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Comparison of Financial Performance of Participation and Conventional Banks Using Multicriteria Methods: Case Study in Turkey

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Abstract:

The participation Bank is the one dealing with Islamic banking system, while the conventional bank deals with the interest in its loan which falls under the rule of usury that is a sin in Islam. Nowadays Islamic banking system is considered as the alternative to the conventional banking system, that's why, it's important to compare the financial performances of conventional and participation banks. This study aims to compare the performance of participation banks represented by 3 Islamic banks with the performance of conventional banks represented by 6 conventional banks in Turkey through ranking each bank alone using multi criteria data analysis using MAUT and TOPSIS methods, which depend on some financial ratios were collected from the annual financial reports, for the period of 5 years during 2011 to 2015; To rank the years from best year to worst year of each bank according to their performance; first the most common five financial ratios are calculated for each banks during 5 years, then applying the MAUT and TOPSIS methods to those indicators. The final findings of this research use MAUT and TOPSIS methods with each bank approach and all banks together approach. The result showed the best performance of all selected Turkish banks occurred in 2011 for Islamic banks, 2011 and 2012 for Conventional banks, and it is not highly affected by the method is used; it might have different findings using a higher number of banks, a different period, or applying other methods.

Keywords: Participation banks, conventional banks, financial ratios, turkish banks, multi criteria decision, MAUT method, TOPSIS method

1. Introduction

Banks are the most important institution systems that have a main role in any country's economy, banks' activities have to run efficiently to improve living standard of any country, usually there are two types of banks around the world which are conventional and participation banks (Purwanto& Juliani, 2017).This section of study is explained an introduction about banks, the two types of banks, and the difference between Islamic bank and conventional bank, also it shows the reason of why Islamic banks have been popular in the last years.

1.1. Banks System in Turkey

According to Banking Regulation and Supervisory Authority (BRSA, 2017) there are 51 banks in Turkey (5 of them are Islamic banks, 33 deposit banks, and 13 development and investment banks).

1.2. Organizational Structure of Banks

Islamic banks and conventional banks have many similarities also they have many differences, for example in mechanism of transfer money, financial report, money's receipt and so on such these technical things. However, they also have several differences between them.

Conventional Bank	Islamic Bank
Interest rate based	Profit and loss sharing
Debtor-creditor relation	Partnership relation
Any kind of investments	Doing only halal investments
Commissary board	Sharia supervisory board

Table 1 : The Differences between Islamic and Conventional Bank

1.3. Conventional and Islamic Banks System

The main principle of conventional banks is based on profit maximization, while the Islamic banks' principle is based on Islamic financial law which prohibits the interest and requires risk sharing (Olson & Zoubi, 2008).The

conventional bank can be defined as a bank that operates its business activities in a classical way. While Islamic banks can be defined as an institution without using any interest to match the laws of sharia; and they deal with the money as intermediary for exchange the money not as a commodity (Karaosman, 2014). While (Ozkara, 2010) defined the Participation word as the activity performed on banking sector based on profit/loss principle.

1.4. Purpose of Participation Bank

The aim of establishing Islamic banks in Turkey was to introduce the framework of interest-free financing, and to evolve the relations of Turkey with Islamic countries (Ozkara, 2010). Furthermore the increasing of Islamic banks' branches and the people who work inside these banks which leads to increases the deposits means that these banks have achieved their aim significantly (Ozkara, 2010). Islamic banking has grown at an annual rate of 15 per cent during the past five years and it is estimated that there are approximately more than 300 Islamic financial institutions operating in 75 countries (Zeitun, 2012).

1.5. The Concept of Profit and Loss

Sharia guides the participation banks by some Islamic laws, and the prohibition of interest (Riba) is the most important feature of these laws, because the interest leads to an inequitable distribution of income, therefore the concept of interest in the Islamic banking model is replaced by the principle of risk sharing meaning that Islamic banks should operate only using profit/loss sharing (PLS) arrangements (Olson & Zoubi, 2008).

1.6. Banks during the Financial Crisis

According to (Scott, 2014), the financial markets in the whole world was hit by a serious crisis in the last few years, during 2007 to 2008 the global financial crisis made a losses in billions of dollars and the result from that was collapse of many financial institutions. For example, in 2007 the number of Islamic branches was 422 and it is increased by 26% to reach 530 in 2008, and it is increased by 7% in 2008 to reach 569 branches in the year 2009. During the global financial crisis all conventional banks around the world faced difficulties while Islamic banks at that period were totally isolated from that crisis (Yilmaz, 2009).

