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The Effect of Innovation Strategies on Business Performance of Pharmaceutical Companies: The Moderating Role of Financial Management and Intellectual Capital

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ABSTRACT

Background: Management science is seeking ways to realize organizational goals, strategies, and expectations, which are the criteria for a company's successful performance. One of the most important aspects of management in an organization is the evaluation and measurement of business performance. Measuring business performance is crucial and according to some experts, "you cannot manage what you do not measure". Having a systematic view of business performance in pharmaceutical companies is of great significance.

Methods: According to the studies and interviews with pharmaceutical experts, we developed a conceptual model and examined the factors affecting pharmaceutical companies' innovative strategies. A descriptive method, specifically the Partial Least Squares Structural Equation Modeling (PLS-SEM) was adopted. The statistical population of the study consisted of pharmaceutical companies' experts selected by cluster sampling. Also, according to the Morgan Table, the number of statistical population and sample members were 70 and 59, respectively.

Results: The obtained results indicated that the key processes and product innovative strategies improved business performance. Financial management, as the moderator variable, affected the relationship between product and process innovation and business performance improvement. Intellectual capital, as the other moderator variable, affected the relationship between product and process innovation and business performance improvement.

Conclusion: The findings of this study showed that factors, like financial management, product innovation strategy, process innovation strategy, and intellectual capital development significantly affect business performance improvement. Generally, a review of previous literature showed that the present study confirms their results to some extent and by including some factors, which had not been considered before, it is a more novel comprehensive research on this issue.

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1. Introduction

One of the objectives of the health organization is to facilitate access to medicines; therefore, health organization is deemed a strategically important sector in each country. The pharmaceutical supply chain should deliver safe and efficacious medicines with high quality, in precise numbers, timely, in appropriate places, and at a reasonable price to the users so that this process is in line with the health system's objectives and also is profitable for its stakeholders. Surely, the supply chain costs affect medication prices. This sector should be able to provide the country's medication needs as quickly and accurately as possible; therefore, tracking the medication supply chain is an essential endeavor [1, 2].

In today's world, the concept of innovation has become the basis of a successful business, which means that a company cannot keep its markets or generate high, long-term revenue unless it is innovative in different aspects. The innovation strategy is a determining factor in enhancing business performance [3]. Today, the pharmaceutical market is highly competitive and it is critical for companies to engage in innovation, optimization, and improving their supply chain, and increasing their efficiency. Companies have started appreciating the significance of innovation in order to gain a competitive advantage because innovation is the motivation for competition and determines companies 'positions in the market.

Currently, due to the complex and dynamic nature of the environment, finding an industry, which does not engage in constant or periodic innovation is difficult. Additionally, the best way to create growth, performance development, and variety in business performance in such dynamic environments is through innovation strategies. Most companies are required to invest in researching and making technological innovations. In the pharmaceutical industry, innovation is of great importance as a tool for creating a competitive advantage in a wide range of activities. In recent years, pharmaceutical companies have been trying to create innovation in a cheaper and faster way and with less controlling barriers, while, re-innovation and incremental innovation would be ideal to achieve this goal. On the other hand, there is little evidence of extreme innovation in the pharmaceutical industry [4].

Innovation is often a set of activities, which is referred to as a company's competitive advantage. Increasing interest in understanding innovation has greatly affected a company's capabilities [5]. Research and development in sciences and technologies are amongst the most important prerequisites of the product innovation process. Therefore, the existing and relevant knowledge and technologies for each company are recognized and evaluated and ultimately utilized to enhance the company's standards for developing products according to factors, like the organization's strategy, the capability to attract knowledge, etc. This approach will increase the likelihood of the project's success, as well [6]. Factories' research and development units have a close interaction with laboratories.

Currently, the factories are facing severe economic recession and strong competition in the market. A prominent feature of research and development in this era is that research is only meaningful in the context of innovative activity and technologies related to products and in line with the pharmaceutical industry [7]. The environment of a science-based business requires an approach, which includes the new organizational intangible assets, such as human resources' knowledge and abilities, innovation, customer relationships, organizational culture, systems, organizational structures, etc. Among these assets, intellectual capital has drawn the increasing attention of the academicians and organizational stakeholders [8].

