



The Impact of Innovation and Knowledge Management on the Relationship between Balanced Scorecard Dimensions and Banking Productivity

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ABSTRACT

In 1992, Kaplan & Norton introduced the Balanced Scorecard as a tool for evaluating performance in organizations. The important function of the banking system as an active monetary sector in the economy also requires that the evaluation of their performance & productivity based on modern management accounting techniques be considered. The purpose of this study is measuring the effects of management tools such as knowledge management & innovation on the relationship between four dimensions of a BSC on bank productivity. Studies conducted on 10 banks in the country in 1398 using random sampling & with the help of data collected from questionnaires sent to 172 senior experts of the bank & based on the output of structural equation technique have shown that innovation on the relationship between two dimensions of the internal process, learning the dimensions of the BSC with the productivity of banks has a significant effect, However, the relationship between two financial dimensions and the customer of the four dimensions of BSC with banking efficiency have not been significantly affected. Also, knowledge management had a significant effect on the relationship between financial and customer dimensions with bank productivity, but no effect was observed on the relationship between internal process dimensions & learning & productivity. These results draw the attention of policymakers in the banking system to prioritizing innovation and knowledge management, as well as improving the level of use of all development tools with the aim of aligning them to strengthen the relationship between BSC and banking productivity.

Keywords:

Banking Productivity, Balanced Scorecard, Knowledge Management, Innovation.



1. Introduction

In today's world, paying attention to productivity and using tools to increase it in banks is one of the most important ways to improve the quality of banks' performance in line with their strategic goals. Many researchers such as (Thornhill (1990), Kentz et al. (1986), (Landel (1986), Resident et al. (1988), Shermerhorn (1989)) also concluded in their research that productivity is related to the effectiveness and efficiency of performance. And increasing productivity in the organization is the result of management efficiency. In order for organizations to be able to conduct their activities successfully in these situations, They must equip themselves with efficient techniques and tools (Debra Adams, 1997, p. 2). The Balanced Scorecard, developed by Kaplan and Norton in 1992, introduces a new way to evaluate the performance of business units that are directly related to their mission and strategic goals. This modern method expresses the mission, values and vision and strategy of the organization in the form of goals and scales in four perspectives: financial, customer, internal processes and learning and growth (Neon, 2002, p. 14). On the other hand, Peter Drucker believes that "the secret to the success of organizations is the proper implementation of knowledge management. A manager is a person who makes use of knowledge (Peter Drucker, 2004).

Today's organizations, in order to be able to survive in the new paradigm of competition, which is a competitive and knowledge-based environment, must consider innovation as a necessary strategy in the current era. (Rastegar and Maghsoudi, 2016). In view of the above, since no formal studies have been conducted on measuring the effects of modern management accounting techniques such as innovative activities and knowledge management in order to use the balanced third generation scorecard (Kaplan-Norton, 1996) to achieve the efficiency of Iran's banking system, An attempt has been made to study the effects of knowledge management and innovation on the relationship between the four perspectives of a balanced scorecard with bank productivity in 10 private banks in the country. This research can be used for bank decision makers and planners. Identify the strengths and weaknesses of management accounting tools and, given the limited resources of the bank, prioritize its use and optimal and targeted implementation.

2. Review Literature

2.1. Theoretical foundations

Balanced Scorecard

The Balanced Scorecard is a military performance management concept, first conceived in 1990 during Kaplan-Norton's research into new areas of performance measurement, And then expanded and improved (Kaplan and Norton, 1992). (Gholizadeh, 2010). Kaplan and Norton introduced the Third Generation Balanced Scorecard in 1996 as a Strategic Management System. They stated that management systems are incapable of linking the company's long-term strategies with its short-term implementation. The Balanced Scorecard allows them to initiate four management processes that, separately and in combination, link long-term strategic goals and short-term actions. (Gholizadeh, 2010).

knowledge management

In recent years, the role of knowledge as the key resource of organizations in gaining competitive advantage and the idea that knowledge can be managed has opened the door to many knowledge-based businesses. (Jafari and Kalantar, 2003, p. 25). There are several models for measuring knowledge management. In this research, the model (Hicks, 2010) which includes four processes (knowledge creation, knowledge storage, knowledge sharing and knowledge application) is used to measure knowledge management.

Innovation

Innovation is not a propaganda slogan but a necessity for the survival and growth of any bank. To achieve this, it is necessary to plan and equip and prepare the organization's resources (Nasirzadeh, 1390). The main indicators of innovation in banking services can be named in 4 dimensions of new service, customer interaction, service delivery and technology. (Builderbeek, 2004, quoted by Khamesi, 2013).

- Innovation in new service New services can be a new solution to a specific problem or application or even specific markets. This dimension is influenced by existing services or competitive services.
- Innovation in customer interaction This dimension includes the design and planning of customer service relationship. Which is the source of many organizational innovations.

- Innovation in service delivery structure This dimension is a special type of customer interaction. This dimension refers to the organizational contexts that must be provided to perform the duties of service personnel.
- -Technology Innovation Technology in services can play a facilitating or empowering role.

Productivity

The word "productivity" was first coined by (Quizney, 1776). He believed that productivity includes the effectiveness and efficiency of performance and increasing productivity in the organization is the result of management efficiency and effectiveness. Productivity is one of the most important indicators in the organization that states how much resources are consumed, output and products are generated. In other words, productivity is the sum of efficiency and effectiveness. Productivity is calculated in several ways, the most important of which are (Haji Ebrahim and Jafarian (2010).

2.2. Review of Related Literature

Haji Ebrahim and Jafarian (2010) believe that productivity is one of the most important indicators in the organization that states how much resources have been consumed, output and products have been produced.

Foroughnejad et al. (2015) examined the effect of strategic knowledge management on brokerage and performance of brokerage firms. The results of their survey of 91 brokerage firms active in the stock market showed that codified knowledge management strategies can affect the performance of companies directly and indirectly by increasing capacity and innovation.