The environment guided by sharia principles prevents the financial products that affect conventional banks to affect the Islamic banks to flowing into the crisis (Hasan & Dridi, 2010). As a result, the values of the finance of Islamic banks are increased to the investors who have depressed after the crisis over the world because of the conventional banks' pursuit (Abdul-Majid, Saal, & Battisti, 2008). Islamic banks are spread around the world not only Islamic countries; there are 300 Islamic financial institutes over 70 countries, 5 in UK and 19 in USA (Johnes, Izzeldin, & Pappas, 2014).

1.7. Development of Participation Banks

According to Participation Banks Association of Turkey (PBAT) the Islamic banks' braches in a few years ago were too low for example in 2004 the number of branches was 255 but it was continuously increasing year by year especially during the global crises and in the last year 2016, the number of Islamic bank branches becomes 959. While the maximum number of stuff who worked in participation banks during last 10 years is 16,763 employees in 2013, and the maximum number of branches has been reaches is in 2015 when it was 1,080 branches around Turkey as it is shown in figure 1 below (TKBB, 2016).

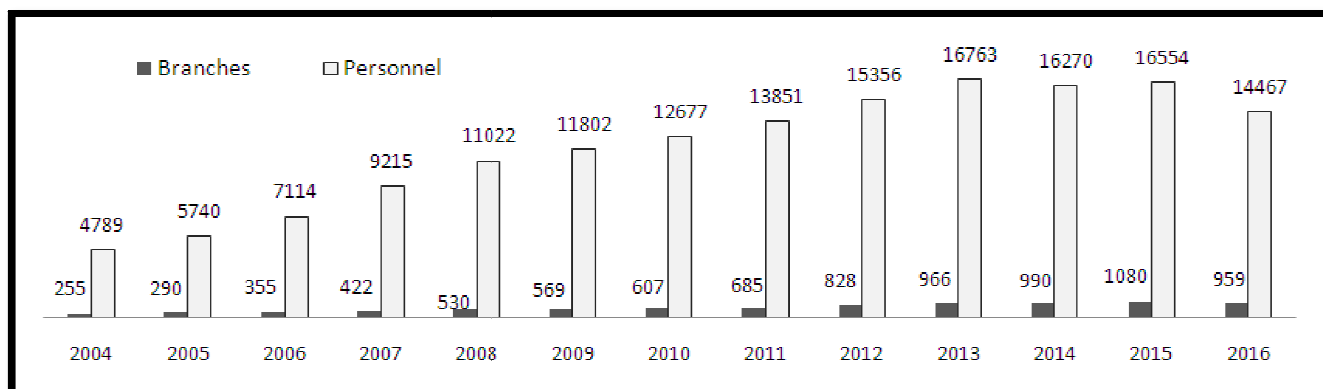


Figure 1: Development of Braches and Staff of Islamic Banks

The expanding of Islamic banks' branches in Turkey shows that these types of banks providing the convenience to the people who deal with them; especially Turkey is a country with Muslim majority. However, participation banks made their agreements according to the Islamic law.

1.8. Evaluation Performances of Banks

The main purpose of analyzing the performance of bank's financial status is to evaluate the management; it can be determined from the ratios analysis of the financial reports for a period of time. A lot of people who are really concerned about this kind of sector or they deal with banks affect from the performance of the bank evaluation, also the same case with the investors who are affected because of their investments in the banks, it is also important to the managers who manage those banks because they always try to make their banks look better and make more benefits to people who deal with the bank to make them feel better as their investments are in safe hands (Elmomni & Elsarwgy, 2005). It is really important to managers and investors to know the evaluation of the bank's performance, according to these result investors will take a move to invest their money in that bank or to withdraw it (Samad & Hassan, 1999).

1.9. Financial Statements and Ratios

The financial performance of any bank in a specific period could be shown by financial statements of that bank, in order to know the financial performance then calculating the rations according to the financial statements is important, and there are many type of ratios could be measured, which is liquidity's ratios, solvency's ratios, operational efficiency, and profitability's ratios such as NPL, LDR, OER, CAR, and ROA (Purwanto & Juliani, 2017).

2. Literature Review

There are similar researches which compare the performance of Islamic and conventional banks, for example according to (Elmomni & Elsarwgy, 2005) that compared banks in Jordan for 10 years by using several financial ratios the results showed that there are no significant differences between the Islamic and conventional banks. In other research (Bitar, Madies, & Taramasco, 2017) as they have used data from 8615 banks during 2006 to 2012, Islamic banks are more profitable and liquid than conventional banks. The same thing that another study said that conventional banks are less profitable than Islamic banks (Olson & Zoubi, 2008). While in Pakistan, (Kakakhel, Rahim, & Tariq, 2013) indicated in their study that Islamic banks are less efficient and less profitable than conventional banks during the period 2008 to 2010. Also in GCC region during 2003 to 2011, Islamic banks were less liquid and profitable than conventional banks during first years of the research but were more liquid and profitable during later years (Tai, 2014). (Johnes et al., 2014) compared the two kinds of banks for 6 year in Jordan; they have found that in terms of gross efficiency both Islamic and conventional banks are the same; however Islamic bank is lower in type of efficiency and higher in net efficiency.