This study aimed at analyzing the development and effect of pharmaceutical companies' innovative strategies on business performance. According to the resource-based approach, innovation refers to the development and renewal of resources' structure in order to enhance productivity and achieve strategic objectives. Strategic innovation capabilities are one of the most important tools to create a competitive advantage. Strategic innovation capability is defined as the ability to constantly transfer knowledge and ideas about products, processes, and systems, which can result in competitive advantage in pharmaceutical companies' business performance, specifically in profitability, increased sales, and customer satisfaction and loyalty for the company and stakeholders. Therefore, this study tried to answer the following question: what is the effect of pharmaceutical companies' strategic innovation on their business performance?

Huynh (2016) in his study concluded that four dimensions of communication, atmosphere, risk-taking orientation, and employees' proactive personalities had significant impacts on employee creativity and ultimately organizational innovative capability [9]. Furthermore, Ondrej (2014) concluded that performance measurement systems have been developed due to the short-

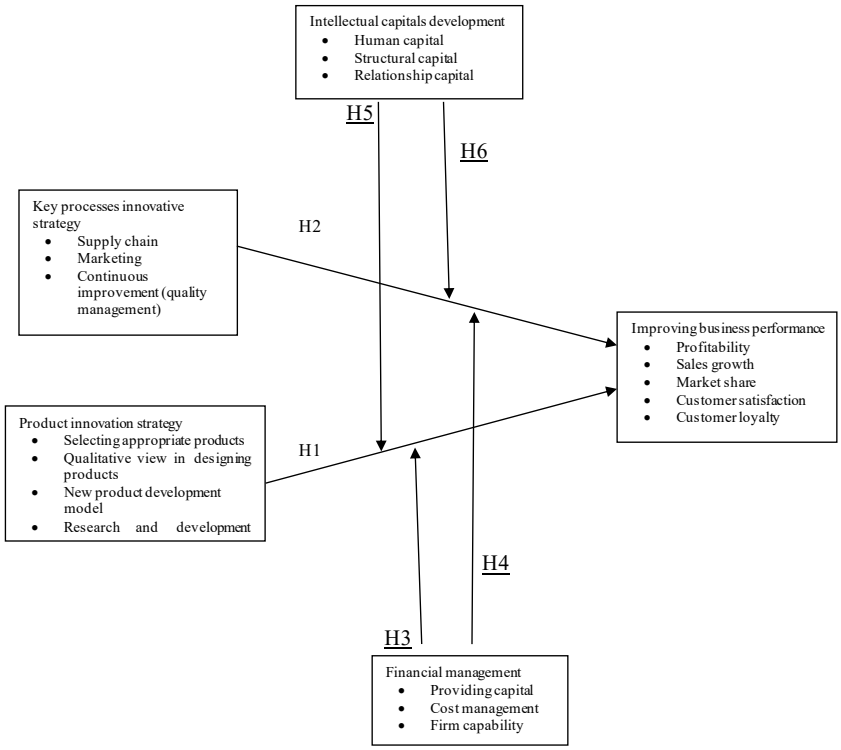

Figure 1. The Research Conceptual Model

comings of traditional accounting systems in the management of companies [10]. It has also been shown that the firms using external sources for their research and development strategies result in better innovation outcomes [11]. Foroutan (2016) in a study argued that innovation for long-term existence in a competitive economy is a good guarantee that a firm can survive in fast-moving markets [4].

Kargarshahamat (2016) conducted most innovations in the Iranian pharmaceutical sector not through innovative research and capabilities, but as a result of informal relationships and the existence of intense competition in the market [12]. The total hidden values of the firm are also referred to as Intellectual Capital (IC) [13]. IC is responsible for the increase in the market value of the stock of many firms in comparison with the replacement cost of their tangible resources [14]. Sveiby (1997) classified IC into three major components: structural capital (SC), customer or Physical Capital (PC), and Human Capital (HC) [15]. According to the study done by Delkhosh and Mousavi, the financial standards in the execution and scrutinizing the firm's strategy with defined financial objectives linked to the industry standard will help in measuring and improving the firm's performance [16].