Hanifeh (2012), in her dissertation entitled Evaluating the performance of Bank Eghtesad-e-Novin branches based on a balanced scorecard, achieved these findings. It was found that the performance of Eghtesad-e-Novin Bank is favorable in both learning and financial dimensions, but they are not at the desired level in terms of customer and internal process.

Khamesi, Amir, (2013) in a study called "The Impact of Banking Services Innovation on the Development of Bank Market Share with Emphasis on Knowledge Management in Housing Banks of Mazandaran Province" concluded, Knowledge

management has a significant impact on banking service innovation and banking service innovation also has an impact on the development of bank market share.

Singali, Vahid, (2013) in his dissertation called Tejarat Bank Performance Evaluation Using Balanced Scorecard Model showed that financial and customer dimensions are among the main ranking factors of Tejarat Bank with eight other commercial banks in Iran and the dimensions of the internal process and role learning are insignificant. They have more in the rankings.

Kazemi and Panahi (2014), in a study called the evaluation of the balanced scorecard model in Saman Bank, found that examining the four perspectives of the balanced scorecard will be able to develop different scenarios to attract and retain customers.

Safari, Arash (2015) analyzed the productivity of the branches of the National Bank of West Azerbaijan, the results show a decrease in bank productivity due to the strong impact of technological efficiency. Technical knowledge in banks.

Allameh, Mohsen and Abu Masoudi, Sheikh (2015), in a study, studied the effect of intellectual capital with the role of knowledge management and cultural capital on financial performance based on the scorecard model As a result, more intellectual and physical capital than financial capital increases financial performance.

Nematizadeh and Hairi Meybodi (2015) in a study examined the performance of Bank D using four balanced evaluation card views. The findings showed that it is necessary to improve the performance of Bank D due to the weaknesses found in the various dimensions of the Balanced Scorecard.

Ahmadpour and Hosseini (2017) investigated the relationship between knowledge management and innovation of banking services in the National Bank of Mazandaran branches. They found that there is a significant relationship between knowledge management and all components of banking services innovation, including the provision of new services, customer interaction, services and technology in the bank.

Daruch (2005) examined the impact of knowledge management on organizational performance with the role of mediating innovation. His research results indicate the ability of knowledge management that

leads to greater efficiency and innovation improves organizational performance.

Jung Tang Chen (2005), in an article entitled *The Impact of Knowledge Management on the Balanced Scorecard System with a Case Study in Yilan Local Government*, showed that there is a very close relationship between knowledge management efficiency and the learning dimensions and internal process of the BSC system.

Lin and Chen (2007), in an article entitled *"Does Innovation Lead to Better Performance?"* Showed that innovation directly affects organizational performance.

Carlina Vangel (2011), in a study entitled *"Strategic Knowledge Management, Innovation and Organizational Performance"* found that 310 Spaniards could know that performance management strategy can directly or indirectly affect performance by increasing their ability to innovate.

Fakhri et al. (2011), in their study to evaluate the performance of 55 banks in Libya based on balanced scorecard indicators, concluded that most banks recognize financial performance indicators as the most important and first step in performance evaluation.

Z Wang Wang won (2012) examined *"Knowledge Sharing, Innovation and Company Performance"*. The results of their studies show that knowledge sharing is not only directly related to performance but also affects company performance through innovation.

3. Research Methodology

The present research is applied and developmental in terms of objectives; Because it has considered the development of applied knowledge and the presentation of the organizational productivity model and is correlational in nature. And the relationship between variables is analyzed based on the purpose of the research. (Hafiz Nia, 2003).

3.1. Statistical population of the research

The statistical population of the study includes experts familiar with the banking affairs of the country's bank managers.

3.2. Statistical sample of the research

The statistical sample includes 172 well-known banking experts of the managers and deputies of ten banks. The random sampling method is two-stage cluster, so that first 10 banks were selected, then in

each bank to a group of managers and deputies, a research questionnaire in the form of 43 questions after validity and reliability test was distributed among them. As can be seen in Table (1), 215 questionnaires were distributed among the statistical sample of the research, of which 172 received complete questionnaires and 20 received questionnaires were distorted and 23 questionnaires were not received.

Table (1) Summary of information of distributed questionnaires

| Number of questionnaires not received | Number of questionnaires received distorted | Number of complete questionnaires received | Number of questionnaires sent |
|---------------------------------------|---|--|-------------------------------|
| 23 | 20 | 172 | 215 |

3.3. Methods and tools of data collection

In this study, library information such as books, publications, and electronic resources, especially ISI and scientific research articles, as well as bank-approved websites were used.

In this study, a questionnaire approved by at least 4 experts was used. . The researcher-made questionnaire is designed from a five-point Likert scale in 5 scales, very high with 5 points, high with 4 points, medium with 3 points, low with 2 points, and very low with 1 point. This spectrum is a distance scale that consists of a number of expressions and answer options through which the respondent's beliefs and attitudes can be determined (Khaki, 2003, p. 158). A questionnaire was designed to assess the impact of each of the identified factors on the relationship between the balanced scorecard and the productivity of banks.

3.4. Determining the validity and reliability of measuring instruments

Validity of research tools (questionnaire)

The concept of narrative answers the question of the extent to which the measuring instrument measures the desired characteristic (Khaki, 2003: 188). Due to the fact that the validity of the content depends on the judgment of the judges (Sarmad et al., 2006 171), for this purpose, after studying various books and specialized articles, he referred to respected professors, advisors and two experts in accounting. Also, in order to determine the validity of the measuring instrument structure, the confirmatory factor analysis method was

used. Confirmatory factor analysis actually determines which variables are correlated with which factors. In this study, all item variables have the appropriate factor load.

