THE EFFECT OF INTELLECTUAL CAPITAL INDICATORS ON NEW PRODUCT DEVELOPMENT IN KHUZESTAN MANUFACTURING FIRMS

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Abstract

The current study aimed at investigating the effects of intellectual capital on the new product development. The statistical population of the study included 1600 manufacturing firms in khuzestan. The sampling was done using stratified random sampling and Cochran methods and 310 firms were chosen as samples. The data were collected using a standard questionnaire. SPSS was used for data analysis and for structural equation modeling, the PLS software was used in two parts of measurement model and structure. For the first part, the technical features of the questionnaire were evaluated and for the second part, the t coefficients were used for testing the research hypotheses. The results of the study indicative of the significant and positive impact of customer capital on the new product development but the effect of human capital, Structural Capital on the new product development are not significant.

Keywords: Intellectual Capital, Human Capital, Structural Capital, Customer Capital, New Product Development

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Introduction

Firms in the dynamic atmosphere of modern global competition, despite rapid changes, have been increasingly committed to entrepreneurial activities (Farsi et al., 2013) to continue to have innovation in their products and new products are launched. New products development for the firm in terms of profits, increase of market growth and maintain a competitive advantage in a competitive environment is very important, because globalization of markets and technologies constantly change the field of competition has been very intense, so that the new products, firms are better able to come to market conditions and achieve better performance (Chen et al., 2009). the process of new products development is a complex and knowledge-based activities, including not only provide ideas for new products and technologies, but also be included offer solutions to the inevitable problems associated with the new products development (Goffin & Koners, 2011). New products development, the most effective use is common knowledge that firms can create competitive advantage by it. For this reason, based on knowledge-based view, it seems that intellectual capital affect the performance of new products (Kim et al., 2012). This perspective suggests that intellectual capital plays an important role in the acquisition and utilization of knowledge resources and improved use of new products. According based on knowledge, intellectual capital provide the context for the new products development through technical knowledge that leads to successful products (Kelley et al., 2011).

The intellectual capital is the intellectual part of 21st century organizations. It is a resource-based theory which is considered as a strategic resource (Zeghal & Maaloul, 2010). Intellectual capital is a set of knowledge-based assets which belongs to an organization. In other words, intellectual capital is defined as having knowledge, using experience, organizational technology, communication with the customer and supplier, besides professional abilities provide the firm with a competitive advantage in the market (Ileanu & Tanasoiu, 2008). Intellectual capital provides many organizational value varieties such as benefit creation, determining a strategy (market share, leadership, and brand), innovation, customer loyalty, cost reduction, improvement in effectiveness and other things (Sullivan, 2000).

Therefore, the different indicators of intellectual capital such as human capital, structural capital, and customer capital make possible the well investigation and reviewing the future opportunities and trends market, so the managers can use these opportunities for their own new products development. Accordingly, the intellectual capital is a vital and important subject for the organizations for achieving new products development.

Theoretical basis of research and hypotheses development

Intellectual Capital

Reed et al (2006) developed a theory based on intellectual capital. Reed et al considered their theory as a medium because it concentrates on a specific aspect of the more general theory-based approach focuses resources. Although this theory like other theories to explain the performance of firms through the effective and efficient use of firm resources, but the theory of intellectual capital considerate intellectual capital as a strategic source that can create value for the firm (Zeghal & Maaloul, 2010). The approach of intellectual capital focus on the stock and intangible assets in the firm with the assumption that have the effect on organizational financial performance (Peng, 2011).

The intellectual capital is a type of capital arising from staffs, managers, leaders, supervisors, chief executive officers and in general manpower of the firm. Intellectual capital is viewed from a resource-based theory and is also considered as a strategic source (Zeghal & Maaloul, 2010). In general, the intellectual capital is known as a set of knowledge-based assets allocated to a firm.

Moon and Kym (2006) have divided intellectual capital to three types (human capital, structural capital, and customer capital). Human capital or employees' merits imply skill, training, experience, and value features of work force (Ling, 2013). Ling (2013) consider structural capital as a part of organization's internal structure denoting the included knowledge in organizational procedures and structures, created by the employees and mostly belonging to the organization.

