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A Method Based on Wavelet Denoising and DTW Algorithm for Stock Price Pattern Recognition in Tehran Stock Exchange

Rahim Ghasemiyeh *, Hasanali Sinaei,** Elnaz Ghalambor Dezfuli***

** Associate Professor of Management, Department of Management, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran. (Corresponding Author)*
*** Professor of Financial Management, Department of Management, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran.*
**** Master of Financial Management, Department of Management, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz. Iran..*

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CORRESPONDING AUTHOR'S:
Email:
r.ghasemiyeh@scu.ac.ir
0000-0002-1042-3918

Postal address:
Golestan street, Golestan, Department of Management, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Khuzestan, Postal code: 61357-93113, Iran

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ABSTRACT

The primary reason most people invest in stocks is the potential return compared to alternatives such as bank certificates of deposit, gold, and Treasury bonds. This requires accurate information about the stock market, price changes and predicting future trends. The main purpose of this study is to present a method based on wavelet denoising and dynamic time warping to identify the stock price pattern in the Tehran Stock Exchange. Instead of focusing and summarizing different and numerous methods to predict stock prices, this research concentrates on neural networks and wavelet denoising, and dynamic time warping to identify the stock price patterns. This methodology has been approved by researchers as a new effective technique. In this regard, first, using the wavelet denoising preprocessing step, noise is removed from the stock price time series, and then the extracted data was used as input to the dynamic time warping prediction model. MATLAB software version 9.11 was used to analyze the research data. The statistical population of the present study includes 3 shares among the shares of steel industry companies of Tehran Stock Exchange. The research was conducted in the period 2016 to 2020. The results show that the predictions obtained from the dynamic time warping method equipped with the wavelet denoising preprocessing step in comparison with the predictions obtained from the dynamic time warping method without the wavelet denoising preprocessing step in the sample, have been associated with much less accuracy and error.

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1- INTRODUCTION

Achieving economic growth and development in the country requires continuous monitoring and control of financial markets. In economic literature, financial markets as the flow of financial resources from non-productive sectors to productive play a vital role in economic growth, job creation, investment, stabilization of monetary and financial variables and overall improvement of society's welfare(Jafari Samimi & Baloonejad, 2013). Facilitating economic activities at the world level greatly increases the importance of these markets (Zolfaghari, 2018).

The financial system of each country is responsible for transferring savings and allocating them as investment resources. The role of the financial subsystem is to transfer funds from units with surplus to those with a lack of funds (Mohammadi, Mosleh Shirazi, Abbasi, & Akhlaghpour, 2019). In a general classification, financial markets are divided into two categories: money and capital markets. The stock exchange is an organized and formal capital market in which buying and selling of shares or government bonds or bonds related to reputable private institutions is done under certain rules and regulations (Feghehmajidi. Ali & Shahidi.Fariba, 2018). The capital market by providing features such as low transaction costs, appropriate dissemination of market information and clarification in this area, attracting harmful liquidity in other parallel markets, assigning returns to investors in appropriate risk, increasing liquidity and facilitating securities exchanges (Osoolian & Koushki, 2020). The stock exchange is the most important pillar in attracting and properly organizing financial resources in the country. In most countries the stock exchange has two important functions. As a ready market for securities, it ensures their liquidity and thus encourages people to channel savings into corporate investment.

For this reason, it is of particular importance to create conditions where investors would have a wide range of investment products to choose from (Sadeghi & Beheshti Tabar, 2019). Every conscious

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decision depends on a forecast of its consequences. In a general definition, forecasting means the possible estimation of future events based on present and past information (Khaidem, Saha, & Dey, 2016).

Forecasting changes in company stock prices is one of the most important measures in financial markets. Researchers consider it a big challenge to predict how the stock market will move (Asadi et al.,2023). This has attracted the attention of researchers and policymakers in the last two decades. They use these forecasts in evaluating and pricing assets, optimal allocation of financial resources, and evaluation of risk management performance. The dynamic nature of stock markets means the price of traded shares can change quickly(Hoseeini Ebrahimabad, Jahangiri, Ghaemi Asl, & Heydari, 2020). The purpose of forecasting in the stock market is to determine the direction of the future movement of stocks. The more correct this prediction is, the more profit investors will get. Considering the significant amount of investment in the stock market, the lack of knowledge and sufficient details can lead to significant losses (Rezagholizadeh et al., 2023).

Since stock market data is generated periodically, it is considered time-series data. For stock prices, time series forecasting is common to track the price movement of the security over time (Bao, 2008).

The purpose of this research is to compare different stock price forecasting methods and determine the most effective ones. For a long time, in scientific and professional circles, the use of non-classical methods to identify the model and predict the behavior of complex systems has become common and usual.

In many complex and non-linear systems, whose modeling, prediction, and control through classical and analytical methods seem very difficult and sometimes even impossible (Ghasemiyeh et al.,2017 & Ghasemiyeh et al., 2024), the use of non-classical methods with

features such as intelligence will be desirable (Asgari Oskoei, 2002; Shojaei & Heidarzadeh Hanzaei, 2021; Tehrani, Mohammadi, & Mohamadalizadeh, 2011).

The research and studies carried out so far in the field of stock price modeling and forecasting have mostly been based on the proof of this hypothesis that the changes in stock prices and returns in the Tehran Stock Exchange, despite being very similar to random behavior, it was not accidental, but rather chaotic (Raoofi & Mohammadi, 2018). Therefore, short- and medium-term modeling and forecasting can be performed using complex and powerful models such as neural networks, fuzzy networks, etc. (Khaloozade. H & Khaki Sedigh, 2005). In contrast to the other current survey studies that concentrate on summarizing many methods used for forecasting the stock market, this research concentrates on neural networks and wavelet denoising, and dynamic time warping to identify the stock price patterns.

1-1- Research Hypothesis

In order to achieve the goals of the research, two hypotheses have been proposed and tested:

1) The method based on wavelet denoising, and dynamic time warping is able to estimate the stock price and provide an effective model to identify the price trends of the companies accepted in the Tehran Stock Exchange.

2) Applying wavelet denoising pre-processing step removes noise from time series signals and has a direct relationship with increasing accuracy and reducing error in price prediction by dynamic time warping method and recognition of stock price pattern.

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2- METHODOLOGY

The required data has been collected from the website of the Tehran Stock Exchange Organization. Excel software was used to categorize the research data and MATLAB version 9.11 software was used to analyze the research data. Basic metal such as steel and copper in Iran constitute the most important part of the country's non-oil exports. This industry in Tehran Stock Exchange also has the highest correlation with the stock index. About 15% of the total value of the Tehran Stock Exchange is owned by the Basic Metals Group, and the Isfahan Mobarake Steel, Khuzestan Steel, and Khorasan Steel companies have the largest share of the total capital market value, respectively, compared to other Metals Group companies. As a result, among other industries active in the Tehran Stock Exchange, the basic metals industry and among the shares of companies active in the metals industry, the aforementioned 3 shares were selected as the statistical population of the research. The required data, 1300 data for each company, were collected during a four-year period. Also, the K-fold method has been used to divide the stock transactions of each company into training and test sections.