Reliability of research tool (questionnaire)

There are several methods for determining the reliability of a measuring instrument, one of which is the Cronbach's alpha test. This coefficient indicates the optimal reliability of the research instrument. In this tool, the answer to each question can take different numerical values (Bazargan, 2008:169). A Cronbach's alpha value above 0.7 indicates acceptable reliability. For variables with a small number of questions, the value of 0.6 has been introduced as the Cronbach's alpha coefficient limit (Mussen et al., 1998).

3.5. Data analysis method

In this study, the collected data were analyzed in two sections of descriptive and inferential statistics using two softwares 3Smart Pls and 24 Spss.

Descriptive statistics methods

In the descriptive statistics of this research, the collected data have been analyzed using frequency distribution tables, mean, standard deviation (standard), minimum, maximum, skewness, elongation.

Inferential statistical methods

Smart Pls 3 software was used to test the hypotheses in structural equation model analysis. In correlation, the two criteria of coefficient of determination and correlation coefficient are discussed. The coefficient of determination is the most important criterion with which the relationship between two variables can be explained and shows what percentage of changes in the dependent variable is determined by the independent variable. The correlation coefficient also indicates the intensity of the relationship as well as the type of positive or negative relationship.

3.6. Testing research hypotheses

In order to test the research hypotheses in the structural equation model, the model fits in two stages are used. First, the evaluation of the measurement fit of the model and then the evaluation of the structural fit of the model, in order to evaluate the significance of the relationship between the variables, the t-test or t

value is used. Because significance is checked at the error level of 0.05, so if the significance is calculated with a t value test greater than 1.96, the relationship is significant, and if the significance is less than 1.96, the relationship is not significant.

Spearman test

Due to the non-parametric nature of the data distribution, a test called Spearman is used to examine the relationship between research variables. If the level of significance of correlation coefficients is less than 5%, it indicates that there is a significant correlation between the research variables. As a result, it is possible to test the hypotheses using the structural equation method.

Sampling adequacy test

The KMO test indicates whether the number of sample data is suitable for factor analysis. The value of this index varies between zero and one. If the value of the index is close to one (at least 0.6), the data are suitable for factor analysis. Otherwise (usually less than 0.6) the results of factor analysis are not suitable for the data.

Bartlett test

This test confirms that the variables are not related to each other, which is achieved through the significance of the chi-square test. If the significance level in Bartlett test is less than 5%, the correlation matrix will not be a unit, ie there is a relationship between the variables.

Table (2): Research questions and variables

| Questions related to the factors of variables according to the 43-item questionnaire | | |
|--|------------------------------------|-------------------|
| Question | Index names | Symbol of factors |
| Questions 1 to 5 | Financial dimension | FP |
| Questions 6 to 8 | customer dimension | CP |
| Questions 9 to 10 | Internal process dimension | IPP |
| Questions 11 to 13 | learning dimension | GLP |
| Questions about the four dimensions of the independent variable (Balanced Scorecard) | | |
| Questions 14 to 16 | Knowledge sharing | KM1 |
| Questions 17 to 18 | knowledge creation | KM2 |
| Questions 19 to 22 | Save knowledge | KM3 |
| Questions 23 to 25 | Applying knowledge | KM4 |
| Questions related to the four mediating variables (knowledge management) | | |
| Questions 26 to 27 | Innovation in banking services | IN1 |
| Questions 28 to 29 | Innovation in new services | IN2 |
| Questions 30 to 31 | Technology innovation | IN3 |
| Questions 32 to 33 | Innovation in customer interaction | IN4 |
| Questions about the four factors of moderation (innovation) | | |
| Questions 34 to 38 | Efficiency | P1 |
| Questions 39 to 43 | Proficiency | P2 |
| Questions related to two dependent variable factors (productivity) | | |

4. Variables and their measurement methods

The variables in the structural equation model include the dependent variable (bank productivity), the independent variables (four dimensions of the balanced scorecard), the moderator variable (innovation) and the mediator variable (knowledge management). Also, their measurement method has been calculated by averaging the total items of each index in the questionnaire (Table 2). In other words, to measure variables that have more than one data (item) can be used to calculate the average of the data of each index, the result will be an index that represents the index of that criterion (Karimi, 1394 92).

4.1. Independent variables (predictor)

FP: Financial perspective is one of the components of a balanced scorecard that is calculated through the average of questions 1 to 5 of the questionnaire.

CP: Customer perspective is one of the components of a balanced scorecard that is calculated through an average of 6 to 8 questionnaires.

IPP: The perspective of internal processes is one of the components of a balanced scorecard, which is

calculated through an average of 9 to 10 questionnaires.

GLP: The learning perspective is one of the components of a balanced scorecard, which is calculated through an average of 11 to 13 questionnaires.

Mediator and moderator variables

KM: Knowledge management is a mediating variable that affects the relationship between bank productivity and a balanced scorecard and is calculated through the average data of questions 14 to 25 of the questionnaire.

IN: Innovation is a moderating variable that affects the relationship between banks' productivity and the balanced scorecard, which is calculated through an average of 26 to 33 questionnaires.

P: Productivity is a dependent variable that is calculated through the average of questions 34 to 43 of the questionnaire.

