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# The Impact of Knowledge-Based Human Resource Management Procedures on Intellectual Capital and Innovation

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**Abstract**

This paper aims to investigate the impact of knowledge-based human resource management (HRM) procedures on intellectual capital and innovation. A descriptive-correlative method is proposed then. The statistical society included all managers and experts of small and medium enterprises of Ghazvin province in Iran. The sample size is set to 384 and analyzed concordant with *Cochran* formula. The findings of the correlation analysis and pattern of structural equations between variables prove that knowledge-based HRM procedures are influential on innovation. Knowledge-based HRM procedures are also proved to be influential on structural, relational and human capital. Furthermore, it is demonstrated that Knowledge-based HRM procedures are influential on innovation when all of these capitals play the role of intermediate items.

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## 1. Introduction

A retrospective study reveals that in the 20th century, the economy was industry-based and those companies and nations who owned more physical tangible assets were able to produce more wealth. In the 21st century though, the economy is knowledge-based. Seetharaman et al. (2002) quoted from Condric a famous American economist that during 1925, the ratio of intangible assets to tangible assets was 30 to 70. Steward (1997) argues that human capital is the most significant asset a company may have. Hence, companies who possess richer intellectual human capital are expected to be financially more successful. The other effects of human capital on an enterprise are considered significant in service providing companies because these companies are more relying on their intangible resources and potentials (Mention and Bontis, 2013). On the other hand, within the past two decades, the increasing rate of commercial competition and the advent of modern information technologies have given more significance to the role played by intangible assets and they are now believed as the most important factors in companies' evaluation (Lev, 2004). Intangible assets reporting and assessment is a fascinating topic for researchers in the domain of accounting and this fascination is even more now due to the difference between the nominal values and market values of the companies (Beattie, 2005). There is now an increasing concern about the inability

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to identify the intangible assets. This concern is due to the conservative nature of the criteria used to identify the assets and the concerns are about the reliability of the recent accounting standards (Oliveira et al., 2010). Hence, the high level of unreliability limits the ability to identify some intangible assets in those enterprises who invest on intangible assets and this hinders transferring of proper information to the external persons. This problem is more visible in those companies who are knowledge-based. Yet, it can be said that human capital data has informational contents. The information published about the merits and qualifications of personnel is positively and significantly correlated to the company's value. The exposure of this information does not make short-term changes in the market value (Gamerschlag, 2013). Intellectual capital is a far more valuable capital compared with physical and tangible assets. Nowadays, intellectual capitals may develop added value and domestic gross production, relying on knowledge and information and as a result of the wealth that a knowledge-based economy may produce.

### 1.2. Importance and necessity of this research

Bavakhani (2016) studied the impact of intellectual capital on knowledge management of knowledge-based organizations. This research is just the opposite and tries to investigate the impact of knowledge management on intellectual capital. Rezaei et al. (2014) studied the impact of intellectual capital on organizational innovation, while this research tries to investigate the impact of knowledge-based human resource management (HRM) procedures on innovation when intellectual capital plays the role of an intermediate. None of the previous researches have addressed the factor of knowledge-based HRM procedures as an influential factor for increasing human capital, relational capital and structural capital. Ignoring knowledge-based HRM prevents improving personal knowledge and prevents improving their motivation to add to their knowledge and skills and ultimately, the organizational efficiency may decline.

### 1.3. Theoretical framework of this research

The theoretical framework is a pattern based on which the researcher can explain the relationship between factors considered significant in developing a case. It clarifies the relations between variables, suggests assumptions on the basis of these relationships and describes the nature and direction of the relationships. The study background is set as the basis for the theoretical framework, and a good theoretical framework can by itself provide a logical basis to assume testable assumptions. The variables of the study include intellectual capital and its various aspects and function. The conceptual model of the research is illustrated below and conveys the theoretical relationship between the intellectual capital aspects and performance. In other words, this research, as the research topic and theoretical funda intellectuals may imply, investigated the importance and aspects of intellectual capital including relational, human and structural capitals and next investigated the importance of innovation. Aspects of intellectual capital and performance are extracted from the research of Kianto et al. (2017) and on the basis of the theoretical framework of the research, the conceptual model of the research may be presented as illustrated in Figure 1.