In the study of (M. tayeb Khan, 2016) about Turkish banks which compared Islamic and conventional banks for 5 years; and the study found out that conventional banks are less efficient than Islamic banks for the period 2010 to 2015. According to the study of (Srairi, 2009) that Islamic banks in GCC region are less efficient than conventional banks, especially at generating the profits during the period 1999 to 2007. It is mentioned in similar study of (Alqahtani, Mayes, & Brown, 2017) that Islamic banks in GCC have no big difference than conventional banks in terms of cost efficiency for the period 1999 to 2012. However, in terms of profit efficiency, Islamic banks are less efficient than conventional banks.

3. Research Methodology

The present study shows the comparison of financial performance of Islamic banks and conventional banks using multi criteria decision making technique. In other word MAUT and TOPSIS methods have been used to evaluate the banks for 5 years (2011-2015), this study is different from the earlier studies with respect to contents, coverage of years and methodology has been used.

To assess the financial performance of banks sector, five different types of financial ratios have been chosen. This research contains of two steps, analyze the financial annual reports and evaluate the result using MCDM approach. The financial annual reports of the banks are analyzed according to return and margin ratios, and the data collection was gathered from the financial reports in the banks' official websites and from the Banks Association of Turkey.

There are two types of banks, the participation bank and conventional bank. In turkey, there are 5 Islamic banks and 46 conventional banks according to banking regulation and supervision agency (BRSA, 2017). In this research 3 Islamic banks (Albaraka bank, Kuveytturk bank, and Turkiyefinans bank) and 6 conventional banks (Ziraat bank, İşbank, Deniz bank, Finans bank, Şeker bank, and Alternatif bank) have been chosen as samples to understand the performance of each bank through the financial ratios and the result is evaluated with other bank. There are several financial ratios that can be calculated to analyze the financial performance of bank, but in this research only 5 ratios are used as shown in table 2 below.

Definition	Formula
Return On Asset	Net Income / Total Assets
Return on Equity	Net Income / Total Shareholders' Equity
Gross Profit Margin	Gross Profit / Revenue
Net Profit Margin	Net Profit / Revenue
Operating Margin	Operating Profit / Revenue

Table 2: Financial Ratios Used in This Research and Formulas

The financial ratio is a relationship between two financial aspects and it can be considered the simplest financial analyzing tool; Return on Assets (ROA) is a ratio shows the percentage of the operating efficiency of the bank depends on the division of the net profit by the total assets. In other word, it shows the profit per assets. Return on owner's Equity

(ROE) is a ratio reveals the shareholders rate of return on the investment, it can be calculated as net profit divided by total equity (Kabajeh, Nu'aimat, & Dahmash, 2012).

Gross margin (GPM) expresses the difference between sales and costs divided by net sales; Operating Margin (OPM) shows the percentage of division of operating profit by revenues; Net Profit Margin (NPM) is represents the percentage of net profit by the total revenue (Helfert, 2001).

According to velasquez & hester (2013) the MCDM methods are:

- Technique for Order of Preference by Similarity to Ideal Solution TOPSIS
- Multi Attribute Utility Theory MAUT
- Analytic Hierarchy Process AHP
- Simple Multi Attribute Rating Technique SMART
- Data Envelopment Analysis DEA
- Fuzzy Set Theory
- Simple Additive Weighting SAW
- Case-based Reasoning
- Goal Programming, and Electre

All of us considered as a decision makers because anything we do is a result of decision in order to take the right decision, we try to gather information about a specific thing, it is important to put our alternatives and criteria to rank the best decision to take; Multi criteria decision making is a critical point that everyone should takes to have a decision in real life (Sharma, 2013).It can be referred to as MCDM which is a way to take decision when there are multiple conflicting criteria, it has problems such in personal life when needs to buy a house with different properties and criteria regarding size, location, and price. In spite of MCDM problems are widespread but the development of technology recently has made it easily to solve such complex issues, there are many techniques reviewed to solve problems (Hwang and Yoon, 1981).