5. Research models

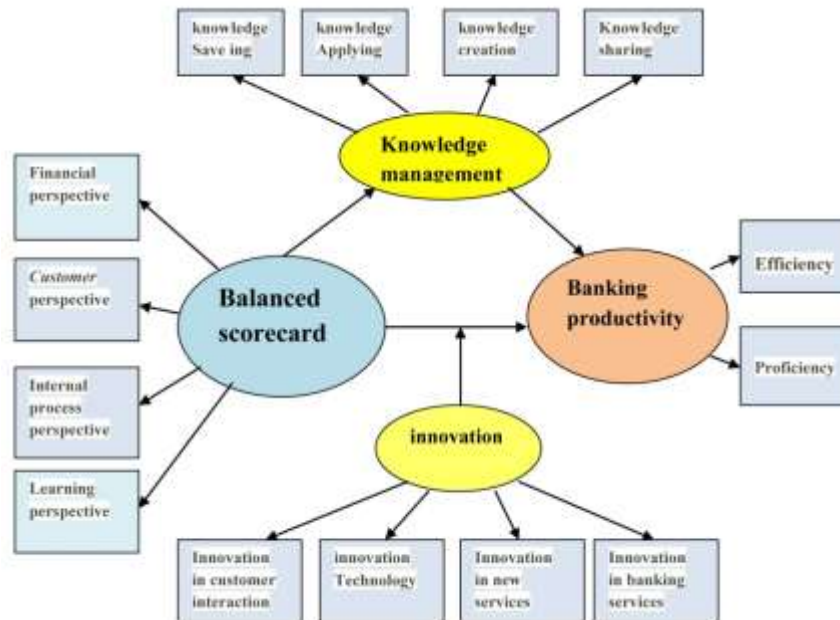


Figure (1): Conceptual model (made by the researcher)

6. Research Hypotheses

Hypothesis A1: Innovation has a significant effect on the relationship between the financial dimension of the balanced scorecard and bank productivity.

Hypothesis A2: Knowledge management has a significant effect on the relationship between the financial dimension of the balanced scorecard and bank productivity.

Hypothesis B1: Innovation has a significant effect on the relationship between the balanced scorecard customer dimension and bank productivity.

Hypothesis B2: Knowledge management has a significant effect on the relationship between the balanced scorecard customer dimension and bank productivity.

Hypothesis C1: Innovation has a significant effect on the relationship between the internal process dimension of the Balanced Scorecard and bank productivity.

Hypothesis C2: Knowledge management has a significant effect on the relationship between the

internal process dimension of the Balanced Scorecard and bank productivity.

Hypothesis D1: Innovation has a significant effect on the relationship between the balanced scorecard learning dimension and bank productivity.

Hypothesis D2: Knowledge management has a significant effect on the relationship between the balanced scorecard learning dimension and bank productivity.

7. Research Findings

In this section, information related to the answers of 172 managers and deputies of ten private banks in the country have been collected and analyzed using SPSS 24 and Smart PLS 3 software.

The first part is devoted to descriptive statistics in which the data are described using central indicators and dispersion. In the second part, which is dedicated to inferential statistics, after examining the distribution of data and the significance of the relationships, the research hypotheses are tested.

7.1. Descriptive Statistics

According to Table (3), it can be seen that the average response of individuals to the indicators is between 4 and 2. The average score in the financial dimension is 2.88, in the customer dimension is 3.01, in the internal process dimension is 2.82, in the learning dimension is 3.14. Average scores in knowledge sharing 3.31, knowledge creation 3.38, knowledge storage 3.46, knowledge utilization 3.48, innovation in banking services 3.12, innovation in new

services 3.14, innovation in technology 3.17, innovation in customer interaction 3.32, The effectiveness is 3.19 and the efficiency is 3.02.

Considering the values of Table (4) that the significance level for all variables is less than 0.05, so the distribution of variables does not follow the normal distribution. Therefore, non-parametric methods are used to examine the relationships between research variables and hypotheses.

Table (3): Central indicators and dispersion of research variables

| Protraction | skewness | Maximum | Minimum | standard deviation | Average | Factor |
|-------------|----------|---------|---------|--------------------|---------|------------------------------------|
| -0.99 | 0.10 | 4.80 | 1 | 0.95 | 2.88 | Financial dimension |
| -1.04 | 0.18 | 5 | 1 | 1.04 | 3.01 | customer dimension |
| -0.94 | 0.33 | 5 | 1 | 1.18 | 2.82 | Internal process dimension |
| -1.07 | 0.34 | 5 | 1 | 1.01 | 3.14 | learning dimension |
| -0.74 | -0.16 | 5 | 1 | 1.02 | 3.31 | Knowledge sharing |
| -0.75 | -0.30 | 5 | 1 | 1.12 | 3.38 | knowledge creation |
| -0.39 | -0.58 | 5 | 1.25 | 0.90 | 3.46 | Save knowledge |
| -0.32 | -0.20 | 5 | 1 | 0.86 | 3.38 | Applying knowledge |
| -0.42 | -0.13 | 5 | 1 | 0.97 | 3.12 | Innovation in banking services |
| -0.77 | 0.11 | 5 | 1 | 1.09 | 3.14 | Innovation in new services |
| -1.20 | 0.14 | 5 | 1.50 | 1.09 | 3.17 | Technology innovation |
| -0.68 | 0.20 | 5 | 1 | 0.95 | 3.32 | Innovation in customer interaction |
| -0.97 | -0.10 | 5 | 1 | 1.01 | 3.19 | Efficiency |
| -0.97 | -0.22 | 5 | 1 | 1.02 | 3.02 | Proficiency |

Table (4) Kolmogorov and Smirnov test to evaluate the normality of the distribution of research variables

| Result | significance level | Test statistics | standard deviation | Average | Sample size | Factor |
|----------|--------------------|-----------------|--------------------|---------|-------------|------------------------------------|
| Abnormal | 0.001 | 0.12 | 0.96 | 2.88 | 171 | Financial dimension |
| Abnormal | 0.001 | 0.14 | 1.04 | 3.01 | 171 | customer dimension |
| Abnormal | 0.001 | 0.16 | 1.18 | 2.82 | 171 | Internal process dimension |
| Abnormal | 0.001 | 0.16 | 1.01 | 3.15 | 171 | learning dimension |
| Abnormal | 0.001 | 0.11 | 1.02 | 3.31 | 171 | Knowledge sharing |
| Abnormal | 0.001 | 0.15 | 1.12 | 3.38 | 171 | knowledge creation |
| Abnormal | 0.001 | 0.12 | 0.90 | 3.46 | 171 | Save knowledge |
| Abnormal | 0.001 | 0.10 | 0.86 | 3.38 | 171 | Applying knowledge |
| Abnormal | 0.001 | 0.14 | 0.97 | 3.12 | 171 | Innovation in banking services |
| Abnormal | 0.001 | 0.16 | 1.09 | 3.14 | 171 | Innovation in new services |
| Abnormal | 0.001 | 0.16 | 1.09 | 3.17 | 171 | Technology innovation |
| Abnormal | 0.001 | 0.17 | 0.95 | 3.32 | 171 | Innovation in customer interaction |
| Abnormal | 0.001 | 0.11 | 1.01 | 3.19 | 171 | Efficiency |
| Abnormal | 0.001 | 0.11 | 1.02 | 3.02 | 171 | Proficiency |