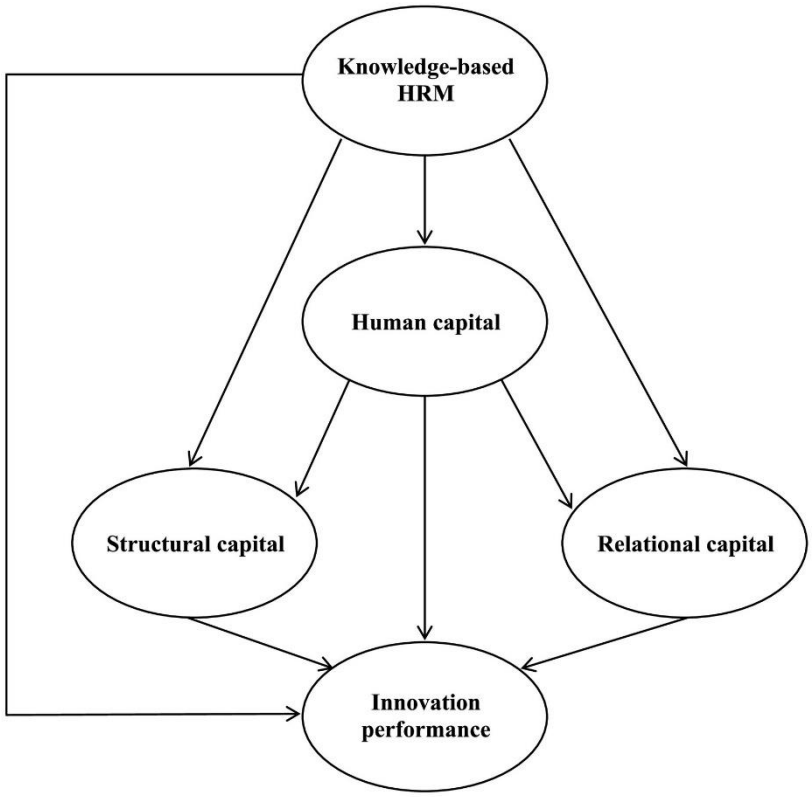


**Fig. 1.** Conceptual Model of the Research (Kianto et al., 2017).

### 1.4. Research goals

**Main goal:**

Determination of the impact of knowledge-based HRM procedures on intellectual capital and innovation

**Secondary goals:**

1. Determination of the impact of knowledge-based HRM procedures on innovative performance
2. Determination of the impact of knowledge-based HRM procedures on structural capital
3. Determination of the impact of knowledge-based HRM procedures on relational capital
4. Determination of the impact of knowledge-based HRM procedures on human capital
5. Determination of the impact of knowledge-based HRM procedures on innovative performance, when structural capital plays the role of an intermediate
6. Determination of the impact of knowledge-based HRM procedures on innovative Performance, when human capital plays the role of an intermediate.
7. Determination of the impact of knowledge-based HRM procedures on innovative Performance, when relational capital plays the role of an intermediate.

## 2. Research background

Maditinos et al. (2011) studied the impact of Intellectual capital on the companies' market values and financial performances. Their sample included 96 companies from four economic

sectors in Greece, within the time span of 2006 to 2008. The data were analyzed using Regression method. Rates of return on stockholders' equities, return on assets and revenue growth were considered as indicators of financial performance, ratio of "the market value of ordinary stocks" to "nominal value of the stockholders' equities" was considered as an indicator for market value, and three constituents of Palic added-value intellectual capital was considered as an indicator of intellectual capital. Although intellectual capital was believed to be an important strategic asset leading to the company's competitive advantage, the research findings did not prove that. The finding only accredited the human resources and the financial performance indicator. Hsu and Wang (2012) studied the intellectual capital and performance in biotechnological companies. Their sample included 279 biotechnological companies in the United States' market within the time span of 1994 to 2005. The research measured human capital by assessing different factors and concluded that there was a positive correlation between technological innovation and financial performances. Alipour (2012), studied the impact of intellectual capital on innovation. The research method contained descriptive and surveying types. The findings of data analysis revealed that intellectual capital and organizational innovation are in a positive and significant correlation and human aspect of intellectual capital has the highest level of influence over the dependent variable.

Panahandeh and Ahmadkhani (2014) studied the intellectual capital and organizational innovation within the banking industry. The research type was descriptive and surveying. In order to collect data, questionnaires were used. The results of data analysis proved that three aspects of intellectual capital including human, structural & Relational explain 55% of the changes in the organizational innovation.