According to Gadau (2012), the structural capital is indicative of human capital substructure and includes the organization's ability for compatibility with markets' occasions, managerial

philosophy, organization culture, trademarks, moral property, managerial processes, and other assets owned by the firm. The customer capital includes the current value and future potential value of organizations' connections with the customers. It also includes cases such as: trademarks, market share, customers' information, communication with the customers, the accessible centers for the customers, and commercial contracts (Bontis et al., 2000).

New Products Development (NPD)

New product development as a new approach for responding to environmental changes and the introduction applied to enter the competition and gain competitive advantage in today's dynamic world. In 1981, 700 American companies, about one-third of the company's profit were due to the new products that have been supplied (Seyedhosseini & Iranian, 2004). New product development defines to achieve the financial goals and market development, on the introduction of product to the market in time (Johnson & Filippini, 2013). New product development is process in which new product or service to be marketed. The success of this process can be measured by definitions of indicators that show the extent of the success or failure.

Past research showed that the industry can improve new product development process, detailed product more acceptable and more successful in their production (Pitta & Pitta, 2012). In fact, the quality of the new product development process has a strong relationship with the new product performance (Ozer & Chen, 2006). The companies that to care and to manage new product development process in each stage, measure and act carefully criterias of idea generation and evaluation, product concept development, product development, and also you can see new better product performance (Liu & Tsai, 2009).

Finally, we can say that intellectual capital raised by the indicators of the parts described above, are used to make firms are constantly new products development on the market (Chen et al., 2014). Hence, assessing the perspectives of each main variable, the following hypotheses are suggested:

H_1: There is a positive impact of human capital on new products development.

H_2: There is a positive impact of structural capital on new products development.

H_3: There is a positive impact of customer capital on new products development.

Considering the main objective of the study and also the research hypothesis, the conceptual model of the study (figure 1) is prepared which is shown as below:

Research Methodology

In terms of objective, the current study is an applied study and considering the data collection, it is descriptive-survey. Moreover, quantitative data were collected for hypothesis testing for which some questionnaires were distributed among all managers Manufacturing Firms in Khuzestan and the results were recorded. The statistical population of the study included all Manufacturing Firms in Khuzestan which is 1600 firms. Sample size was calculated using Cochran method and 310 firm's managers were chosen as samples, and the questionnaire was distributed among them and finally, 146 questionnaires were collected. We used a standard questionnaire Chen et al (2014) for data collection. Based on this questionnaire, the intellectual capital questionnaire included 16 questions which 5 questions allocated to human capital, 4 questions allocated to structural capital, and 7 questions allocated customer capital. Also, new product development included of 5 questions (Return on investment, Profitability, Market share, Sales and new project development product).

The SPSS software was used for assessment of the reliability of the questionnaire. The reliability of the instrument accounts using Cronbach's alpha coefficient and results showed that the appropriate research tools. The findings of Cronbach's alpha for variables stated in table (1):

Table (1): Cronbach's alpha coefficients

Variables	Cronbach's alpha
Human Capital	0.721
Structural Capital	0847
Customer Capital	0.882
New Product Development	0.883
Total	0.97

The

questionnaire's validity was also assessed by both convergent and divergent validity criteria which are specific to structural equation modeling. AVE (Average Variance Extracted) was used for convergent validity assessment in PLS software whose results for the research variables are presented in table 2. The acceptance criterion for AVE was 0.5 (Hulland, 1999). As indicated in table 2; All the AVE values for constructs are higher than 0.5 which approves the questionnaire's convergent reliability. In addition, for divergent validity, the differences between one construct's indices with those of another construct are compared. This is done through comparison between each construct's square AVE and correlation coefficients values of constructs. The obtained results from PLS indicated that each construct's square AVE was higher the correlation coefficients of that construct compared to other constructs, which approves the divergent validity of the constructs.