2. Methods

Conceptual Model and Research Hypotheses

The following hypotheses are formulated based on Figure 1:

H1: Product innovation strategy affects business performance improvement

H2: Key processes innovative strategy affects business performance improvement

H3: Financial management moderates the relationship between product innovation and improves business performance

H4: Financial management moderates the relationship between the process innovation and improves business performance

H5: IC moderates the relationship between product innovation and improves business performance

H6: H4: IC moderates the relationship between the process innovation and improves business performance

In terms of research methodology, this study was a descriptive and correlational study. Additionally, in terms

Table 1. The questionnaire segmentation

Variables	Questions
Financial management	1-5
Product innovative strategy	6-10
Key processes innovative strategy	11-15
Intellectual capital development	16-20
Improving business performance	21-25

of objective, the present paper is applied research. The population of the study consists of pharmaceutical companies' experts and cluster sampling was used to select the sample. For this purpose, Tehran was divided into five parts (south, north, east, west, and center), and then pharmaceutical companies were considered in these areas and the research questionnaires were developed after talking to the personnel. Also, target employees were chosen through a random sampling method. According to the Morgan table, the number of statistical population and sample members was 70 and 59, respectively. To collect data, two methods were employed:

1. Field methodology: using studies, in which questionnaires were used. The questionnaire used in this study was designed using desk research and the assistance of experts. The share of each variable from the questions is presented in Table 1.

2. Desk study methodology, in which data are gathered from secondary sources prior to beginning the study. Relevant data, literature, and theoretical discussions were collected through a review of the English and Persian books, articles, dissertations, and websites. Undoubtedly, the suitability of the measurement instruments is of great importance. Therefore, the reliability and validity in the PLS method are determined in a different section: the measurement models section, which includes the three parts of Cronbach's alpha, Composite Reliability (CR), and factor loading measurement, including convergent validity.

Cronbach's alpha is a classic way to determine the reliability and a good criterion to evaluate the internal consistency of a test. An Alpha value above 0.7 (Cronbach, 1951) shows acceptable reliability.

According to Table 2, alpha values closer to one show higher internal consistency, and values above 0.7 are generally acceptable.

The advantage of the PLS is that in contrast to Cronbach's alpha, it uses a more modern measure to determine the constructs' reliability called CR. According to Table 3, CR values above 0.7 (Nunnally, 1978) for a single construct show acceptable internal consistency.

Convergent validity is the second parameter used in the PLS method. The average variance extracted (AVE) is the average amount of variances between each construct and its indicators [17]. According to Table 4, the critical value for AVE is 0.5, i.e. an AVE value above 0.5 shows acceptable convergent validity [18].

Table 2. Variables' Cronbach's alpha values

Variables	Cronbach's Alpha
Financial management	0.798540
Product innovative strategy	0.865422
Key processes innovative strategy	0.844654
Intellectual capital development	0.896234
Improving business performance	0.854960

Finally, the technique of the structural equation was used to analyze the data. Therefore, first, the significance of the items used for measuring the variables was determined with the confirmatory factor analysis. Then, the relationship between the dependent and independent variables was checked using the structural model. Prior to employing this model, the normality of distribution was tested using the Kolmogorov–Smirnov test. To measure minor hypotheses, SPSS, and in particular, the PLS was used. A factor loading above 0.4 and test statistic above 1.96 show the effect of these variables on each other, otherwise, it can be said that the variables do not have any effect on the defined relationships.

3. Results

Descriptive statistics, including mean, standard deviation, and the Kolmogorov–Smirnov test for each research factor, i.e. financial management, product innovation strategy, key process innovation strategy, IC development, and business performance improvement are shown in Table 5.

According to Table 5, the values of financial management, product innovation strategy, key process innovation strategy, IC development, and business performance improvement factors were less than 0.05. Therefore, data had no normal distribution and non-parametric tests were used. Due to the non-normal distribution of data and the small sample size, i.e. 62 participants, the PLS method was employed.

Confirmatory factor analysis of research factors (measurement model)

Figures 1 and 2 show the confirmatory factor analysis of the research factors. The model's factor loadings in the state of standard and non-standard estimates showed the level of effect of individual variables or items in explaining the variance of variable values or the main factor. Factor loadings are values that represent the strength of the relationship between unobserved factors (constructs) and observed variables (items). The value of factor loading varies between 0 and 1. If this value is less than 0.4, the relationship is considered to be weak and ignored. Factor loading values between 0.4 and 0.6 is acceptable and favorable if it is above 0.6. The results of the used measure's (the measurement model) confirmatory factor analysis are represented in Table 6.

