledge management success. The main question of this study is whether or not a high level intellectual property can result in a successful knowledge management. The statistical population of this study is the National Iranian oil production distribution company using simple random sampling. The data collection has been carried out through distributing personal questionnaire, employing field-descriptive research method. Using correlation coefficient test and structural equations test, the research findings demonstrate that there is a significant relationship between all intellectual property variables (human asset, structural property, customer capital) and knowledge management success. Finally, regarding the findings, some helpful suggestions have been offered.

Key words: intellectual property, human asset, structural property, customer capital, knowledge management.

INTRODUCTION

The growing significance of knowledge as a success-determining factor and organizations’ competitiveness have lead to the formation of knowledge-oriented economy and turned it into the most fundamental duty of an organization (Fee, 2001, p. 10). Therefore, organizations are trying to develop into a learner organization through creating, maintaining, transferring and using knowledge so as to reform and improve their activities and performances (lee & Cho 2003, p.180). Knowledge management refers to the efforts which are systematically made in order to find, organize, and make intellectual properties of organizations accessible and enhance learning culture and share knowledge in the organization (Cappelli, 2000, p.12). Many organizations, by focusing on knowledge management, are trying to access its advantages and thus, are investing widely on the field of information technology. They are also trying to improve their performance by implementing knowledge management (Rostogi.2000, pp. 39-49).

In parallel to the expansion of knowledge-orientedness of economy and its challenges, the first wave of efforts have been based on installing hardware and using modern technologies so as to gain productivity and organizational effectiveness. Considering the fact that human and social factors have gained growing attentions, some attempts have been made for integrating software and brain ware with aforesaid items (Abdullahi & Naveh Ibrahim, 1997, p.11). According to Davenport & Prusak (2000), the majority of organizations have taken the first required technological and equipment steps in order to promote organizational productivity level; however, they have reached a constant situation which do not develop any added value for them. To change this status needs major changes and concentration on key aspects such as culture, structure and the other social fields of organization (Damenport & Prusak, 2000, 101).

A significant point is that gaining competitive advantages and stable productivity in knowledge economy entail changing the behavior of all members of a company in different levels and subsequently require that their beliefs and attitudes be adapted. It should be recalled that mere change in behavior does not occur by simple steps such as purchasing technology, requirements and advanced tools, or changing the names of traditional phenomena to the new ones and following pioneer firms; however, it involves using other tools obtained through efforts and necessary qualifications and resulted in the high standing of the organization.

The most appropriate term to describe this concept is the phrase ‘intellectual property’ meaning the combination of intangible asset of market, intellectual property, human resource and infrastructural possessions that empowers an organization to perform its activities (Brooking, 1996, p.76). Accordingly, the main question of this research is whether there is a relationship between intellectual property and knowledge management in the intended statistical population. Whether a large number of intellectual property variables leads to the promotion of the success of knowledge management or vice versa. Therefore, regarding the main variables of...
these two concepts, some hypotheses have been formulated and tested. The present study mainly claims that there is a positive and significant relationship between intellectual property and knowledge management, resulting in the elevation of accomplishment in the organization.

**Theoretical Context: Intellectual Property:**

The most applied definitions for intellectual property offered by the Organization for Economic Cooperation and Development (OECD) are: economic value of two categories of intangible assets for each company; first, organizational (structural) capital; second, human capital that include human resource inside an organization (which means staff), and human resource outside the organization, that is, customers and suppliers, (OECD,2000). Some of the most important definitions of intellectual property include the following: intellectual property is a vague and complicated expression, but when it is appreciated and exploited, it can help provide a new resource base through which an organization can compete (Bontis, 1996:41). Bontis believes that intellectual property is defined as an attempt for effective use of knowledge (end product) against the information (raw material). Brookings has remarked that intellectual property is an expression for the combining intangible property of market, intellectual property, human property and infrastructural property that empowers an organization to do its activities (Brooking, 1996, p.76). According to Roos et al, intellectual property includes all the processes and assets which are not shown in the balance sheet; it also involves all the intangible properties (such as trademarks, registration right and etc) which are considered in modern accounting methods. Intellectual property is the sum of the knowledge of organization members and its application (Roos et al, 1997, pp.413–426). Generally, in the definitions of intellectual property, a kind of convergence can be noticed on its three main structures i.e. human property, structural capital and customers.

Brooking believes that human asset of an organization includes skills, specialty, and problem solution ability and leadership styles (Brooking,1996, p.76). Chen et al. has also commented that human asset as the basis of intellectual property refers to such factors as knowledge, skill, and capability and also the attitudes of employees. (Chen et al, 2004, pp.195-212). Furthermore, knowledge and skill exist in the employees’ minds, that is, their minds carry them. If intellectual employees are not utilized by an organization, knowledge and skill in their minds cannot be activated or have market value. Caring for human asset contributes to the organizations to rely mostly on the employees’ knowledge and skills for making income and growth as well as improving efficiency and productivity (Lank, 1997, pp. 406-412). Human asset indexes have been presented in Table1.