2-1- Wavelet Transform

The wavelet transform decomposes the signal into a weighted linear combination of a set of parent wavelet functions and mother wavelet functions. So that the mother and father wavelet functions (scale functions) are orthogonal functions that divide the function space into a series of orthogonal low and high-frequency spaces(Leal, Costa, & Campos, 2019). Therefore, after applying the wavelet transformation to the signal, we are faced with four coefficients, two of which are known as approximate coefficients and the other two are partial coefficients. Approximate coefficients contain low-frequency information, which are the same coefficients resulting from the functions of the parent wavelet, and partial coefficients contain high-frequency information, which are the same coefficients resulting from the transformation of the mother wavelet.

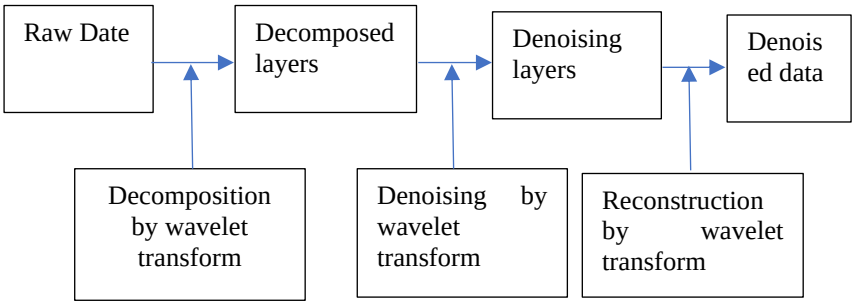

Figure 1. Denoising by wavelet transform
Source: Result Research

Wavelet transform can be considered as a piece-by-piece decomposition of information in a time series. In this process, the primary information is first decomposed into layers by wavelet transformation, which is called function decomposition (Paliwal, Choudhur, & Govandhan, 2014). Each part of the decomposed signal can be considered as a wavelet coefficient and a scaling coefficient. In wavelet analysis, data is divided into two groups with high and low frequencies. By applying the father wavelet on the original data, low-frequency data is obtained, which determines the main characteristics of that data. By applying the mother wavelet to the original series, high-frequency data is obtained, which is called noise. In fact, the main purpose of wavelet decomposition is to separate the main features of the series from the noise (Cottis, Homborg, & Mol, 2016). After removing the noise from the time series, the denoised layers are reconstructed using wavelet transform and the denoised data is extracted the denoised data is extracted (RAEI, MOHAMMADI, & FENDERESKI, 2015).

In this research, the discrete Mallet wavelet and Butterworth[1] transform are used to extract the average phase and amplitude with application in removing noise from time series signals of stock trading.

[1] butterworth

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For two-dimensional signals, the function f(x,y), the decomposition formula is:

(1) $$C_{n,m}^{j} = \frac{1}{2}\sum_{k,j\in Z} \overline{h}_{k-2,n}\, \overline{h}_{j-2,m} C_{k,j}^{j-1}$$

(2) $$d_{n,m}^{j1} = \frac{1}{2}\sum_{k,j\in Z} \overline{h}_{k-2,n}\, \overline{g}_{j-2,m} C_{k,j}^{j-1}$$

(3) $$d_{n,m}^{j2} = \frac{1}{2}\sum_{k,j\in Z} \overline{g}_{k-2,n}\, \overline{h}_{j-2,m} C_{k,j}^{j-1}$$

(4) $$d_{n,m}^{j3} = \frac{1}{2}\sum_{k,j\in Z} \overline{g}_{k-2,n}\, \overline{g}_{j-2,m} C_{k,j}^{j-1}$$

Where $C_{n,m}^{j-1}$ represents the approximate information in the signal with the scale of 2^{j-1} and $C_{n,m}^{j}$represents the approximate information in the signal with the scale of 2^{j} (LL), and $C_{n,m}^{j}$ represents the approximation of the horizontal direction and the partial vertical component of the signal dimension (LH). $d_{n,m}^{j2}$ represents the horizontal part of the signal with dimension 2^{j} and the approximate part in the vertical direction (HL part). $d_{n,m}^{j3}$ represents the diagonal part of the partial component in the signal dimension (HH part). The signal reconstruction formula will be as follows:

(5) $$C_{n,m}^{j-1} = \frac{1}{2}\sum_{k,j\in Z} C_{k,j}^{j} h_{n-2k}\, h_{m-2k} + d_{k,j}^{j1} h_{n-2k} g_{m-2k} + d_{k,j}^{j2} g_{n-2k} h_{m-2k} + d_{k,j}^{j3} g_{n-2k} g_{m-2k}$$

Where h and g represent the coefficients of the low-pass and mid-pass filters, respectively (Mallat, 2009).

2-2- Dynamic time warping

In time series, dynamic time warping is an algorithm for measuring the similarity between two time sequences that may differ in speed or time(Han et al., 2020) . For example, DTW can find the similarity between two walking patterns even if their walking speed or acceleration is not the same in time intervals (Kim et al., 2018). In fact, DTW can analyze any data that can be obtained as a sequence of information (Izakian, Pedrycz, & Jamal, 2015). In general, DTW is a

method that finds the most optimal matching between two time sequences with certain constraints (Myers, Rabiner, & Rosenberg, 1980). The dynamic time warping approach calculates the best mapping between two time series according to the dynamic changes of time (Jiang et al., 2020).

To better understand how this method works, consider two time series in the form $A = \{a_1, a_2, a_3, \dots, a_i, \dots, a_n\}$ and $\{b_1, b_2, b_3, \dots, b_j, \dots, b_m\}$. At first, we form the matrix dist(m,n) in such a way that each element of dist(i,j) represents the square of the Euclidean distance between two points ai and bj in two time series which is obtained from the following relationship:

(6) $$\text{Dist}(i, j) = (a_i - b_j)^2$$

$P = \{p_1, p_2, p_3, \dots, p_k, \dots, p_K\}$ shows the matching path between two time series A and B, where K represents the length of the path and applies to the inequality Max(n,m) < K < n+m+1. Also, the kth element represents the relationship between two corresponding points in the two time series under investigation. This matching path is limited to the following conditions:

1) Boundary condition: The starting point of the path corresponds to the first point of the two time series and the end point of the path corresponds to the end point of the two time series and these points correspond to the beginning and end points of the dist(m,n) matrix. In other words, it can be said that $p_1 = [1,1]$ و $p_k = [m, n]$.

2) Continuity condition: The matching path between two time series is continuous and without jumps. Therefore, the specified points in this path are adjacent and in the dist(m,n) matrix, they move only along the diagonal, horizontal and vertical lines without jump. Considering $p_k = [i_k, j_k]$ and $p_{k-1} = [i_{k-1}, j_{k-1}]$ و the following two inequalities will be established.