Dastgir et al. (2014) studied the impact of intellectual capital on the financial performance of a company. The sample included 68 companies. The required data were collected to test the hypotheses and the value of intellectual capital was calculated on the basis of Palic's model, the financial performance was calculated based on Tobin's Q ratio, price to revenue ratio, and growth rate. Next, using the compound data method, the data analysis process was carried out using Fisher's statistic, Hadri and Durbin-Watson tests. Finally, a regression analysis was carried out. The results of testing the first hypothesis revealed the existence of a significant correlation between intellectual capital and the two indicators of financial performance (ratio of price to revenue and growth rate).

Rezaei et al. (2014), studied the impact of intellectual capital on the organizational innovation of service providing companies. Based on the goal, the research was of an applied type and it was a descriptive research and correlation study as far as data collection was concerned. The statistical society of the research included 280 experts from agricultural services companies of ZANJAN province/Iran. 200 of experts were selected via stratified sampling method and based on Krejcie and Morgan table (Morgan, 1970). To collect data, standards questionnaires were applied. The content validity of the questionnaires was approved by a panel of experts and the structural validity and composite reliability was assessed and the required corrections were applied. The findings proved the authenticity of the research hypotheses and the three constituents of intellectual capital including human and relational capital, were in a significant and positive correlation with the dependent variable and totally explained for 51% of the organizational innovation variance in the companies who participated in this study.

Bavakhani (2016) studied the impact of intellectual capital on knowledge management in knowledge-based organizations. The research is a descriptive and correlation study carried out through surveying and it is a cross-sectional study. The statistical society of the research includes all personnel of the Iranian Atomic Energy Organization (IAEO). The Statistical sample of the research included 93 companies concordant with Morgan's table. To collect data, the standard questionnaire of intellectual capital (Bontis, 1997) and Koenig's standard questionnaire of knowledge management (Ponzi and Koenig, 2002) were used. The study results proved that intellectual capital can significantly influence the process of knowledge creation and distribution in a knowledge-based organization. The findings revealed the existence of a correlation between the intellectual capital and its pertinent aspects on one part and knowledge-management on the other part.

Kianto et al. (2017) studied the impact of knowledge management procedures on intellectual capital and innovation. For this purpose, 180 questionnaires were distributed among Spanish companies. The results obtained from structural equations, with Smart PLS software, revealed that knowledge management procedures have an impact on intellectual capital and innovation.

## 3. Methodology

To assess the questionnaire reliability, Cronbach's alpha was applied. On this basis, the values of alpha were calculated using SPSS 21 software and are reflected in Table 1.

**Table 1.** Questionnaire Reliability.

| Variables | Cronbach's alpha |
|---|---|
| HRM | 0.890 |
| Structural Capital | 0.802 |
| Human Capital | 0.794 |
| Relational Capital | 0.736 |
| Innovative Performance | 0.892 |
| Total Questions | 0.942 |

### 3.1. Data analysis method

At the descriptive level, data is analyzed and diagrams are illustrated using statistical features like frequency and percentage and at the inferential level, the relationships between the variables are investigated through structural equations model making that allows investigation of the interrelations of several variables in a model. SPSS and AMOS software of descriptive and inferential types will be used to analyze data.

### 3.2. Assessment of normal distribution of data

To apply the statistical methods and calculate the proper test statistic and to logically conclude about the research hypotheses, first and before all, a proper statistical method has to be selected. For this purpose, it is of a fundamental importance to be aware of how data are distributed. So, Kolmogorov-Smirnov test was used to check the normal distribution of the research data. The test checks the normal distribution on the basis of the following hypotheses:

$H_0$: Data are distributed normally

$H_1$: Data are not distributed normally

To find out whether the data are distributed normally or not based on Kolmogorov-Smirnov table, the significance level of all variables is referred to. When it is higher than the test level

(0.05), the distribution is recognized as normal. The rest results are proved in Table 2. Since the significance level of all variables is higher than 0.05, we have to conclude that the null hypothesis is correct and the data are distributed normally.