<table>
<thead>
<tr>
<th>Employees merit</th>
<th>Employees attitude</th>
<th>Employees creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>strategic leadership management, employees attributes, learning ability of employees, efficiency of employees training, the ability of employees to participate in decision making and management, training of technical and managerial employees</td>
<td>Acquiring identity via values of an organization, satisfaction rate, the rate of employees turnover, the average of employees’ useful life</td>
<td>Creative ability of employees, income earned from the creative thoughts of employees</td>
</tr>
</tbody>
</table>

Structural capital includes all non-human knowledge resource in an organization, involving data bases, organizational diagrams, administrative procedures of processes, strategies, administrative plans and whatever is more worthy for an organization than material possessions (Roos et al, 1997, pp. 413-426). Roos et al. believe that structure capital is everything that is left in the company when employees go back home at night. They also hold that structure capital comprises intellectual property, innovation, processes, cultural property, and development and reconstruction capital such as registration right of products. Table 2 illustrates structural capital indexes. (Chen et al, 2004:195-212).

<table>
<thead>
<tr>
<th>Organizational culture</th>
<th>Creating Corporate Culture, Identity of employees acquired from outlook of an organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational structure</td>
<td>Clear relationship of authority, responsibilities and benefits, Validity of the control system</td>
</tr>
<tr>
<td>Organizational learning</td>
<td>Creation and application of data network within an enterprise, created and application of organizational information repositories</td>
</tr>
<tr>
<td>Operational process</td>
<td>Period of business process, quality level of a product, organizational operational efficiency</td>
</tr>
<tr>
<td>Information system</td>
<td>Cooperation and mutual support among employees, capability for accessing the enterprise information, Knowledge-sharing</td>
</tr>
</tbody>
</table>

Stewart believes that customer capital is the market information for customizing to use in attracting and maintaining the customers. The main subject of customer capital is the knowledge available in marketing channels and relationships with the customers. Customer capital represents potential ability of an organization due to its external intangible factors (Skyrme, 2003). Although the expression of customer capital was first proposed by Hubert Staint-Onge, the new definitions have expanded its concept to relational capital including
the knowledge available in all relations which organizations have with customers, competitors, suppliers, trade associations or with the government (Bontis, 1999, pp. 433-462). Chen et al. (2004) have classified the customer capital as in marketing capability, market intensity and customer loyalty as illustrated in Table 3. (Chen et al,2004:195-212)

Table 3: Customer capital indices (Chen et al,2004:195-212).

<table>
<thead>
<tr>
<th>The basic capability of marketing</th>
<th>Creation and application of a customer database, customer service capability, ability to identify customer needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market intensity</td>
<td>Market share, market potential, customer sale units, trademark reputation and brand name, Creation of sales channel</td>
</tr>
<tr>
<td>Customer loyalty</td>
<td>Customers’ satisfaction, customers’ complaints, customers’ escape customers, capitalizing on the relationship with customers</td>
</tr>
</tbody>
</table>

Knowledge Management:

Since mid 1980s, organizations have gradually realized the important role of Knowledge in competitive environments; and within short time this phenomenon established itself among other wealth producing resources,(Rowly, 2000, p.220). The well-known expression to introduce this period is “economics of idea”. Economics of idea often refers to the unlimited potential for economic success and growth on which innovations and knowledge-based productions can be possible. This process is distinguished from more aspects of traditional economy which assumes that limited opportunities are based on the principle of shortage of physical resources, specialized labor force, capital and etc (Kelli, 1998, p.149).

Karl Wiig published the concept of knowledge management for the first time in 1986. Wiig defines knowledge management as making, renewing, applying and benefiting from knowledge in order to maximize the effectiveness of an organization’s knowledge and return its knowledge properties. Ever since, lots of efforts have been made to define management. Nevertheless, the definition of knowledge management is complicated due to the fact that there are various interpretations resulted from different views and related fields. Knowledge management can be considered as a way of improving performance, productivity and competiveness, efficient improvement of business, sharing and using information of inside an organization, a tool for improvement of decision-making, a method of achieving the best procedures a technique for reducing the costs and becoming more innovative organization (Martin 2007,p. 17). Knowledge management means developing and benefiting from knowledge properties of an organization. In the business world, knowledge management means the process of value production through intangible property; in fact this kind of management is a type of interaction between internal and external organization, that is, customers and beneficiaries. The main strategy in knowledge management is presenting adequate knowledge to any individual within proper time and location and in right manner (Dawenport et.al.1999, p.103). According to Skulltez, knowledge management is to challenge discovering individual knowledge and converting it to an information topic so that it can be stored in data bases, exchanged with others, and applied in the process of routine activities (Zahedi, 2001, p. 4). Variety of definitions in the literature of knowledge management leads us to a definition which includes a body of activities and business policies aimed at creating, retaining, transferring and using knowledge.