There are two types of MCDM; one type could be infinite solutions while the other could have finite alternatives solutions which are normally associated; normally in problems related with the number of alternatives which is limited (Xu & Yang, 2001).In this thesis, we will focus on second type of MCDM which has finite alternatives, it could be described with a decision matrix; a MCDM may be described using a decision matrix, assuming there is m number of alternatives and n number of attribute, a decision matrix is a matrix consists of $m \times n$. It composes as a hierarchy form, It may have scarcity of information or the estimation may not be conclusive (Xu & Yang, 2001). The conditions in which decisions are made is more sophisticated recently according to the complicated of life that's why it is so hard to take a decision, to take a decision in different level of life's depends on the situation and problems a decision making analysis can be defined as a philosophy that contains a set of logic things that methodologies and collection of procedures are based on these logic things to solve a critical problem (Keeney, 1982).Simple Multi Attribute rating technique SMART, Data Envelopment Analysis DEA, Analytic Hierarchy Process AHP, Fuzzy Theory, and Analytic Network ANP; all these are approaches of Extensive MCDM (Ho, Xu, & Dey, 2010). MCDA is so important nowadays, because it is important to solve decision problems and it is also a collection of theories can deal with this issue. In this research, the focus only on two kinds of MCDM which are Multiple attribute utility theory (MAUT) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) methods one of the simplest approaches to evaluate alternatives and criteria is MAUT; by using this method the decision makers would be able to compare performances of alternatives and select the best choice (Youngblood & Collins, 2003). MAUT is an approach of MCDM techniques, it which assigns for each action a utility, this utility is a number representing the prefer ability of the considered action which is the summation of all utilities of each criteria. Thus, this approach very often matches with classical approach which is easy to deal with it (figueira, greco, & ehrgott, 2005).The other method that used in this article is TOPSIS which sets for Technique for Order of Preference by Similarity to Ideal Solution; TOPSIS is one approach used when there are a finite number of alternatives to identify solutions. The main rule is that the chosen alternative Should have the farthest distance from the negative ideal Solution and the shortest distance from the positive ideal Solution (sharma, 2013).

In this research, two steps were used to reach the purpose; first step is calculating the performance of selected banks through financial ratios; in the second step these ratios are criteria to rank the best performance of a year during the period for each bank or all of banks together using two analyzing methods MAUT and TOPSIS methods. All matrixes are built as $m \times n$ dimensions, where the period of 5 years between 2011 and 2015 has been indicated by m, and n indicates the 5 common performance ratios. Kuveytturk bank is randomly selected to explain the performance analysis as shown in table 3 below and all the following tables are based on this bank.

Year	GPM	OPM	NPM	ROA	ROE
2011	0.559	0.254	0.202	0.013	0.136
2012	0.537	0.239	0.193	0.013	0.149
2013	0.577	0.256	0.209	0.012	0.130
2014	0.565	0.229	0.184	0.010	0.122
2015	0.573	0.216	0.173	0.010	0.130

Table 3 : Financial Indicators of Kuveytturk Bank

3.1. MAUT Method

MAUT is refers to Multi Attribute Utility Theory which is specified over a set of attribute; additive approach has been used which is considered one of the most common approach of MAUT functions. In this research, MAUT method is

shown in two approaches; the first approach considered each bank alone, for that reason Kuvaytturk bank has been randomly selected to show the steps of how the MAUT method is used. While the second approach considered all banks together as it explained in the following pages.

3.1.1. MAUT Method with Each Bank alone Approach

The following steps show the way of using Multi Attribute Utility Theory: (Can, Ozari, & Eren, 2017)

First step: Determine all the alternatives and criteria of kuvaytturk bank during the period 5 years; specify the alternatives are the years from 2011 to 2015, while the criteria are the selected financial ratios. Then, the best and worst value of each criteria are been calculated.

Second step: in general, all criteria have a specific weight w_i , but in this article the weights are equally distributed, so the weight w_i for each criterion is 0.20 because its only 5 financial ratios, so 0.20×5 equals 1.

$\sum_{i=1}^n W = 1$, where n is the number of criteria

Third step: Calculating utility values for criteria to be maximized and calculating utility values for criteria to be minimized to construct the Normalized Decision Matrix,

$$U_i(X_i) = \frac{x - x_i^-}{x_i^+ - x_i^-}; \quad U_i(X_i) = \frac{x_i^+ - x}{x_i^+ - x_i^-}$$

Where, x_i^+ is the best value of the alternatives, x_i^- is the worst value of the alternatives

Fourth step: Calculating the Weight Matrix and then calculate the total utility which can be find by summation of each row of matrix,

$$U_i = \sum_{j=1}^m W_j U_{ij}$$

Fifth step: Rank the alternatives starting from the value that has the highest total utility and then in decreasing order. In other word, the best year is the one who has the higher total utility value.

Sixth step: doing all previous steps with each bank alone, to find the best year of each bank according to the rank which depends on the highest total utility.