After determining the correlation between variables, significance tests should be run. In order to determine the significance of the observed correlations, the boot-

Table 3. The variables' composite reliability values

Variables	Composite Reliability Value
Financial management	0.819299
Product innovative strategy	0.845654
Key processes innovative strategy	0.751583
Intellectual capital development	0.780628
Improving business performance	0.770680

Table 4. Convergent validity of the variables

Variables	Convergent Validity
Financial management	0.578698
Product innovative strategy	0.845654
Key processes innovative strategy	0.645869
Intellectual capital development	0.54778
Improving business performance	0.756303

Table 5. The Kolmogorov-Smirnov Test Results

Factor	Significance	Test Statistic	Mean±SD
Financial management	0.006	0.136	3.92±0.537
Product innovative strategy	0.037	0.116	3.16±0.502
Key processes innovative strategy	0.004	0.101	3.81±0.556
Intellectual capital development	0.009	0.110	3.59±0.537
Improving business performance	0.002	0.100	3.65±0.490

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strap or jackknife methods are used. In this study, bootstrapping was used, which renders the t-statistic. If the bootstrapping statistic of T-value in the error level of 5% is greater than 1.96, the observed correlations are significant.

The Structural Model: significant coefficients of Z (T-values)

The T-value is the most basic criterion to measure the relationship between the model's construct.

According to Figure 3, there was a significant positive relationship with a T-value of 7.944 between product innovation strategy and business performance constructs, and according to Figure 2, the factor loading coefficient was 0.758. Therefore, the first hypothesis is supported, i.e. an increase in the product innovation strategy value results in an increase in the business performance of pharmaceutical companies. Additionally, Figure 3 shows the significant positive relationship between process innovation strategy and business performance constructs with a T-value of 5.692 between the two variables. Also, according to Figure 2, the factor loading coefficient was 0.812. Therefore, the second hypothesis is supported and an increase in the value of process innovation strategy results in an increase in the business performance of pharmaceutical companies.

Additionally, Figure 3 shows the moderating role of financial management in the relationship between the two constructs of product innovation and business performance improvement with a T-value of 7.101. Also, according to Figure 2, the factor loading coefficient between the two variables was 0.678, which means that the third hypothesis is supported. This means that an increase in the value of financial management will result in an increase in the relationship between product innovation and business performance improvement in pharmaceutical companies. Also, there was a significant positive relationship between the financial management moderator on the one hand and the key processes innovation-business performance improvement relationship on the other hand. The T-value and factor loading coefficient were 6.410 and 0.569, respectively.

Therefore, the fourth hypothesis is supported and greater financial management values cause an increase in the value of the relationship between a key process innovation and business performance improvement. Furthermore, Figure 3 shows the moderating role of IC development in the relationship between the two constructs of product innovation and business performance improvement with a T-value of 8.126. Also, according to Figure 2, the factor loading coefficient between the two variables was 0.942, which means that the fourth hypothesis is supported. Finally, there was a significant positive relationship between the IC development moderator on the one hand and the key processes innovation-business performance improvement relationship on the other hand. The T-value and factor loading coefficient were 7.568 and 0.745, respectively. Therefore, the sixth hypothesis is supported and greater IC development values cause an increase in the value of the relationship between a key process innovation and business performance improvement. In Table 6, T-values, factor loading coefficients, and the results are presented.

4. Discussion

The improvement of business performance is one of the reasons for a company's success. The managers' planning plays a crucial role in the development and progress of companies. In recent years, abundant problems in companies have encouraged stakeholders and decision-makers to pay more attention to financial management, innovation strategy development, IC development, and pharmaceutical services in order to achieve their goals. A great number of countries, including Iran, have tried to improve their business performance in recent years. Studies have highlighted the importance of optimizing in-