Table (5): Results of three criteria of Cronbach's alpha, convergent reliability and validity

| Mean extraction variance AVE>0.5 | Combined reliability coefficient Cr>0.7 | Cronbach's alpha coefficients Alpha>0.7 | Factor | question | Variables |
|----------------------------------|---|---|--------|----------|----------------------------|
| 0.734 | 0.932 | 0.909 | 0.837 | 1 | Financial dimension |
| | | | 0.877 | 2 | |
| | | | 0.878 | 3 | |
| | | | 0.869 | 4 | |
| | | | 0.822 | 5 | |
| 0.770 | 0.909 | 0.851 | 0.871 | 6 | Customer dimension |
| | | | 0.890 | 7 | |
| | | | 0.871 | 8 | |
| 0.902 | 0.948 | 0.891 | 0.952 | 9 | Internal process dimension |
| | | | 0.947 | 10 | |
| 0.760 | 0.905 | 0.844 | 0.817 | 11 | Learning dimension |
| | | | 0.917 | 12 | |
| | | | 0.889 | 13 | |
| 0.732 | 0.916 | 0.878 | 0.817 | 14 to16 | knowledge management |
| | | | 0.876 | 17 to18 | |
| | | | 0.885 | 19 to22 | |
| | | | 0.844 | 23 to25 | |
| 0.724 | 0.913 | 0.872 | 0.824 | 26 to 27 | Innovation |
| | | | 0.885 | 28 to29 | |
| | | | 0.912 | 30 to31 | |
| | | | 0.779 | 32 to33 | |
| 0.914 | 0.955 | 0.906 | 0.952 | 36 to39 | efficiency Proficiency |
| | | | 0.960 | 40 to43 | |

Given that Cronbach's alpha numbers, hybrid reliability, and AVE are all in the range, The appropriateness of convergent reliability and validity of the research model can be confirmed.

Sampling adequacy test

According to the explanations in Table (7), the obtained index (0.922 (KMO =)), shows that the number of data is suitable for factor analysis. Table (6) shows the factor load of the variables.

Bartlett test

According to Table (7), the significance level of the test is 0.001. This means that the null hypothesis is rejected and there is a significant relationship between the variables.

The results of Spearman correlation between research variables show the results (significance level less than 0.05) There is a significant correlation between all research variables. As a result, it is possible to test the hypotheses using the structural equation method.

The results of inferential statistics of this method show that the moderator and mediator variables have a

significant adjustment effect on the relationship between some dimensions of the balanced scorecard and bank productivity. In other words:

The innovation variable has a significant effect on the relationship between the dimensions of the internal process of learning a balanced scorecard and bank productivity (hypotheses (c1) and (d1) have been confirmed. However, it does not have a significant effect on the relationship between the financial dimensions and the customer, balanced scorecard and bank productivity (Hypotheses (a-1) and (b - 1) are not confirmed. Knowledge management variable has a significant effect on the relationship between financial dimensions, balanced scorecard customer and bank productivity (Hypotheses A2) and (B2) have been confirmed. However, it did not have a significant effect on the relationship between the dimensions of the internal process and learning a balanced scorecard and bank productivity. (Hypotheses (c2) and (d2) have not been confirmed

| Factor Coefficient | Question description | Ref | Variable |
|--------------------|---|-----|---------------------------------------|
| 0.837 | To what extent does the service provided by the workforce increase with the implementation of the Balanced Scorecard? | 1 | Financial dimension |
| 0.877 | To what extent does the bank's asset management improve with the implementation of the Balanced Scorecard? | 2 | |
| 0.878 | To what extent does the profit growth of the bank-affiliated sectors lead to the implementation of a balanced scorecard? | 3 | |
| 0.869 | To what extent is revenue growth and development and market share increase due to the implementation of the Balanced Scorecard? | 4 | |
| 0.822 | To what extent does the cost structure improve with the implementation of the Balanced Scorecard? | 5 | |
| 0.871 | To what extent is the development of investment in ITC due to the implementation of a balanced scorecard? | 7 | Customer dimension |
| 0.890 | To what extent does the strengthening of the bank's brand happen due to the implementation of the balanced scorecard? | 7 | |
| 0.871 | How much do you think customer satisfaction can be achieved through the implementation of a balanced scorecard? | 8 | |
| 0.952 | How much is the improvement of quality, capability and features of products and services due to the implementation of a balanced scorecard? | 9 | Internal process dimension |
| 0.947 | How much improvement in operational processes occurs with respect to the implementation of the Balanced Scorecard? | 10 | |
| 0.817 | To what extent does employee satisfaction increase with the implementation of a balanced scorecard? | 11 | Learning dimension |
| 0.907 | How much is the upgrade of strategic technologies due to the implementation of the balanced scorecard? | 12 | |
| 0.889 | To what extent is the upgrading of key employee capabilities resulting from the implementation of a balanced scorecard? | 13 | |
| 0.817 | To what extent has this knowledge bank shared its vision, mission, and strategy with its employees, mission, and organizational goals? | 14 | Knowledge Sharing |
| 0.816 | How much organizational coordination has been done in this bank to recognize the knowledge management structure? | 15 | |
| 0.814 | How much financial resources are allocated to the initiatives and structure of knowledge management in the bank? | 16 | |
| 0.876 | To what extent does the bank's senior management consider and reward performance improvement, personal learning, knowledge sharing and innovation? | 17 | knowledge creation |
| 0.872 | To what extent are bank managers a model for the values of knowledge sharing and teamwork, and do they spend a lot of time distributing information and facilitating the flow of knowledge among the employees of all bank units? | 18 | |
| 0.885 | To what extent does the bank consider new technology and knowledge sharing in the design of business processes? | 19 | Save knowledge |
| 0.884 | To what extent does this bank collect information, assets and knowledge resources and keep them in a knowledge repository? | 20 | |
| 0.882 | to what extent does this bank have a source of information storage of its employees' knowledge capabilities? | 21 | |
| 0.885 | How much knowledge and experience of employees who leave the bank is stored inside the bank? | 22 | |
| 0.844 | To what extent is the bank's information technology infrastructure in line with the knowledge management strategy? | 23 | |
| 0.841 | To what extent in this bank, indicators have been designed to assess the impact of knowledge initiatives and people's share in them | 24 | Applying knowledge |
| 0.843 | How much has the bank been able to make significant improvements in processes, stakeholder relations and the quality of its services as a result of applying knowledge? | 25 | |
| 0.824 | In your opinion, to what extent is the ease of completing banking forms and the waiting time for receiving banking services based on creativity and innovation? | 26 | Innovation in banking services |
| 0.821 | The bank has well developed financial systems to provide better services with an innovation approach. | 27 | |
| 0.885 | To what extent is the internal arrangement, installation of signs and instructions in the branches, the existence of the queuing system and other new service delivery systems based | 28 | Innovation in new services |