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(7) $$i_k - i_{k-1} \leq 1$$

(8) $$j_k - j_{k-1} \leq 1$$

3) Uniformity condition: The matching path of two time series in each step is progressive in at least one of the time series and fixed or progressive in the other and cannot go back. Considering $p_k = [i_k, j_k]$ and $p_{k-1} = [i_{k-1}, j_{k-1}]$ this condition will be established if the following two inequalities are established:

(9) $$i_k \geq i_{k-1}$$

(10) $$j_k \geq j_{k-1}$$

4) Warping window width: In finding the best route, it should be noted that the optimal route is one whose deviation from the diameter of the matrix is not large. To achieve this condition, a number like k is determined as the width of the warping window, and the following inequality holds for all points of the route:

(11) $$|i_k - j_k| \leq k$$

In Figure 2, there are different matching paths for two time series with different lengths of 6 and 8. According to the matrices in Figure 1, the boundary condition is not established in the matching path specified in matrix A. In the path specified in matrix b, the continuity condition is not met. The selected matching path in matrix C does not satisfy the condition of uniformity, and also in matrix D, the swing window condition is not met, and finally, in matrix C, we have an optimal matching path that has all the necessary conditions.

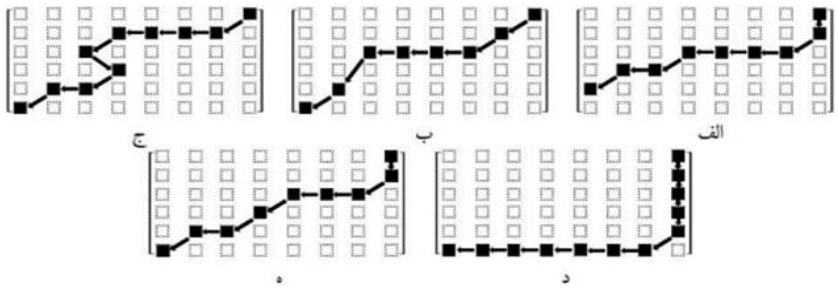

Figure 2. Different matching paths for two financial time series of lengths 6 and 8
Source: Result Resaerch

The optimal matching path is the shortest possible path, as a result of this path, taking into account the mentioned conditions, by minimizing the cumulative distance calculated using the following matrix:

(12) $$DIST_{DTW} = [min\{\sum dist(i_k, j_k)\}]^{\frac{1}{2}}$$

To find the minimum value of this function and as a result to achieve the optimal matching path by using the cumulative distance definition and using the $DIST_{m,n}$ matrix, the $D_{m,n}$ matrix must be formed in such a way that its dimensions are obtained from the following recursive relation:

(13) $$d(i,j) = dist(i,j) + min\{d(i,j-1), d(i-1,j), d(i-1,j-1)\}$$

After completing the above-mentioned matrix, the optimal path will be recursively obtained from the element d(m,n) to d(0,0) with the minimum distance criterion in each path and considering the mentioned conditions. Then according to the path obtained, in the matrix $D_{m,n}$and its corresponding rows in the matrix $DIST_{m,n}$, the elements of the matching path P are obtained (Sadeghi & Beheshti Tabar, 2019).

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2-3- Research variables

1) Opening Price: The first traded price in the current day
2) the highest price: the highest trading price of the share in the current day
3) Lowest price: the lowest price of the share transaction in the current day
4) Closing price: the last trading price of the share in the current day
5) Closing price: the weighted average of all the prices that each share was traded in the current day.

3- FINDINGS

3-1- Data analysis and findings

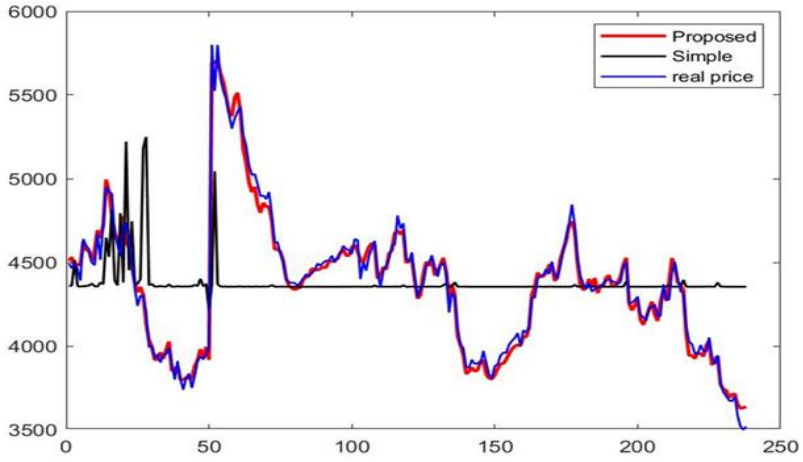

Figure 3. Forecast chart of Mobarake steel price trend in Isfahan in the proposed method and the compared method
Source: Result Resaerch

Figure 3 shows the forecast trend of Isfahan Mobarakeh Steel Company stock price, that the proposed method (red line) is exactly on the actual price chart (blue line). This shows the high accuracy of the proposed research method (dynamic time warping equipped with wavelet denoising step). However, the prediction of the price trend according to the compared method (black line), the dynamic time convolution method without wavelet denoising step, has low power and the predicted trend is not in accordance with the actual price trend.

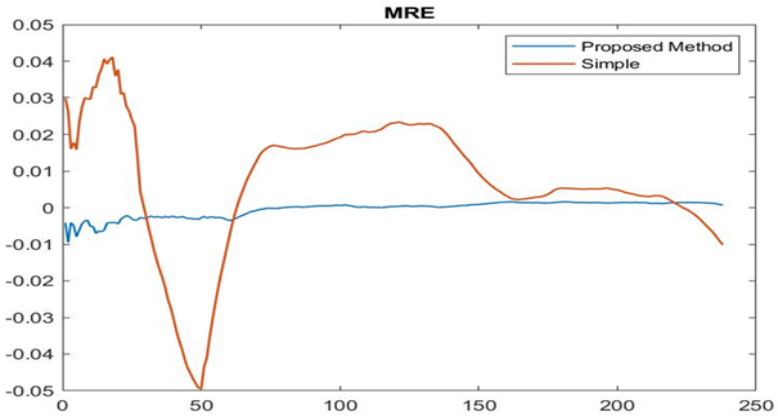

Figure 4. The average relative error of forecasting Mobarake steel in Isfahan in the proposed method and the compared method
Source: Result Resaerch

Figure 4 shows the average relative error of forecasting the share price of Isfahan Mobarakeh Steel Company, which according to the proposed method (blue line), was almost equal to zero during the entire test period and was associated with very little fluctuation around the zero axis, but in the compared method (orange line), the average amount of relative error is very high and in the range of -0.05 to 0.04, it has faced severe fluctuations.