BANKS	2011	2012	2013	2014	2015
Ziraat	X	X	Best	X	X
Isbank	X	Best	X	X	X
Deniz	Best	X	X	X	X
Finans	Best	X	X	X	X
Seker	X	Best	X	X	X
Alternatif	X	X	X	Best	X
Baraka	X	X	Best	X	X
Kuvaytturk	Best	X	X	X	X
Turkiyefinans	Best	X	X	X	X

Table 4 : Best Year Using MAUT Method Each Bank Alone

In table 4 above, it can be seen that 2011 is the best year for 4 banks, 2 Islamic banks and 2 Conventional banks, in 2012 is the best year for 2 banks both of them are conventional banks and no Islamic bank has reach the best year in 2012. The year 2013 is the best year for 2 banks, one of them is Islamic bank and the other is conventional bank. While 2014 is the best year for only 1 bank which is conventional bank. However, in 2015 no bank has record this year as the best year. By regrouping all these banks and the best year of each bank under two categories; Islamic banks and conventional banks, one can understand that 2 is the maximum frequency number of Islamic banks that are ranked 2011 is the best year as in table 5 below. While the maximum frequency number of the conventional banks is also 2, in such case it can be understand that 2011 and 2012 are the best years for Conventional banks by using MAUT method with each bank alone.

Banks	2011	2012	2013	2014	2015
Freq conventional	2	2	1	1	0
Freq Islamic	2	0	1	0	0

Table 5 : Result of Using MAUT Method with Each Bank Alone

From above table 5, the final result of using MAUT method by considering each bank alone and then regrouping them all into two categories, it can be seen that 2011 is the best year for Islamic banks, 2011 and 2012 are the best years for Conventional banks.

3.1.2 MAUT Method with all Banks together Approach

In this section, all the previous steps of MAUT method with each bank alone is being used here but instead of calculating each bank alone, all banks will be calculated together to reach the final result of MAUT method with all banks together.

It can be found the best year for each bank by taking the best rank of each bank considering it the best year, the final result of this approach shown in table 6 below.

Banks	2011	2012	2013	2014	2015
Ziraat	X	X	Best	X	X
Isbank	X	Best	X	X	X
Deniz	Best	X	X	X	X
Finans	Best	X	X	X	X
Seker	X	Best	X	X	X
Alternatif	X	X	X	Best	X
Baraka	X	X	Best	X	X
Kuveytturk	X	X	Best	X	X
Turkiyefinans	Best	X	X	X	X

Table 6 : The Best Years for Each Bank Using MAUT Method

In table 6 above, it can be seen that 2011 is the best year for 3 banks, 1 Islamic bank and 2 Conventional banks, in 2012 is the best year for 2 banks both of them are conventional banks and no Islamic bank has reach the best year in 2012. The year 2013 is the best year for 3 banks, 2 of them are Islamic banks and 1 Conventional bank. While 2014 is the best year for only 1 bank which is conventional bank. However, in 2015 no bank has record this year as the best year. By regrouping all these banks and the best year of each bank under two categories; Islamic banks and conventional banks, one can understand that 2 is the maximum frequency number of Islamic banks that are ranked 2013 is the best year as shown in table 7 below.

While the maximum frequency number of the conventional banks is also 2, in such case it can be understand that 2011 and 2012 are the best years for Conventional banks by using MAUT method with all banks together approach.

Banks	2011	2012	2013	2014	2015
Freq of conventional	2	2	1	1	0
Freq of Islamic	1	0	2	0	0

Table 7 : Maximum Frequency Number of Best Year in Banks

From above table 7, the final result of using MAUT method by considering all banks together approach and regrouping them all into two categories, it can be seen that 2013 is the best year for Islamic banks, while 2011 and 2012 are the best years for Conventional banks. Furthermore, from the result of step (4) above, it can be found the best bank's performance regarding the total value for each bank as it shown in table 8 below.

Order	Banks	Total	Type
1	Deniz11	0.913	Conventional
2	Ziraat13	0.770	Conventional
3	Turkiyefinans11	0.730	Islamic
4	Ziraat15	0.715	Conventional
5	Isbank12	0.714	Conventional
6	Turkiyefinans12	0.695	Islamic
7	Isbank13	0.695	Conventional
8	Baraka13	0.691	Islamic
9	Kuveytturk13	0.667	Islamic
10	Turkiyefinans13	0.667	Islamic

Table 8 : Top 10 Best Performance of Banks Using MAUT Method

3.2. TOPSIS Method

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is one method of Multiple Criteria Decision Making (MCDM) to rank the performance; it was presented by Hwang and Yoon in 1981, the concept of this method is the alternatives should have the farthest distance from the Negative Ideal Solution (NIS) which minimizes the benefit, and the shortest from the Positive Ideal Solution (PIS) which maximizes the benefit (Önder, Taş, & Hepşen, 2010). As it has been done in MAUT method, Kuveytturk bank has been randomly selected in this method, to show the steps of how the TOPSIS method is used.