| Factor Coefficient | Question description | Ref | Variable |
|--------------------|---|-----|------------------------------------|
| | on creativity and innovation? | | |
| 0.882 | How much is the bank innovative in providing various and new services based on the timely needs of customers? | 29 | |
| 0.912 | How sensitive is the bank to information technology related to market changes and is it innovative? | 30 | Technology innovation |
| 0.913 | To what extent does the bank use new technology to adapt to the innovation situation of competitors? | 31 | |
| 0.779 | How much does the bank value customer innovation attitudes and choices? | 32 | Innovation in customer interaction |
| 0.775 | Is the bank flexible in dealing with customers and using the opportunities obtained in an innovative way? | 33 | |
| 0.772 | To what extent do the bank complexes work to improve the methods of doing business? | 34 | |
| 0.773 | In general, to what extent do you consider the methods used in the bank to be effective in the correct and correct execution of activities and tasks? | 35 | |
| 0.960 | To what extent are the bank's activities in line with better services? | 36 | proficiency |
| 0.962 | To what extent has employee performance improved bank services? | 37 | |
| 0.963 | What is the average efficiency of the bank's resources, including human, physical and financial? | 38 | |
| 0.965 | In general, to what extent are the activities performed and the services provided in the bank in order for the customers to work properly? | 39 | efficiency |
| 0.952 | To what extent are the bank's resources and facilities used properly? | 40 | |
| 0.950 | To what extent do bank employees try to devise effective ways of doing things? | 41 | |
| 0.952 | To what extent does the bank work to improve the methods of doing business? | 42 | |
| 0.951 | In general, to what extent do you consider the methods used in the bank to be effective in the correct and correct execution of activities and tasks? | 43 | |

Table (7): KMO and Bartlett index results

| Bartlett test | | Index KMO |
|---------------|------------------------|-----------|
| 7724.22 | Chi-square statistics | 0.922 |
| 1176 | Degree of freedom | |
| 0.001 | The significance level | |

Table (8): Correlation coefficients of the studied variables

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | Variable |
|---|----|----|-------|---------|-------|---------|----------------------------|
| | | | | | | 1 | Financial dimension |
| | | | | | | **0.728 | Customer dimension |
| | | | | 1 | ** | ** | Internal process dimension |
| | | | 1 | **0.660 | 0.728 | 0.769 | Learning dimension |
| | | 1 | ** | ** | ** | ** | KnowledgeManagement |
| | 1 | ** | 0.573 | 0.485 | 0.567 | 0.587 | Innovation |
| 1 | ** | ** | ** | ** | ** | ** | Banking Productivity |

(**p*,0.01>p<0.05)

Table (9): Regression coefficients of structural equation model variables

| result | significance | circumstantial t | coefficient | description |
|---------------|--------------|------------------|-------------|---|
| insignificant | 0.385 | 2.869 | 0.071 | Financial dimension → Innovation → Bank productivity |
| insignificant | 0.829 | 0.217 | -0.019 | Customer dimension → Innovation → Bank productivity |
| significant | 0.001 | 3.218 | 0.237 | Internal Process dimension → Innovation → Bank productivity |
| significant | 0.036 | 2.101 | 0.124 | Learning dimension → Innovation → Bank productivity |
| significant | 0.013 | 2.480 | 0.088 | Financial dimension → Knowledge management → Bank |

| result | significance | circumstantial t | coefficient | description |
|---------------|--------------|------------------|-------------|---|
| | | | | productivity |
| significant | 0.012 | 2.529 | 0.076 | Customer dimension → Knowledge management → Bank productivity |
| insignificant | 0.121 | 1.554 | -0.034 | Internal Process dimension → Knowledge management → Bank productivity |
| insignificant | 0.075 | 1.780 | 0.049 | Learning dimension → Knowledge management → Bank productivity |

Table (10): summarizes the results of inferential statistics of structural equation methods

| Balanced scorecard dimensions | regression coefficient | Innovation | regression coefficient | Knowledge Management | Hypothesis |
|-------------------------------|------------------------|---------------|------------------------|----------------------|----------------------------|
| Financial | 0.071 | insignificant | 0.088 | significant | Hypothesis (a2) and (a1) |
| Customer | -0.019 | insignificant | 0.076 | significant | Hypotheses (B1) and (B2) |
| Internal process | 0.237 | significant | -0.034 | insignificant | Hypotheses (c 1) and (c 2) |
| learning | 0.124 | significant | 0.049 | insignificant | Hypotheses (D1) and (D2) |

Model fit test.