Research Hypotheses:

1- The high level of intellectual property variables leads to knowledge management success in an organization.
2- The high level of structural capital variables leads to knowledge management success in an organization.
3- The high level of customer capital variables leads to knowledge management success in an organization.

Research Methodology and Study Instrument:

In terms of objective, the present study is descriptive, regarding its use, it is an applied one; it is cross-sectional with relation to time dimension, and quantitative in view of data. Measurement tool is a reliable questionnaire which has been designed by some distinguished experts worldwide for researching attitude-measurement. Using Cronbach alpha 0.827 test, the results of questionnaire were validated. In order to measure the validity of the questionnaire, content-validity and construction-validity have been employed through structural equations model, exploring and confirming the validity of the questionnaire.

The statistical population of this study involves all the experts and managers of National Iranian oil production Distribution Company, choosing 120 people randomly from among 200 people.

Data Analysis:

In order to investigate the normality of the research variables, Kolmogrov-Smironov test has been used. As it can been noticed in Table 5, since the significance level of all figures is less than %5, the null hypothesis H₀ is rejected, confirming the normal distribution for all variables.

Testing the Hypotheses:

The high level of intellectual property leads to knowledge management success in an organization.
Table 5: Investigating the normality of distribution for variables.

<table>
<thead>
<tr>
<th></th>
<th>Human dimension</th>
<th>Structural dimension</th>
<th>Customer orientation dimension</th>
<th>Knowledge Management</th>
<th>Intellectual property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolmogorov-Smirnov</td>
<td>1.543</td>
<td>1.859</td>
<td>2.133</td>
<td>1.751</td>
<td>1.616</td>
</tr>
<tr>
<td>Significance level</td>
<td>.017</td>
<td>.002</td>
<td>.000</td>
<td>.004</td>
<td>.011</td>
</tr>
</tbody>
</table>

Table 6: Investigating the correlation between knowledge management and intellectual property.

<table>
<thead>
<tr>
<th></th>
<th>Knowledge Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual property</td>
<td>The correlation coefficient</td>
</tr>
<tr>
<td>Significance level</td>
<td>.000</td>
</tr>
<tr>
<td>observations</td>
<td>120</td>
</tr>
</tbody>
</table>

\( \rho \): correlation coefficient between knowledge management and intellectual property.

\( H_0: \rho = 0 \)

\( H_1: \rho = 1 \)

Correlation coefficient between two variables is 0.56 with significance level of zero.

Since the degree of significance level is less than error degree of 0.05, the assumption of the significant relationship between intellectual property and knowledge management is confirmed with %95 reliability. Therefore, the high level of intellectual property variables leads to knowledge management success in organizations. The diagram-1 demonstrates the results of main hypothesis testing through structural equations modeling. The following diagrams represent standard coefficient (R) and significance coefficient (T-value), casual relation between intellectual property and knowledge management. The table shows R (standard coefficient), T-value and indexes of fitness model such as \( \chi^2 \), RMSEA, GFI, and etc.

Considering the Lizrel output which has been presented in the following diagram, the value of \( \chi^2/df \) has been calculated to be 2.67. Also, the root of average error of approximate squares must be less than 0.08 and this value equals 0.039 in the presented model. The amount of variables GFI and AGFI must be more than 0.9, which are 0.91 and 0.9 respectively in the model under investigation. Regarding the indexes and the outputs of Lizrel software, data is mostly compatible with the model and presented indexes indicate that on the whole the presented model is a suitable model.

Diagram 1: The test output of causal relationship between intellectual property and knowledge management using Lizrel software in standard mode.

Testing Subordinate Hypotheses:

The high level of human, structural and customer asset variables leads to knowledge management success in organizations.
Diagram 2: The test output of causal relationship between intellectual property and knowledge management using Lizrel software at significant mode.