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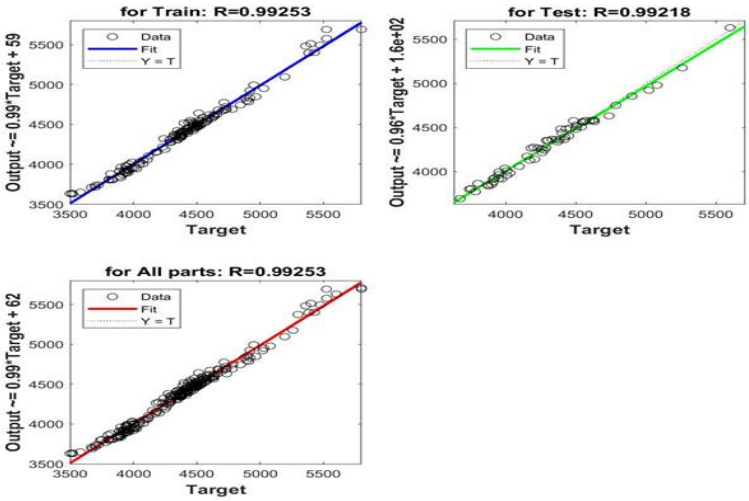
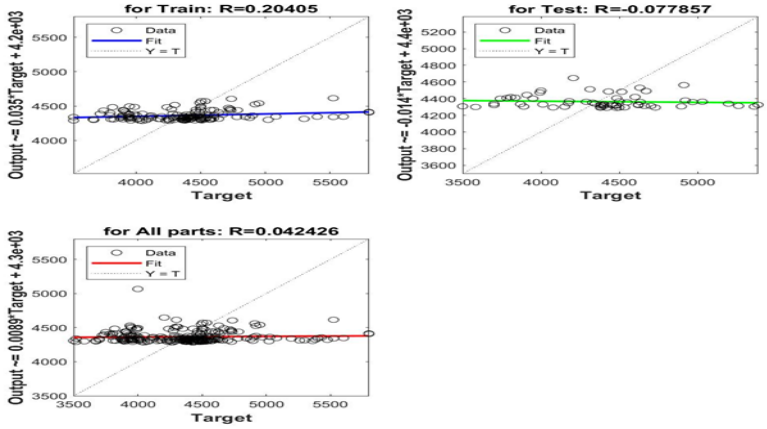


Part A.

Figure 5. Regression analysis of Isfahan Mobarake steel stock price trend in the proposed method

Source: Result Resaerch



Part B.

Source: Result Resaerch

Figure 5 shows the results of the regression analysis of the prediction of the stock price trend of Isfahan Mobarakeh Steel Company, which according to the proposed method (Figure A) in the training section, test and both sections indicates 99% accuracy, but according to the compared method (Figure b) indicates 20% accuracy in the training section, 7% accuracy in the test section and 4% accuracy in both sections. Therefore, this analysis shows that it is possible to trust the results of stock price predictions in the coming years through the proposed method in this research.

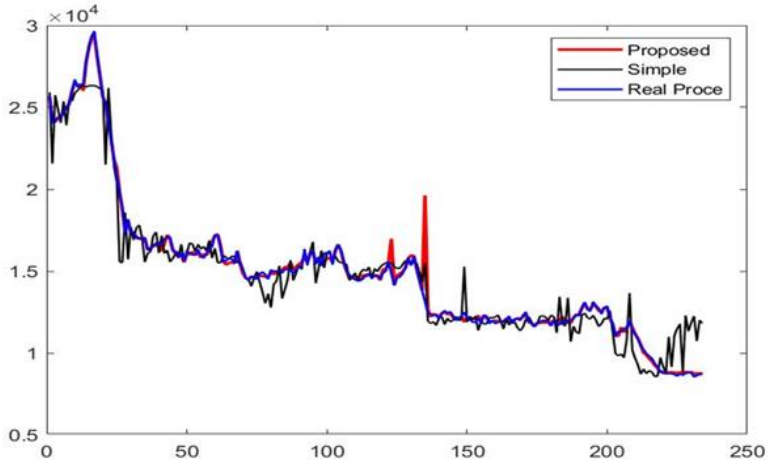


Figure 6. Forecast chart of Khorasan steel company's stock price trend in the proposed method and the compared method
Source: Result Resaerch

Figure 6 shows the prediction of the stock price trend of Khorasan Steel Company that the price prediction trend in the proposed method (red line) is completely consistent with the actual price trend (blue line) and the price prediction trend in the compared method (black line) is also very close to the real price trend.

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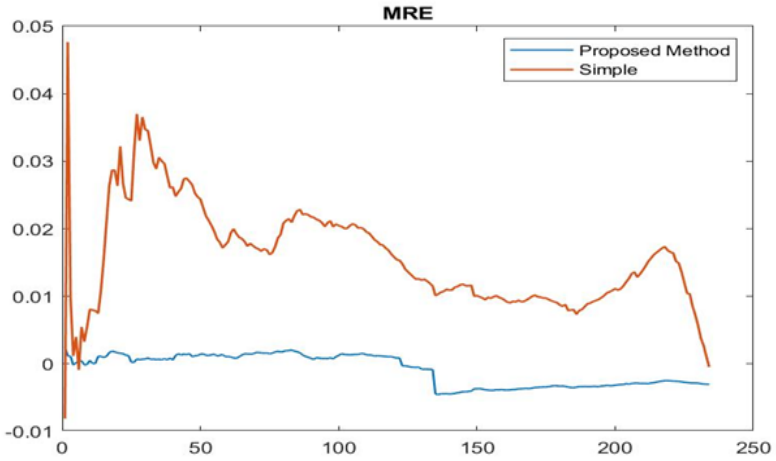
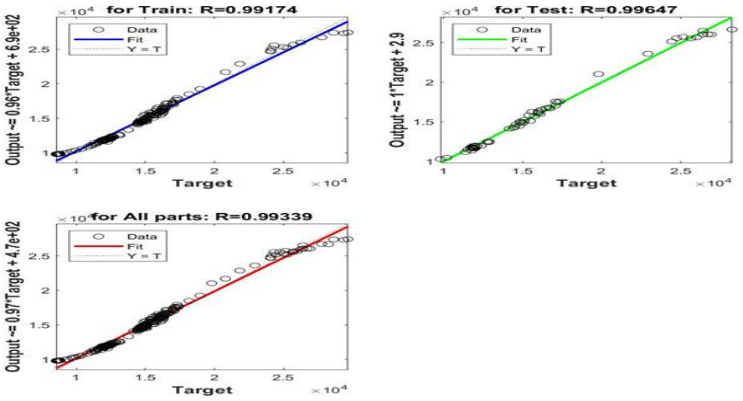