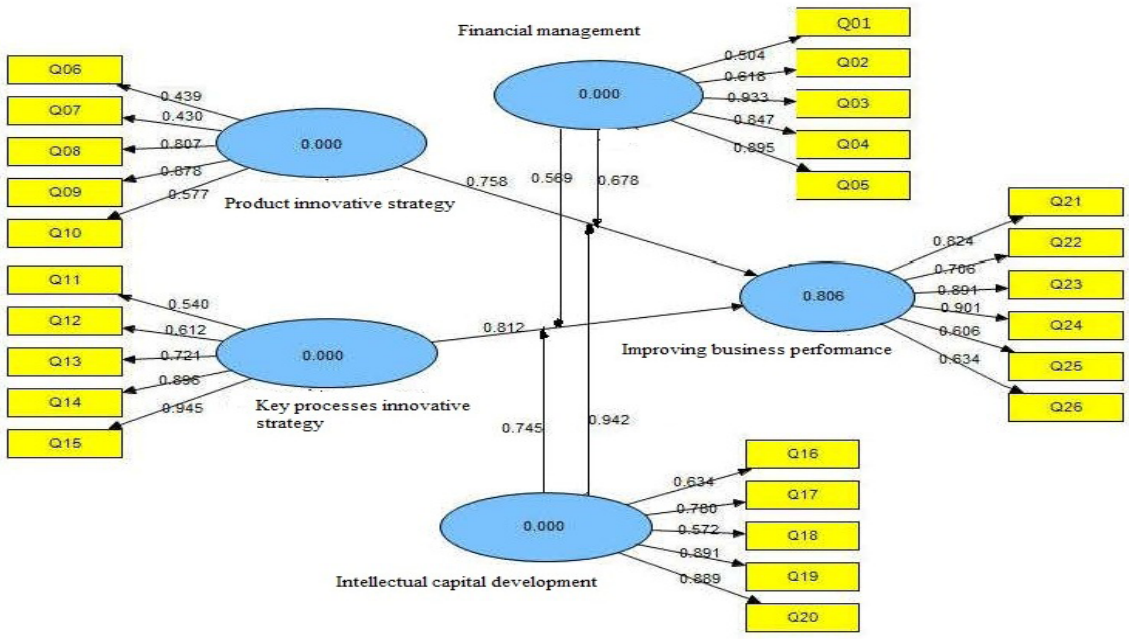

Figure 2. Factor loading coefficient

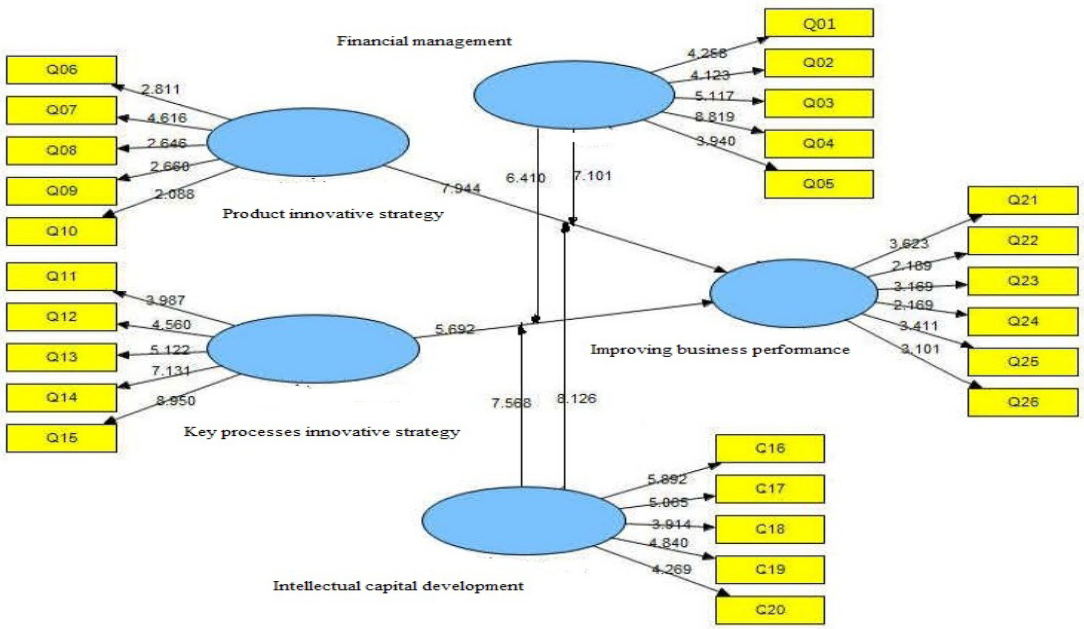

Figure 3. T-value coefficient

novation strategies and the quality of relationships in IC and financial management, especially in service sectors.