3.2.1 TOPSIS Method with Each Bank Alone Approach

The following steps show the way of using TOPSIS method: (Önder, Taş, & Hepşen, 2010)

First step: In this step the Normalized Decision Matrix is constructed: $T_m \times n$ as shown in figure 2, using a special equation as below.

$$T_{m \times n} = [T_{ij}] = \begin{bmatrix} T_{11} & T_{12} & T_{13} & \dots & T_{1n} \\ T_{21} & T_{22} & T_{23} & \dots & T_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ T_{m1} & T_{m2} & T_{m3} & \dots & T_{mn} \end{bmatrix}$$

Figure 2: Normalized Decision Matrix $T_{M \times N}$ TOPSIS Method

After applying below equation below on the matrix of kuveytturk bank’s financial indicator, the following Normalized matrix as shown in table 9 will be the result of this step.

$$T_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}}$$

Where $i = 1, 2, 3 \dots m$. and $j = 1, 2, 3 \dots n$.

Year	GPM	OPM	NPM	ROA	ROE
2011	0.445	0.475	0.469	0.502	0.455
2012	0.427	0.447	0.448	0.502	0.498
2013	0.459	0.478	0.485	0.444	0.435
2014	0.449	0.428	0.427	0.386	0.408
2015	0.456	0.404	0.402	0.386	0.435

Table 9 : Decision Matrix Using TOPSIS Method Each Bank Alone

Second step: The Weighted Normalized Decision Matrix $K_{m \times n}$ can be calculated by multiplying the normalized matrix by the weights:

$$K_{ij} = w_i T_{ij}$$

Where $i = 1, 2, 3 \dots m$. and $j = 1, 2, 3 \dots m$

Where w_i is the weight of the i th criteria, and $0 \leq w_i \leq 1, \sum_{i=1}^n w_i = 1$ for all $i=1, 2, 3 \dots n$.

$$K_{m \times n} = [K_{ij}] = \begin{bmatrix} W_1T_{11} & W_2T_{12} & W_3T_{13} & \dots & W_nT_{1n} \\ W_1T_{21} & W_2T_{22} & W_3T_{23} & \dots & W_nT_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ W_1T_{m1} & W_2T_{m2} & W_3T_{m3} & \dots & W_nT_{mn} \end{bmatrix}$$

Figure 3 : Weighted Normalized Decision Matrix

In this article, the weighted are considered as equally distributed, so the weight w_i is 0.20 for all criteria.

Third step: Identify the Positive Ideal (PIS) and Negative-Ideal Solutions (NIS) using a specific equations below,

$$PIS = A^+ = \{k_1^+, k_2^+ \dots k_n^+\} \text{ where } k_i^+ = ((\max_i k_{ij}, c_1), (\min_i k_{ij}, j \in c_2))$$

$$NIS = A^- = \{k_1^-, k_2^- \dots k_n^-\} \text{ where } k_i^- = ((\min_i k_{ij}, c_1), (\max_i k_{ij}, j \in c_2))$$

Where c_1 is associated with benefit criteria, and c_2 is associated with cost criteria

	GPM	OPM	NPM	ROA	ROE
A+	0.092	0.096	0.097	0.100	0.100
A-	0.085	0.081	0.080	0.077	0.082

Table 10 : Positive Ideal and Negative Ideal Solutions

Forth step: Determine the separation measures (S_i^+ and S_i^-) for each alternative from the positive ideal solution A^+ , and negative ideal solution A^- :

$$S_i^+ = \sqrt{\sum_{j=1}^n (K_{ij} - K_j^+)^2} \quad S_i^- = \sqrt{\sum_{j=1}^n (K_{ij} - K_j^-)^2}$$

Fifth step: Calculate the Relative Closeness to ideal solution:

$$RC_i = \frac{S_i^-}{S_i^- + S_i^+}, \text{ Where } 0 \leq RC_i \leq 1$$

By applying the above equation above, the result of the Relative closeness to ideal solution can be seen in table 11 below.