Table 7: Investigating the correlation among human, structural and customer assets and knowledge management

<table>
<thead>
<tr>
<th></th>
<th>Correlation coefficient</th>
<th>Significance level</th>
<th>Number of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human property</td>
<td>0.436</td>
<td>0.000</td>
<td>120</td>
</tr>
<tr>
<td>Structural property</td>
<td>0.41</td>
<td>0.000</td>
<td>120</td>
</tr>
<tr>
<td>Customer property</td>
<td>0.356</td>
<td>0.000</td>
<td>120</td>
</tr>
</tbody>
</table>

\( \rho \) = correlation coefficient degree between structural, human and customer properties and knowledge management

\( H_0 : \rho = 0 \)

\( H_1 : \rho \neq 1 \)

The degree of correlation coefficient between the variables of structural and customer properties and knowledge management equals 0.436, 0.41 and 0.356 with zero (0.000) significance level. Since the degree of significance level is less than the error degree 0.05, the hypothesis of meaningful relationship between human capital and knowledge management is confirmed with reliability degree of 95%. Furthermore, correlation coefficient degree among variables is average and positive, meaning the increase and improvement in customer, structural, human capital lead to the increase of knowledge management success. Therefore, subordinate hypotheses are also confirmed.

Lizrel Output for Subordinate Hypotheses:

**Human Property and Knowledge Management:**

Regarding Lizrel output, the \( df/\chi^2 \) has been calculated to 2.97. The root of average error for approximate squares must be less than 0.08, which is 0.046 in the presented model. The amounts of AGFI and GFI variables, too, must be more than 0.9 which are 0.93 and 0.88 respectively in the model under study. Regarding the indices and Lizrel software output, the data is to a great extent aligned with the model and accordingly, the indices show that the presented model is a suitable model.

**Structural Property and Knowledge Management:**

Regarding the presented Lizrel output in Diagram 4, the value of \( df/\chi^2 \) has been calculated to be 2.98. The root of average error for approximate squares must be less than 0.08 which equals 0.082 in the presented model. The value of AGFI and GFI variables must be more than 0.9, in the presented model, these values are 0.91 and 0.89 respectively. Regarding the indexes and Lizrel software outputs, data is to a great extent aligned with the model and the presented model is a suitable model.

**Customer Property and Knowledge Management:**

Regarding Lizrel output, the value of \( df/\chi^2 \) has been calculated to be 3.06. The root of average error for approximate squares must be less than 0.08, which is 0.032 in the current presented model. The values of AGFI and GFI variables must be more than 0.9 which are 0.95 and 0.91 respectively in the presented model. Regarding the indexes and Lizrel software output, data is mostly aligned with the model so much and the presented indexes show that the presented model is an appropriate suitable model.
Diagram 3: Test output of causal relationship between human property and knowledge management using Lizrel software in standard mode.

Diagram 4: Test output of causal relationship between human property and knowledge management using Lizrel software at significant mode.

Diagram 5: The test output of causal relationship between structural capital and knowledge management using Lizrel software in standard mode.
Diagram 6: Test output of causal relationship between structural property and knowledge management using Lizrel software at significant mode.

Diagram 7: Test output causal relationship between customer property and knowledge management using Lizrel software in standard mode.
Diagram 8: Test output of causal relationship between customer capital and knowledge management using Lizrel software at significant mode.

**Conclusion:**

Regarding the results of this study, it was proved that there was a significant relationship between intellectual, structural and customer properties with knowledge management success. In order to improve the growth of intellectual properties and the relationships among them and their influence and the facilitating role on knowledge management amount value among managers and experts of National Iranian oil production Distribution Company, the suggestions are made in the following three areas:

1. In order to strengthen any component of human property, the following proposed:
   - Designing a framework for the merits and qualifications of employees and managers including their knowledge and skills, capabilities, planning development based on their qualifications.
   - Measuring employees' qualification level continuously and using succession development at different organizational levels.
   - Measuring employees' performance at intervals continuously and analyzing the information obtained from the measurement of employees' performance and comparing it with performance standards and also taking actions such as punishment and incentives.
   - Designing a system which supports and encourages employees' premier intellectuals in order utilize them in operational processes of organizations and provide suitable feedback and use 360-degree feedback.
   - Creating a constant measurement system for job satisfaction in organizations and measuring it continuously.

2. In order to promote any component of structural property (organizational structure, organizational culture, operational process and etc), the following are suggested:
   - Using advanced and modern structures such as team and project structures in different sections of an organization.
   - Identifying some key processes which have the highest value for clients and documenting the processes, identifying and utilizing external and internal competitors' experience.
   - Devoting more time and budget to applied research and development and interacting with scientific circles and taking advantage of information systems which ease obtaining information.
   - Using the suggestions and proposals system for receiving employees' ideas inside an organization and receiving clients' opinions outside the organization.

3. In order to improve any component of relational property (basic capability of marketing, market intensity and customer loyalty), the following suggestions are offered:
   - Training good manners to employees and staff that have direct relations with the clients.
   - Identifying clients' needs.
   - Constant following-up and responding to clients' expectations and complaints in due time the automating clients' affairs.
   - Conducting strategic planning in order to identify opportunities and threats of external environment; and discovering internal weak and strong points in contracts and agreements.
REFERENCES