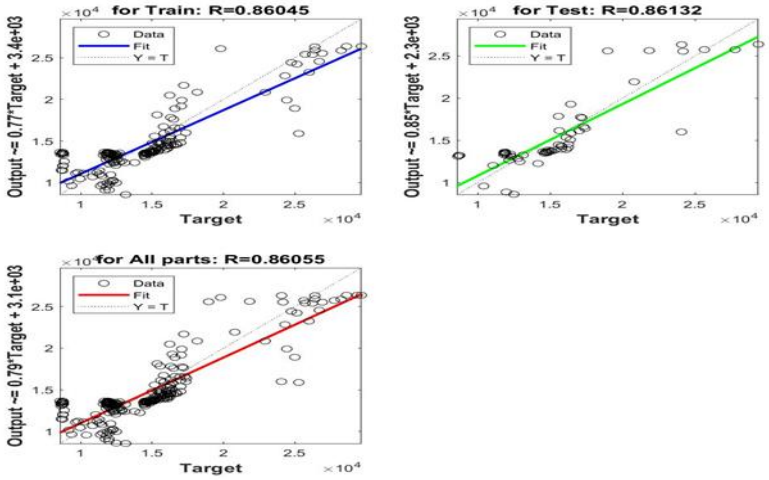
Figure 7. The average relative error of prediction of Khorasan Steel Company in the proposed method and the compared method
Source: Result Resaerch

Figure 7 of the average relative error of Khorasan steel company's prediction for the proposed method (blue line) and the comparison case (orange line) shows that the proposed research method has faced a very small fluctuation in the range between -0.01 and 0. So that in the beginning to the middle of the investigated range, the error rate was close to zero and after that the error tended to be -0.01, but in the compared method, the fluctuations are still very high and vary in the range of -0.01 to 0.05.



Part A.

Figure 8. Regression analysis of stock price trend of Khorasan steel company in the proposed method
Source: Result Resaerch



Part B.
Source: Result Resaerch

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Figure 8 the regression analysis of the stock price forecast of Khorasan Steel Company according to the proposed method (Figure A) in the training section, test and both sections, shows 99% accuracy. Therefore, this analysis shows that it is possible to trust the results of stock price predictions in the coming years through the proposed method in this research. The regression of predicting the stock price trend of Khorasan steel company according to the compared method, which is shown in part b, indicates an accuracy of about 86% for the educational, test and both parts of the stock transactions.

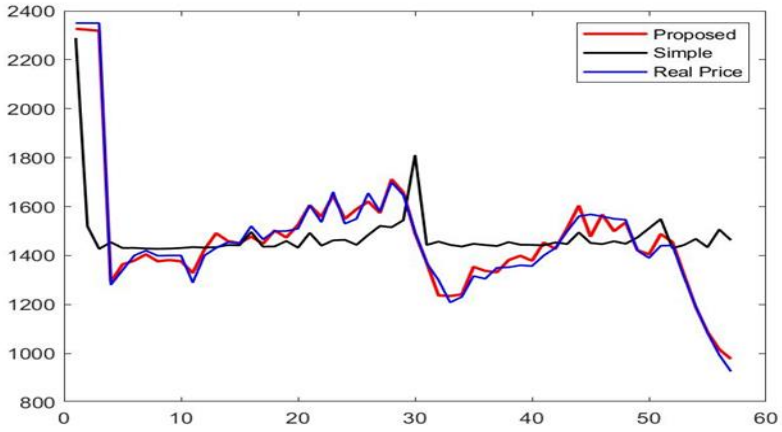

Figure 9. Chart of forecasting process of stock price of Khuzestan Steel Company in the proposed method and compared method
Source: Result Resaerch

Figure 9 shows the stock price trend of Khuzestan Steel Company that the price trend according to the proposed method (red line) is very close to the actual stock price trend (blue line), but according to the compared method (black line), it is with the actual price trend It does not correspond much, which reveals the low accuracy of the prediction with the mentioned method.

The compared method shows a trend with very low and almost constant price fluctuations in the entire range of the test in 2018, with

the exception of high fluctuations in the beginning and middle of 2018, which is not consistent with reality.

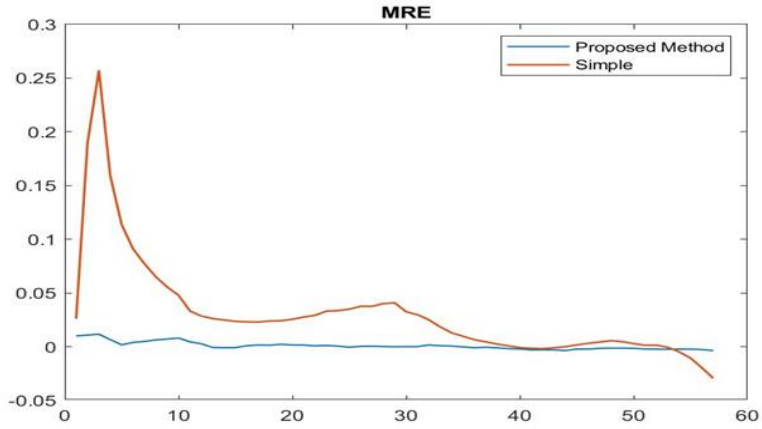

Figure 10. The average relative error of stock price prediction of Khuzestan Steel Company, the proposed method and the compared method
Source: Result Resaerch

Figure 10 indicates the average relative error of forecast of Khuzestan Steel Company according to the proposed method (blue line) and the comparison case (orange line). The figure indicates that the proposed research method has still lead a very low error and the error has fluctuated in the range of 0 to 0.01 and until the end of the test range, it has faced an error of almost 0 in price prediction. But in the compared method, the fluctuation of the error is variable in the range of -0.03 to 0.26, so that in the beginning of 2018, the prediction error of the price trend is very high compared to the middle to the end of 2018.

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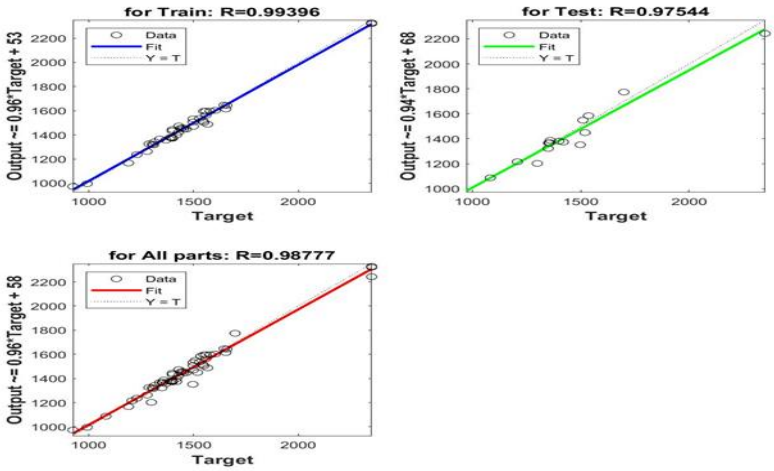
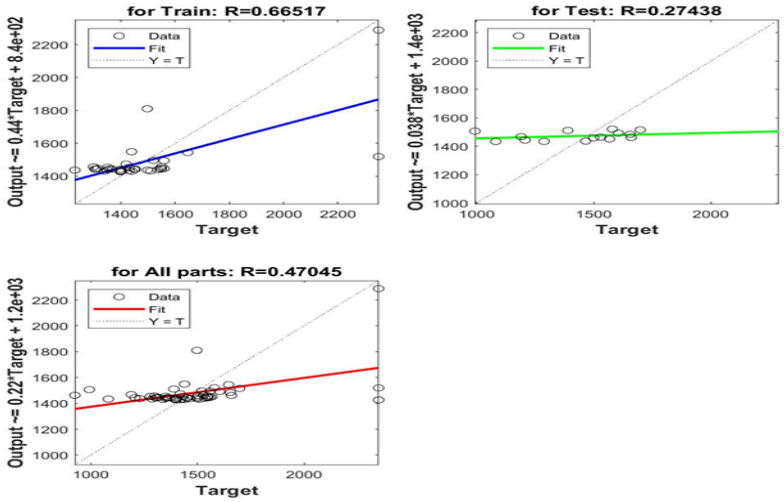


part A.