Year	S+	S-	C+
2011	0.01	0.032	0.766
2012	0.012	0.032	0.733
2013	0.017	0.027	0.607
2014	0.033	0.008	0.201
2015	0.035	0.008	0.184

Table 11 : Calculating the Relative Closeness to the Ideal Solution

Sixth step: Rank the alternatives starting from the value that has the highest RC+ and then in decreasing order. In other word, the best year is that has the higher RC+ value. By applying this step, one can understand that 2011 is the best year for Kuveytturk bank during the 5 years, because it has the highest value of Relative Closeness which is 0.766. However, this is the result of only one bank, by doing all above steps from 1 to 6 to all banks; we will have the best year for all banks in this article. The final result of doing that can be seen in table 12 below.

Banks	2011	2012	2013	2014	2015
Ziraat	X	X	Best	X	X
Isbank	X	Best	X	X	X
Deniz	Best	X	X	X	X
Finans	Best	X	X	X	X
Seker	X	X	X	Best	X
Alternatif	X	X	X	Best	X
Baraka	X	X	Best	X	X
Kuveytturk	Best	X	X	X	X
Turkiyefinans	Best	X	X	X	X

Table 12 : The Best Years of All Banks Using TOPSIS

In table 12 above, it can be seen that 2011 is the best year for 4 banks, 2 Islamic banks and 2 Conventional banks, in 2012 is the best year for only 1 bank which is a Conventional bank and no Islamic bank has reach the best year in 2012. The year 2013 is the best year for 2 banks, one of them is Islamic bank and the other is conventional bank. While 2014 is the best year for 2 banks both of them are Conventional banks. However, in 2015 no bank has record this year as the best year. By regrouping all these banks and the best year of each bank under two categories; Islamic banks and conventional banks, one can understand that 2 is the maximum frequency number of Islamic banks that are ranked 2011 is the best year as it is shown in table 13 below. While the maximum frequency number of the conventional banks is also 2, in such case it can be understand that 2011 and 2014 are the best years for Conventional banks by using TOPSIS method with each bank alone.

Banks	2011	2012	2013	2014	2015
Freq conventional	2	1	1	2	0
Freq islamic	2	0	1	0	0

Table 13 : Result of Using TOPSIS Method with Each Bank Alone

From above table 13 the final result of using TOPSIS method by considering each bank alone and then regrouping them all into two categories, it can be seen that 2011 is the best year for Islamic banks, 2011 and 2014 are the best years for Conventional banks.

3.2.2. TOPSIS Method with all Banks together Approach

In this section, all the previous steps of TOPSIS method with each bank alone is being used here but instead of calculating each bank alone, all banks will be calculated together to reach the final result of TOPSIS method with all banks together as table 14.

Bank	2011	2012	2013	2014	2015
Ziraat	X	X	X	X	Best
Isbank	X	Best	X	X	X
Deniz	Best	X	X	X	X
Finans	Best	X	X	X	X
Seker	X	Best	X	X	X
Alternatif	X	X	X	Best	X
Baraka	Best	X	X	X	X
Kuveytturk	Best	X	X	X	X
Turkiyefinans	Best	X	X	X	X

Table 14: All Banks Using TOPSIS All Banks Together

In table 14 above, it can be seen that 2011 is the best year for 5 banks, 3 of them are Islamic banks and 2 Conventional banks, in 2012 is the best year for 2 banks both of them are conventional banks and no Islamic bank has reach the best year in 2012. In 2013 no bank has recorded this year as the best year. While 2014 is the best year for only 1 bank which is conventional bank. However, in 2015 is also the best year of only one bank which is a Conventional bank. By regrouping all these banks and the best year of each bank under two categories; Islamic banks and conventional banks, one can understand that 3 is the maximum frequency number of Islamic banks that are ranked 2011 is the best year as shown in table 15 below. While the maximum frequency number of the conventional banks is also 2, in such case it can be

understand that 2011 and 2012 are the best years for Conventional banks by using TOPSIS method with all banks together approach.

Bank	2011	2012	2013	2014	2015
Freq of conventional	2	2	0	1	1
Freq of Islamic	3	0	0	0	0

Table 15 : Result of Using TOPSIS Method with All Banks Together

From above table 15 the final result of using TOPSIS method by considering all banks together approach and regrouping them all into two categories, it can be seen that 2011 is the best year for Islamic banks, while 2011 and 2012 are the best years for Conventional banks. Furthermore, from the result of step (6), it can be found the best bank's performance regarding the total value for each bank as it shown in table 16 below.

Order	Banks	Total	Type
1	Deniz11	0.908	Conventional
2	Isbank12	0.754	Conventional
3	Ziraat15	0.739	Conventional
4	Ziraat13	0.732	Conventional
5	Turkiyefinans11	0.693	Islamic
6	Isbank13	0.675	Conventional
7	Ziraat14	0.674	Conventional
8	Finans11	0.668	Conventional
9	Baraka11	0.660	Islamic
10	Baraka13	0.649	Islamic

Table 16 : Top 10 Best Performance of Banks Using TOPSIS Method

4. Result of All Methods

The final result of used methods in above steps can be seen in table 17 below, as MAUT method with each bank alone approach and with all banks together approach, also TOPSIS method with each bank alone approach and with all banks together approach.