Table (2): Convergent and Divergent validity criteria

	HC	SC	CC	NPD
AVE	0.571	0.726	0.624	0.716
CH1				
CH2	0.639	0.097	0.336	0.338
CH3	0.766	0.56	0.406	0.405
CH4	0.829	0.369	0.436	0.337
CH5	0.777	0.437	0.482	0.353
OC1				
OC2	0.374	0.773	0.475	0.4
OC3	0.447	0.919	0.522	0.376
OC4	0.452	0.858	0.537	0.443
CC1	0.278	0.498	0.805	0.649
CC2	0.421	0.429	0.789	0.649
CC3	0.427	0.367	0.887	0.782
CC4	0.517	0.544	0.795	0.612
CC5	0.42	0.558	0.76	0.725
CC6	0.463	0.396	0.689	0.752
CC7	0.517	0.529	0.794	0.619

PP1	0.42	0.547	0.76	0.733
PP2	0.46	0.397	0.693	0.767
PP3	0.322	0.32	0.725	0.906
PP4	0.384	0.332	0.783	0.905
PP5	0.421	0.427	0.704	0.904

For the next stage, the PLS software was used for confirmatory factor analysis of measurement models assessment and also evaluation of causal paths coefficients for assessing the structural section of the used model.

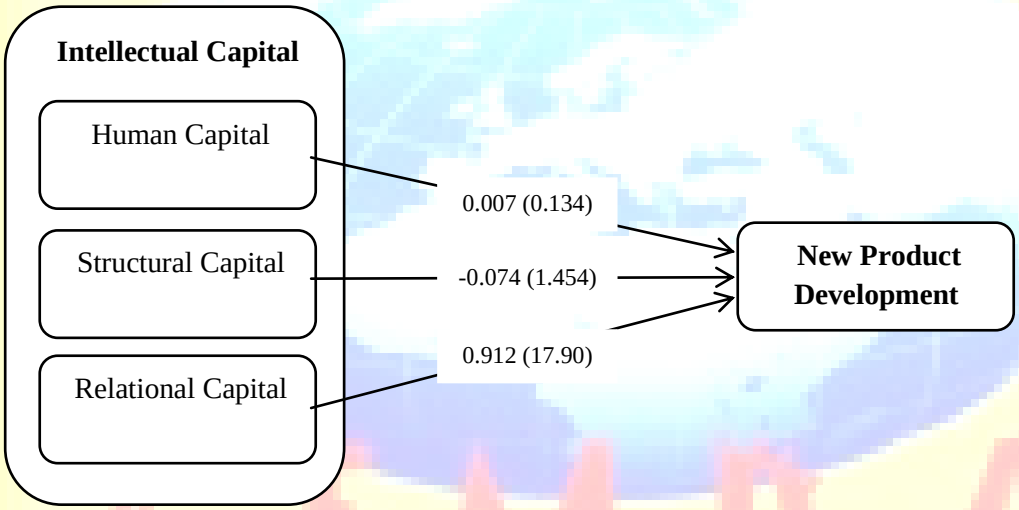

Figure (2): paths coefficients in PLS

According to figure 2 in the PLS output, the relationship between indicators of customer capital on new product development is a significant and direct but effect of human capital and structural capital on new product development is not significant. The table 3 shows the model's paths coefficients. When the t-values are higher than +1.96 or lower than -1.96, the parameter is significant.

Table (3): Model's Paths Coefficients

Hypothesis	Path Coefficients	t-values	Conclusion
HC ⟶ CI	0.007	0.134	-
SC ⟶ CI	-0.074	1.454	-
CC ⟶ CI	0.912	17.90	+

Conclusion

Business environments are more dynamic and more complex than ever before. In such circumstances, new opportunities for fims to gain better performance than competitors, must always looking to develop new products to customers in order to provide them better than their competitors. In this regard intellectual capital as one of the factors that influenced in new product development was examined in this study. As it was mentioned, the intellectual capital is indicative of a set of knowledge-based assets owned by an organization and they are among the most important features of that organization and through adding values to the key beneficiaries of the organization, significantly help with the competitive situation of the organization. Hence, intellectual capital in manufacturing firms provides creativity, nurturing ideas and behavior of innovation that ultimately will facilitate new product development process.

The results of the research hypothesis showed that customer capital have a direct and significant effect on the development of new products. It means that considering the customer capitals of the company and developing these assets, Companies will lead to the development of new products that have more advantages and ultimately better competitive of the company. Another result was that human capital and structural capital have not a significant impact on the new products development. A probability describing for this result could be that although human capital and structural capital is essential for any organization, but it may be not offered a necessary condition for success in new product. It should to be considered previous experience staff about new products as well as the infrastructure for the new products development. If the staff lacks experience with new product or field to develop new products in organization, then the organization can not uses its resources in improving the performance of new products. Therefore,

it is suggested to future research, examine the impact of the experiences of employees in new products and their impact on new product performance.

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