Figure 11. Regression analysis of Khuzestan steel stock price trends in the proposed method
Source: Result Resaerch



Part B.
Source: Result Resaerch

Figure 11 shows the results of the regression obtained from the trend of stock price forecasting in Khuzestan Steel according to the proposed method (Part A) and the compared method (Part B). The regression analysis of the forecasting of the Khuzestan Steel Company's stock price trend in the proposed method shows an accuracy of 99% for the stock transactions of the educational sector and 97% for the stock transactions of the test sector and 98% for the stock transactions of both sectors. Therefore, this analysis shows that it is possible to trust the results of stock price predictions in the coming years through the proposed method in this research.

Part B shows the regression analysis of the Khuzestan steel price trend prediction in the compared method, which indicates 66% accuracy for the educational sector stock transactions, 27% accuracy for the test sector stock transactions, and 47% accuracy for the stock transactions at the both parts.

4- CONCLUSION

Global changes in financial markets and dynamic business uncertainties have become a driving force for accurate prediction of price trends in financial markets. Forecasting stock prices in the stock exchange allows investors to make timely and informed decisions about buying or selling stocks, thus reducing the financial losses of investors.

Therefore, in this research, due to the problems in predicting stock prices using the simple dynamic time convolution method (without wavelet denoising), the wavelet denoising approach was used as a pre-processing step. In contrast to the other current survey studies that concentrate on summarizing many methods used for forecasting the stock market, this research concentrates on neural networks and wavelet denoising, and dynamic time warping to identify the stock price patterns. There are many smart techniques, each of which has advantages and disadvantages, one of the new smart methods that has

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better results than some other methods is the dynamic time warping (DTW).

The proposed framework started with the pre-processing step of wave denoising in order to reduce the examples of useless transactions and remove noise from the trading signals of the shares of the three companies Mobarake Isfahan Steel, Khorasan Steel and Khuzestan Steel.

Then, the prediction of trading signals was modeled with dynamic time warping problem. At the end, the results obtained from the dynamic time warping method with the preprocessing step of wavelet denoising and the results obtained from the simple dynamic time warping method without wavelet denoising were compared.

The statistical population of the present study includes three shares among the shares of companies operating in the Tehran Stock Exchange (Mobarakeh Steel of Isfahan, Khuzestan Steel, Khorasan Steel). The reason for this choice is that about 15% of the total value of the Tehran Stock Exchange is owned by the basic metals group. These three companies have the largest share of the total value of the capital market, respectively, compared to other companies of Metals Group. As a result, among other industries active in the Tehran Stock Exchange, the basic metals industry and among the shares of companies active in the metals industry, the aforementioned 3 shares were selected as the statistical population of the research.

In this study, a method based on wavelet transform and dynamic time twist (DTW) were used to identify the stock price pattern in the Tehran Stock Exchange. In other words, first the wavelet transform method is used to smooth the main stock price chart; then, using the DTW algorithm to find the diagram with the shortest distance from the target diagram under the roller window method, the identification and analysis of the target diagram can be accomplished.

The results indicate that: the forecasting chart of the stock price trend of Mobarakeh Steel Company of Isfahan in the proposed method was very consistent with the real price chart, which shows the high accuracy of the proposed research method, but the forecasting of the

price trend for the compared method is the time twist method. Dynamics without wavelet defrosting step have low power and the predicted trend does not correspond to the real price trend. In general, the results of the findings indicate the high accuracy and reliability of the stock price prediction of the studied steel companies.

The average relative error rate of prediction of stock price of Mobarakeh Steel Company of Isfahan for the proposed method was almost zero during the whole test period and was accompanied by very little fluctuation around axis 0, but in the comparative method, the average relative error rate was very high. And has been associated with severe fluctuations in the range of -0.05 to 0.04. Also, the results of regression analysis predict the stock price trend of Mobarakeh Steel Company of Isfahan for the proposed method in the training section, test and both sections show 99% accuracy, and for the comparative method, indicate 20% accuracy in the training section. Accuracy is 7% in the test section and accuracy is 4% in both sections.

The study of Khorasan steel for the proposed method and the method compared also shows the high accuracy of the proposed method. The forecast chart of the stock price trend of Khorasan Steel Company for the proposed method was in accordance with the real price trend and in the comparative method, the price chart is very close to the real price trend. The average relative error of forecasting the stock price of Khorasan Steel Company for the proposed method, has faced very little fluctuations and has been fluctuating in the range of -0.01 to 0, but according to the method compared, the fluctuations are very high and in the range of 0.01 - varies up to 0.05. Also, the results of regression analysis predict the stock price trend of Khorasan Steel Company based on the proposed method in the training, test and both sections, showing 99% accuracy, but based on the method compared, the accuracy is approximately 86% .

The stock price forecast chart of Khuzestan Steel Company for the proposed method is very close to the real stock price trend, but for the method compared, it does not correspond to the real price trend, which reveals the low accuracy of the forecast with this method. This

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indicates that in the study of Khuzestan steel, we are faced with high accuracy of prediction for the proposed method. The average relative error of forecasting the stock price of Khuzestan Steel Company for the proposed method was almost zero and fluctuated between 0 and 0.01 in the whole period, but in the comparative method, the error varies in the range of -0.03 to 0.026. The results of regression analysis predict the stock price trend of Khuzestan Steel Company for the proposed method in the training section shows 99% accuracy, in the test section 97% accuracy and in both sections, 98% accuracy, but in the comparative method, it shows 66% accuracy in the training section, 27% accuracy in the test section and 47% accuracy for transactions in both sections.

Changing the statistical population and using data from other groups (such as automobile industry) and using similar methods used in this article may be proposed as a proposal. It is also suggested to use other artificial intelligence methods such as neural networks in pattern recognition and stock price prediction in Tehran Stock Exchange.