Banks	MAUT		TOPSIS	
	All	Each	All	Each
Ziraat	2013	2013	2015	2013
Isbank	2012	2012	2012	2012
Deniz	2011	2011	2011	2011
Finans	2011	2011	2011	2011
Seker	2012	2012	2012	2014
Alternatif	2014	2014	2014	2014
Baraka	2013	2013	2011	2013
Kuveytturk	2013	2011	2011	2011
Turkiyefinans	2011	2011	2011	2011
Freq Islamic	2	2	3	2
Freq conv	2	2	2	2
Best Islamic	2013	2011	2011	2011
Bset conv	2011, 2012	2011, 2012	2011, 2012	2011, 2014

Table 17 : The Final Result of All Methods

It concludes from all methods that best year for Islamic banks is 2011; only in MAUT method with all banks together approach shows that best year is 2013. While in conventional banks, regarding all methods used, it can be figure out that best performance year are 2011 and 2012 only when using TOPSIS method with each bank alone approach shows that best years are 2011 and 2014. In addition to that, there is another final result to see the top 10 best performance of banks during the period from 2011 to 2015.

Rank	MAUT		TOPSIS	
	Bank	Type	Bank	Type
1	Deniz11	Conv	Deniz11	Conv
2	Ziraat13	Conv	Isbank12	Conv
3	Turkiyefinans11	Islamic	Ziraat15	Conv
4	Ziraat15	Conv	Ziraat13	Conv
5	Isbank12	Conv	Turkiyefinans11	Islamic
6	Turkiyefinans12	Islamic	Isbank13	Conv
7	Isbank13	Conv	Ziraat14	Conv
8	Baraka13	Islamic	Finans11	Conv
9	Kuveytturk13	Islamic	Baraka11	Islamic
10	Turkiyefinans13	Islamic	Baraka13	Islamic

Table 18 : Top 10 Banks Using MAUT and TOPSIS Methods

From the table 18 above, it can be seen that the top 5 banks are the same banks with different order, these banks are: Deniz bank 2011, Ziraat bank 2013, Turkiyefinans bank 2011, Ziraat bank 2015, and İsbank 2012.

5. Conclusion

The main aim of this research is to evaluate business performance of conventional and participation banks during the period 2011-2015 by using equally weighted MAUT and TOPSIS methods. It is useful to understand whether banks performances are similar in the same or following years during the period. The sample consists of 5 years of data from 2011 to 2015 of 9 banks from the official annual financial reports for each bank. To rank the years from best year to worst year of each bank according to their performance; first the most common five financial ratios are calculated for each banks during 5 years, then applying the MAUT and TOPSIS methods to those indicators. In other words, regarding each bank's five ratios, years were ranked from best to worst using TOPSIS and MAUT methods taking account of equally weighted. In this research, the calculation of each method has been done with two approaches; the first approach is by calculating with each bank alone, while the second approach is by calculating with all banks together. To determine the best years of both Islamic and Conventional banks, all banks of the same type are grouped and maximum frequency of each group is shown as the best year of performance.

The result of using MAUT method equally distributed weights with considering each bank alone approach shows that the best performance for Islamic banks is 2011, while the years of best performance for conventional banks are 2011 and 2012. According to the results of using MAUT method with considering all banks together approach shows that the best year for Islamic banks is 2013, while the best years for Conventional banks are 2011 and 2012. On the other hand, the result of using TOPSIS method equally distributed weights with considering each bank alone approach shows that the best performance for Islamic banks is 2011, while the years of best performance for conventional banks are 2011 and 2014. According to the results of using TOPSIS method with considering all banks together approach shows that the best year for Islamic banks is 2011, while the best years for Conventional banks are 2011 and 2012. In the MAUT and TOPSIS methods with two approaches, the result of best year of Islamic bank is 2011 but only in MAUT method with all banks together approach, the best year is 2013. However, the Conventional banks have the same best years which are 2011 and 2012 but only in TOPSIS method with each bank alone approach, instead of 2012 the best year is 2014.

The final findings of this research used MAUT and TOPSIS methods with each bank approach and all banks together approach. The result showed the best performance of all selected Turkish banks occurred in 2011 for Islamic banks, 2011 and 2012 for Conventional banks, and it is not highly affected by the method is used; it might have different findings using a higher number of banks, a different period, or applying other methods.

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