Model measurement fit

According to the above fitting model, the standardized regression coefficient for the effect of the variable (product of innovation in the financial dimension) on bank productivity is equal to 0.071.

The standardized regression coefficient for the effect of the variable (product of innovation in the customer dimension) on bank productivity is 0.019.

The standardized regression coefficient for the effect of the variable (the product of innovation in the internal process dimension) on bank productivity is 0.237.

The standardized impact regression coefficient for the effect of the variable (the product of innovation in the learning dimension) on bank productivity is 0.124.

The standardized regression coefficient for the effect of the mediating role of knowledge management variable on the relationship between financial dimension and bank productivity is equal to 0.088.

The standardized regression coefficient for the effect of the mediating role of knowledge management variable on the relationship between customer dimension and bank productivity is 0.076.

The standardized regression coefficient for the effect of the mediating role of the knowledge management variable on the relationship between the internal process dimension and bank productivity is 0.034.

The standardized regression coefficient for the effect of the mediating role of knowledge management variable on the relationship between learning dimension and banking productivity is 0.049.

Due to the fact that PLS software uses the value of t-statistic to check the significance of relationships And this value is 1.96 for a 5% error. For a significant study, comparing the value of t-statistic with the value of 1.96 is used. So that if the value of t-statistic is more than the mentioned value, the relationship is significant. According to Figure (2), it can be seen that most of the values of t-statistic are more than 1.96, so most of the model relationships are significant.

The coefficient of determination indicates what percentage of changes in the dependent variable are explained by the independent variable In other words, the coefficient of determination indicates how much of the changes in the dependent variable are affected by the relevant independent variable and the rest of the changes in the dependent variable are related to other factors. Values of 0.19, 0.33 and 0.67 have been considered as criteria for weak, medium and strong values of coefficient of determination (R2) (Davari and Rezazadeh, 2013).

The contents of Table (11) show that the research variables explain 42.7% of the variance of knowledge management and 68.9% of the variance of bank productivity, which is in a good range for the dependent variable of bank productivity.

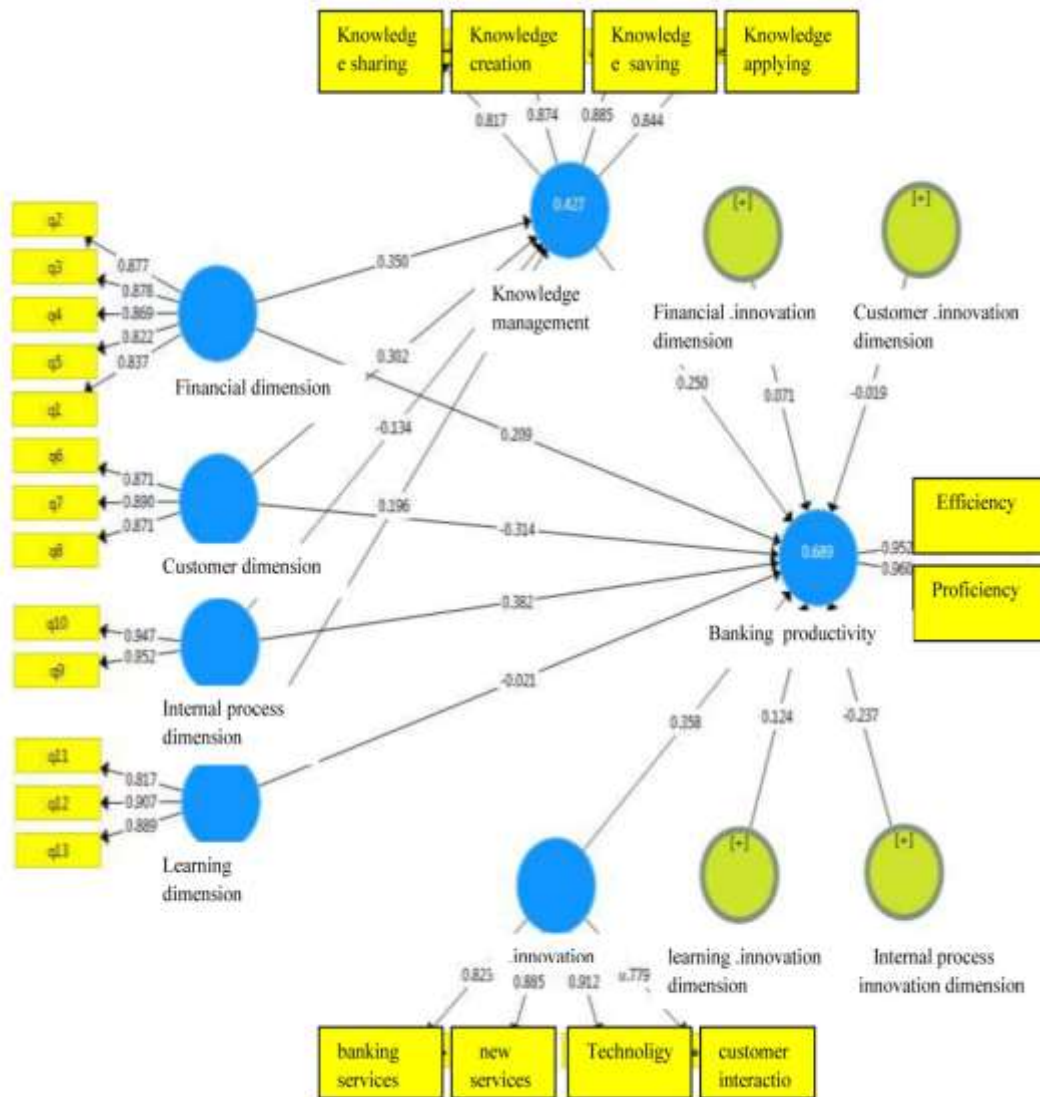


Figure (2): Regression coefficient The mediating role of knowledge management and innovation moderator