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Analysis of the Position of the Developed Human Being in the Fundamental Transformation Document of Iran's Education System

Seyed Morteza Afghah*, Leili Nour Alizadeh**, Seyed Jalal Hashemi***, Abdolmajid Ahangari****

** Associate Professor of Economics, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran. (Corresponding Author)*
*** PhD student in Economics, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran.*
**** Assistant Professor, Educational Sciences and Psychology, Shahid Chamran University, Ahvaz, Ahvaz, Iran.*
***** Associate Professor of Economics, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran.*

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CORRESPONDING AUTHOR'S:
Email:
Email:m.afghah@scu.ac.ir
0000-0001-8903-6998

Postal address:
Golestan street, Golestan, Department of Economics, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Khuzestan, Postal code: 61357-93113, Iran

FURTHER INFORMATION:
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ABSTRACT

The purpose of this study is to analyze the concept of "developed man" and determine the degree to which attention is paid in the Fundamental Transformation Document (FTD) in education in Iran approved in December 2011. This concept has been developed based on the theoretical basics of classical economics on description of "economic man" and also the Engels's theory on the description of "modern man" and with regard to some of adapted and localized national and Islamic ideas and beliefs. What is meant by "Developed man" in this research is a person whose attitude and opinion has been developed and has the ability to turn the country's resources into wealth and prosperity for the people of society. The instrument by which one can measure it, is a researcher-made content analysis checklist that involves 25 characteristics for developed human, and its face reliability and validity have been also verified and ranked by subject matter experts. Shannon entropy indices have been used to determine the importance and ranking of developed human components. In order to achieve a valid explanation and transparent results in this study, some important and fundamental concepts and components that were analyzed in the literature reviewing this document and their frequency was determined, were selected, and their frequency was compared with the total frequency of developed human components in the transformation document text. By use of word-counting the whole text of the Fundamental Transformation Document of education system, it also became evident that only about 1% (113 words out of 10914 words available) of this 64-page document are dedicated to the components of developed human and as a result it can be said that with regard to the weight and importance of the economy and its related issues in the country (such as unemployment, weak attitudes and skills of wealth creation and lack of efforts to increase production and improve public living and poverty alleviation) from the leaders and policymakers viewpoint, especially. In recent decades, little emphasis and attention has been paid to developed human, and accordingly, it is worthwhile to pay close attention to these components in revision of the Transformation Document text.

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1- Introduction and problem description

Despite scientific advances and the expansion of social and economic knowledge, many countries have not been able to identify or overcome the forces inhibiting growth and development. All the factors that influence on growth and development, are not necessarily of economic type and in economic terms they are known as non-economic factors (S. M. Afghah, Ahangari, & Askari por, 2020).

Hozlitz believes that in addition to economic transformations, far-reaching changes are needed in all aspects of life. In response to the question, "Is economic development merely limited to changes in specific and apparent dimensions of behavior?", he states that:

I think that economic development, especially if it requires industrialization, is a rapid and (somehow) revolutionary process that, if it is considered to take root in a society, it must have wide and deep penetration and consequently affect its social and cultural structures. In other words, economic development not only involves a change in production techniques but also a change in orientations in social norms and values (Hoselitz, 1952).

Most of economists believe that development is a process during which the range of choices increases for human being (Baltes & Goulet, 1971). Arthur Lewis has a famous phrase that has been used in the writings of many later economists. The important thing about economic growth is that it gives man more power to control his environment, and with that dominance, the scope of his freedom expands, he says (Lewis, 1954). Walter Elkan has defined development as follows: Development is a process that increases an individual's well-being by expanding the scope of his/her choices. (Elkan, 1973).

Theodore Morgan quotes Bauer whilst supporting him as saying: Our criterion in judging economic development is that development has broadened the range of choices open to human beings (as consumers or producers). (Theodore J. Morgan,). But the scope for

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achieving such goals is not clearly measurable," Bauer himself says. (Bauer & Yanni, 1957: 151).

Seers has questioned three key features of development: The questions to ask about a country's development process are: What has happened to poverty? What has happened to unemployment? What has happened to inequality? If there has been a decline in all three, there is no doubt that development has taken place in the community in question. But if one or two of these three fundamental problems are worsened, especially if all three have worsened, it would be strange to call the result of this process development even if per capita income has increased (S. Afghah, 2021; Seers, 1969).

Gaulet also states three basic components or three core values as criteria for economic development. These three core values that are pursued as core goals by each individual or community are: livelihood, self-confidence and freedom. This attitude towards development seems to have been the beginning of a fundamental change in the definition of development and the introduction of non-economic concepts into this definition. In other words, this definition of development includes not only economic factors but also non-economic factors.

What is meant by "developed man" in this study is a person whose attitude and opinion has developed and has the ability to turn the country's resources into welfare for the people of society (similar to what in the theoretical foundations of economics as an entrepreneur or economic opportunity has been introduced). The conceptual framework of developed man is based on the theoretical foundations derived from classical economics in describing "economic man" and Alex Inkeles's theory in describing "modern man" which it is localized based on some characteristics and Iranian national and religious beliefs (S. Afghah, 2021; Inkeles, 1969).

Hence, several non-economic factors affect the economic behaviors of individuals that the educational system cultivates those factors. In educational systems, basic economic and social insights and

attitudes are transmitted to citizens through textbooks and teaching practices and classroom teachers. Thus, a search of the country's formal education resources can demonstrate whether these teachings can help nurture human beings who can contribute to the country's economic growth and development (hereinafter referred to as the developed human being). Therefore, the present study tried to provide an answer to the question: has ever proper attention been paid to the education of developed human beings in the fundamental transformation document of Iran's education system, as an upstream document of the country's education system. It should be noted that all textbooks of the academic years in the country's educational system are written and formulated based on that transformation document.

Since in the existing background, articles and researches similar to the title of the present research have not been obtained, the following refers only to researches that are methodologically similar to the present research:

Rozi talab et al (2023) examined the impact of good governance on income inequality in selected developing and developed countries with emphasis on corruption control. The results of the model estimate show that corruption control and the rule of law in both groups of countries in the 25th, 50th and 75th quarters have a positive, negative and meaningful effect on income inequality, respectively. Political stability also has negative effects in both groups of countries in 25 and 50 countries and positive and meaningful effects in 75 countries, as well as tax revenues, inflation rates and GDP per capita in these countries have different effects on income inequality in selected countries (Roozitalab, Abounoori, & Maddah, 2023).

Mansouri et al. (2022) have examined the simulation of the Human Development Index in Khuzestan province with emphasis on healthy living and access to knowledge and comparison with Iran. According to the results, the Human Development Index of Khuzestan province reached a high level from 1996 with a value of 0.64 from the average level in 2006 to 2016, which is an acceptable growth in this

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index. The Human Development Index without oil in Khuzestan province is also lower than the similar national index and shows the worse situation in Khuzestan province than in the country in this regard (Mansouri, Afghah, Aghaei Jannat-Makan, & sharifzadeh ahvazi, 2022).

Reza Vafaei et al. (2017) in an article entitled "Assessing the level of attention to the six constructs of educations in Fundamental Transformation Document in social studies textbooks for elementary school " using the content analysis method, showed that the scientific and technological dimensions with information load of 980 and importance factor of 178 has received the most attention. Meanwhile the economic and professional dimension with the information load of 733 and the importance factor of 133 has received the least amount of attention (Vafa'i, Fazlollahi Ghomshi, & Taleifard, 2017).