**Table 2.** Output of kolmogorov-smirnov test regarding normal distribution of data.

| Variable | Kolmogorov-Smirnov Statistic | Level of Significance | Result |
|---|---|---|---|
| Human Capital | 0.566 | 0.23 | Normal |
| Relational Capital | 0.456 | 0.185 | Normal |
| Structural Capital | 0.759 | 0.515 | Normal |
| Innovation | 0.143 | 1.15 | Normal |
| HRM | 0.072 | 1.21 | Normal |

The findings of Kolmogorov-Smirnov test presented in Tables 4 and 5 show that variables of research are of a normal distribution. In other words, it can be concluded that data distribution is normal for these variables. So, parametric tests can be used to assess the research hypotheses.

## 4. Factor analysis of the variables

This research used a questionnaire to collect data. Hence, the general structure of the research questionnaires was evaluated for content validity using confirmatory factor analysis. In order to implement confirmatory factor analysis and to find the model of structural equations, standard factor load and t statistics are calculated. Generally, the governing rule is as follows: The strength of the correlation between factor (hidden variable) and the observable variable is displayed by factor loading. Factor loading is a value ranging from zero to one. When the factor loading is less than 0.3, the correlation is considered as weak. Factor loading ranging from 0.3 to 0.6 is considered as average and when it is higher than 0.6, is desirable.

The factor loading of t-value of the assessment indicators of each aspect studied here, is a bit more than 1.96, with the confidence level of 5%. Hence, the observed correlations are significant. When a model is theoretically supported, the data collected by the researcher are applied to the model for investigation. Hence, some of the goodness of fit tests are used here for the research data and model. In Table 3, all fitness indicators are stated:

**Table 3.** All fitness indicators.

| Abbreviations | Complete name of fitness indicator | Acceptable value |
|---|---|---|
| RMSEA | Root mean square error of approximation (RMSEA) | <0.08 |
| CMIN/DF | - | 3 |
| GFI | Goodness of fit | >=0.90 |
| AGFI | Adjusted goodness of fit | >=0.90 |
| SRMR | Standardized root mean square residual | <0.05 |
| NFI | Normed fit index | >=0.90 |
| NNFI | Non-normed fit index | >=0.90 |
| IFI | Incremental fit index | >=0.90 |

Fitness indicators regarding characteristic behaviors of online purchase customers are stated in Table 4.

**Table 4.** Goodness-of-fit indicators.

| Fitness indicator | CMIN/DF | SRMR | RMSEA | GFI | AGFI | NFI | NNFI | IFI |
|---|---|---|---|---|---|---|---|---|
| Acceptable values | <3 | <0.05 | <0.08 | >0.9 | >0.9 | >0.9 | >0.9 | >0.9 |
| Calculated values | 0.00 | 0.000 | 0.063 | - | - | - | - | - |

## 5. Conclusion and outlook

On the basis of the findings achieved from structural equations model stated in Table 4, the impact of knowledge-based HRM procedures on innovative performance, structural capital, human capital, relational capital and innovative performance was approved. The findings proved that knowledge-based HRM procedures are influential on innovative performance. So, planners and authorities of the statistical society are recommended to develop scientific and executable plans in order to motivate human resources and scientific employees.

Moreover, the findings proved that knowledge-based HRM procedures are influential on innovative performance when human capital plays the role of an intermediate. So, managers are recommended to attend to this fact when they are strategically planning for their marketing abroad and they have to make use of technology proportionately. Managers and authorities are recommended to make use of the opportunities provided for them by the new government who has introduced itself as the government of providence and hope and make use of the chances provided for them due to the presence of a managing director who is so many private and public speeches has announced that he is a part of the body of the organization and that he was honored for this, and make use of the chances provided for them due to the acquaintance of the members of the administrative board with the disorganized status quo of appointments. They are recommended to define a system for recruitment in which all personnel can be considered as a volunteer for the new position and next they have to arrange other steps like an interview, etc. in order to select the most qualified person. For recruiting external persons, also, a system has to be defined and the system should be the only way of entering for those who like to be a member of the company.

The results proved that knowledge-based HRM procedures are influential on innovative performance, when the relational capital plays the role of an intermediate. Managers and authorities are recommended not to pay their attention merely on short term interests rather they have to identify people who are worthy enough to spend the company's budget on. The managers shall less attend to appearance and when qualified force are not accessible in the region, they have to plan for recruitment from other places and have to provide them with accommodation and commuting services.

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