Table (11): Determination coefficients

| Coefficient R ² justified | Coefficient R ² | Variable |
|--------------------------------------|----------------------------|----------------------|
| 0.413 | 0.427 | knowledge management |
| 0.670 | 0.689 | Banking efficiency |

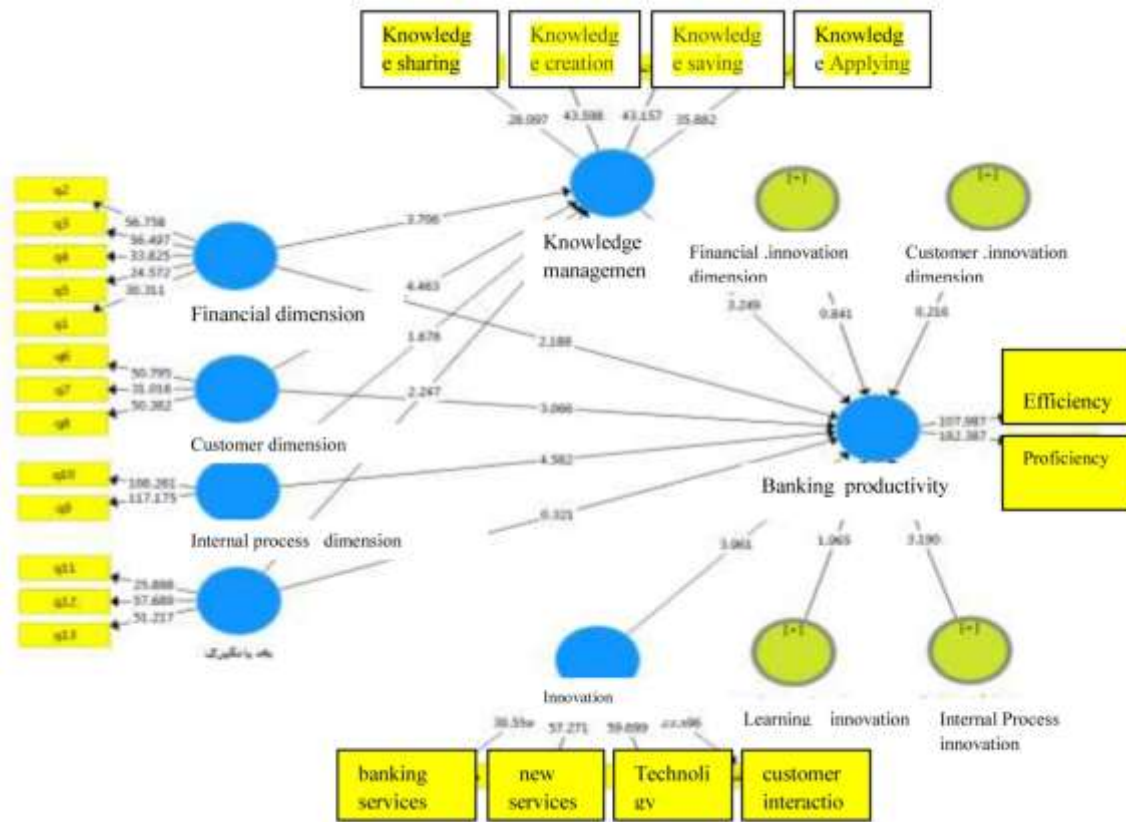


Figure (3): T Value values of the research model

8. Discussion and Conclusion

Nowadays, the application of modern management accounting techniques in organizations and at the same time the critical approaches governing the application of these techniques in academic circles and research centers is expanding and is on the path of rapid growth. Such conditions provide the necessary grounds for theorizing in modern accounting. The present study has tried to use accounting and economic information to clarify the relationships between interfering factors in improving productivity in the banking system. Hopefully, it will be a basis for predicting related phenomena in the future.

Findings in this study indicate that innovation and creativity have been able to strengthen the relationship between the dimensions of the internal process and learning a balanced scorecard with the productivity of banks. Knowledge management has also been able to influence the relationship between financial and

customer dimensions with bank productivity. These results are consistent with the findings of studies conducted by Zed Wang Wan (2012) and the results of Hanifa Research (2012) and studies conducted by Nematizadeh and Hairy Meybodi (2015). These results draw the attention of policymakers in the banking system to prioritizing factors and focusing on innovation and knowledge management, as well as improving the use of all development tools with the aim of aligning them to strengthen the relationship between balanced scorecard and banking system productivity.

Investigating the causes and factors of the weak impact of the innovation index on the relationship between the two dimensions of finance and customer from a set of four dimensions of a balanced scorecard with the productivity of banks on the one hand Also, analysis and interpretation of the reasons for not creating a synergy of knowledge management factor in

the interaction between the dimensions of the internal process and learning from the four dimensions of the balanced scorecard with the productivity of banks on the other hand. Is one of the most important proposals based on the results of this study with the aim of reviewing the existing mechanisms and removing the relevant obstacles in order to improve the level of productivity of banks. Also study on the role of other development factors such as competition and the active role of banks in the capital market and the use of new financial techniques (FIN TECH), customer behavior, marketing of banking services. And the role of political factors such as sanctions and restrictions on the relationship between the four dimensions of the Balanced Scorecard with bank productivity. Also, conducting similar research in service, manufacturing and commercial organizations is one of the most important suggestions for future research with the aim of conducting applied and developmental research.

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