The findings of this study showed that factors, like financial management, product innovation strategy, process innovation strategy, and IC development significantly affect business performance improvement. Generally, a review of previous literature shows that the present study confirms previous research to some extent, and by including some factors, which had not been the subject of previous studies; it is a more comprehensive research, which has looked at the issue from a different angle.

H1: product innovation strategy affects business performance improvement

According to the factor loading coefficient between product innovation strategy and business performance improvement, which is 0.758, it is evident that there is a

Table 6. The measure's confirmatory factor analysis results

Measures	Item	Coefficient Factor	T
Financial management	Q1	0.504	4.258
	Q2	0.618	4.123
	Q3	0.933	5.117
	Q4	0.847	8.819
	Q5	0.895	3.940
Product innovative strategy	Q6	0.439	2.811
	Q7	0.430	4.616
	Q8	0.807	2.646
	Q9	0.878	2.660
	Q10	0.577	2.088
Key processes innovative strategy	Q11	0.540	3.897
	Q12	0.612	4.560
	Q13	0.721	5.122
	Q14	0.896	7.131
	Q15	0.945	8.950
Intellectual capital development	Q16	0.634	5.892
	Q17	0.780	5.065
	Q18	0.572	3.914
	Q19	0.891	4.840
	Q20	0.889	4.269
Improving business performance	Q21	0.824	3.623
	Q22	0.706	2.189
	Q23	0.891	3.169
	Q24	0.901	2.169
	Q25	0.606	3.411
	Q26	0.634	3.101

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significant correlation at the significance level above 0.4, and an increase in one variable causes an increase in the other. This finding is in line with that of Foroutan (2016).

H2: Key process innovation strategy affects business performance improvement

There is no reason to reject this hypothesis because the factor loading coefficient between key process innovation strategy and business performance improvement was 0.812, and there was a significant correlation at the significance level of above 0.4, and an increase in one variable results in an increase in the other. In addition, Mortazavi (2016) found similar results to this finding [19].

H3: Financial management as a moderating variable affects the relationship between product innovation and business performance improvement

The value of the factor loading coefficient, i.e. 0.678, shows the existence of a significant correlation at the significant level of above 0.4 between financial management as the moderator and the product innovation-

business performance relationship and they increase simultaneously. This finding is also in line with that reported by Seyedi [20] (2014).

H4: Financial management as a moderating variable affects the relationship between a key process innovation and business performance improvement

Based on the factor loading coefficient of 0.678, it can be claimed that there was a significant relationship between financial management as a moderator on the one hand and the relationship between a key process innovation and business performance improvement on the other hand. Therefore, the moderating variable of financial management was effective in the relationship between key process innovation strategy and business performance improvement. Ghalaychi (2014) in similar research found similar results to this study [21].

H5: Intellectual capital as a moderating variable affects the relationship between product innovation and business performance improvement

According to the factor loading coefficient resulted from the effect of IC in the relationship between product innovation strategy and business performance improvement, which was 0.678, there was a significant correlation between these two at the significance level above 0.4, and an increase in one variable can increase in the other. It can be inferred that IC development as a moderating variable affects the aforementioned relationship. The result is in line with that of Meta and Woerter [11].

H6: Intellectual capital as a moderating variable affects the relationship between the process innovation and business performance improvement

The factor loading coefficient of the two variables in this hypothesis, i.e. IC and process innovation-business performance was 0.678 and shows a significant relationship between the two variables. Obviously, an increase in one variable will result in an increase in the other. Chen and Hsiao (2013) investigated this issue and produced similar results [22].

5. Conclusion

Our results indicated a significant relationship between the independent variables of research - product innovation strategy and key process innovation strategy - and business performance in pharmaceutical companies. The results also confirm the significant impact of moderating variables - IC management and financial management - on the relationship between innovation strategies and business performance. The research data highlight the importance of managing IC in the relationship between independent and dependent variables. We emphasized the important role of IC management on the relationship between independent and dependent variables. According to the coefficient obtained for the goodness-of-fit index, it can be said that the structural model and measurement model have the appropriate accuracy and strength.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the Virtual School, Tehran University of Medical Sciences.

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Authors' contributions

All authors contributed in preparing this paper.

Conflict of interest

The authors declared no conflict of interest.

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