Najafi et al. (2015), in an article entitled "Explaining the dimensions and components of human spiritual growth and its analysis in the content of the Fundamental Transformation Document in Iranian education" using qualitative and documentary content analysis and Shannon entropy, found that spiritual growth has a total of 72 frequencies in the transformation document and among the components of spiritual growth, attention to the moral dimension with an information load of 0.839 and an importance factor of 0.373 has received the highest amount of attention, and the dimension of rationality with an information load of 0.670 and an importance factor of 0.298 had received the least amount of attention (Najafi, Vafaei, & Maleki, 2016).

Farahani et al. (2019), in an article entitled "Study of the place of Hayat Tayyeba in the Fundamental Transformation Document and explanation of the ways to achieve it in education system", with use of content analysis method, found that the frequency of the terms Hayat Tayyeba and righteous society in the philosophy of educations in Islamic Republic of Iran is 202 times, the frequency of the term Hayat

Tayyeba in the philosophy of formal and public education in the Islamic Republic of Iran is 57 times, and its frequency in the guidelines of the formal and public education system in the Islamic Republic of Iran is 71 times, which indicates the importance of Hayat Tayyeba in the fundamental transformation document of Iranian education system (farmahini farahani, hosseiniaee, & ahmad abadi arani, 2019).

2- Methodology

Quantitative content analysis method was used to answer the research question. Content analysis is the method of studying and analyzing relationships in an objective and quantitative systematic manner to measure variables, the steps of which involves preparing and organizing, reviewing and processing messages. Hence, once collected, data will be categorized and coded. The research analysis community is the eight chapters of the Fundamental Transformation Document in education system (approved by Secretariat of the Supreme Council of the Cultural Revolution, 2011).

Component coding and determination of indicators in this research has been done by box method, in which components are determined before conducting research. For this reason, it is also called a predetermined method (Nourian, 2010: 65). In this research, the theme is considered to be the unit of record, although attention has been paid to each word and phrase, but in the end, their content has been considered by the researchers of the present article. What is meant by theme, is a specific message that has been taken into account by the authors of the document. The counting method in this study is frequency (or number of counted components).

Data collection was done in two stages: first, determining the dimensions and components of developed human and ranking them in terms of effectiveness in creating the context of development followed by preparation of content review checklists.

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3- The components of developed human:

Based on the theoretical foundations of economic human and with regard to the three scopes of knowledge, attitude and skill, a set of components for developed human have been extracted and then ranked by experts. In order to perform content analysis, the initial 25-component set were transformed and subdivided into sub-components or objective and behavioral manifestations of developed human, and accordingly, in a transparent and operational manner, a content review checklist was formed. It should be noted that in the research, the same sub-components are examined and counted, whether they have appeared explicitly (finding the very same concepts) in the text of the transformation document or they have been mentioned based on the theme (**Tabel 1**).

Tabel 1. Description of components and sub-components of developed human according to some domain along with component ranking
Source: Research Result

Sub-component	Component	Rank of Components according to experts	Area
Giving importance and using advanced tools and technologies and new ideas in personal and social life. For example, having a bigger house, a better car.	Developed human casre about well-being and enjoyment in life and in general, material life.	1	Attitude
Searching new ways to earn and increase income, entrepreneurship and job creation.		11	
In general, he/she tries to make the most of the available facilities.		13	
He cares about his homeland and birthplace and serves the development of society. Respects the land, flag, cultural resources, native literature,	Developed human is a patriot and believes in a sense of patriotism as a	10	

celebrities and language of his nation and helps compatriot.	motivation to advance society.		
Tries to increase production and works hard and innovates to achieve it	Developed human pays attention to increase productivity and efficiency and seeks to find novel ways to do works.	3	
Seeks faster and more useful ways to get things done and avoid wasting time and resources.		12	
Tries to be the best at his job and duties.		8	
He does not leave his destiny to fate. He thinks, innovates and strives to improve his living conditions. He seeks to elevate its social class and avoids behaviors that do not contribute to progress or hinder the achievement of development goals.	Developed human runs counter to traditions that hinder progress and development	9	
Strives to use nature to increase its science and knowledge.	Developed man believes that man is able to overcome nature and must go through the steps of progress towards progress on a regular and continuous basis.	2	
Seeks continuous progress and never stops and does not settle for the acceptance of the status quo..		4	
Prefers larger amounts to less.	Man Development The finding is inherently extravagant: he tends to increase his well-being through work, effort, and investment.	5	
He saves and encourages others to save and avoid overconsumption. Uses capital and profits to reinvest.		6	

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He seeks practical and applied use of innovations in society.	Developed man believes in the importance of innovations and inventions in increasing the well-being of themselves and society.	7	
Tries to increase production and create new job opportunities that increase income and purchasing power and ultimately reduce poverty.	From a developed human viewpoint, poverty is reprehensible and seeks to reduce or eliminate it in society.	14	
Seeks to find ways to improve income distribution as well as apply appropriate tax methods to society to reduce poverty and inequality.		15	
attaches great importance to the preservation of man and all aspects of his existence, including: the provision of living needs, dignity, his time and place, his social, political and economic rights, his security and individual and social freedoms, and so on.	From a developed human point of view, man and all aspects of his existence (to us as human beings and regardless of his transcendental characteristics), is respected and honored.	16	
He gives importance to study science, expand research, improve the quality and quantity of educational centers and resources (such as textbooks and educational).	Developed human believes in science and knowledge as the only tool for the growth and development of the country.	17	
Preserves resources and strives to avoid wasting resources. He also tries to make better and more efficient use of available and scarce resources.	Developed human believes in the value of natural resources and the environment	18	
Gives importance to efficiency and improving the efficiency of production resources.		19	

He considers irrational capitals (crude natural resources, oil, etc.) as potential and attaches the greatest value and importance to his manpower and intellect	. Developed man knows that the only irreplaceable wealth of society is man and his intellect and innovations.	20	
It supports the products of human thought, including scientific inventions, and is of particular importance to scientists, inventors, creators, creative teachers, and scientific educators.		21	
He is the one who advises and supports productivity in production (in all three sectors of agriculture, industry and services).	Developed man knows the concept, value and importance of productivity.	22	Knowledge
He uses science and research to use nature to increase his well-being.	Developed human knows that the acquisition of science and knowledge is essential for the enjoyment of nature and the surrounding environment.	23	
He tries to teach the concept and importance of development to others.	The developed man has knowledge and awareness of the concept of development and cares about it.	24	
An individual is an investor or cares about investing in society.	Developed human is aware of the role of capital (human, physical and financial) in development.	25	
He is an educated person and calls others to acquire knowledge.	Developed human considers familiarity and mastery of knowledge and science necessary to achieve development.	Ranking of components according to experts	

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Reinvests investments.	Developed human draws attention to sufficient knowledge about the importance of the issue of capital accumulation (financial and physical).	1	
Supports a strong and dynamic banking and monetary system.		11	
Prevents waste or improper and inappropriate allocation and their total loss	Developed human knows that available natural resources are scarce or limited.	13	
He is extremely sensitive to environmental protection.		10	
He is a bold and risk-taking person.	Developed man tries to advance himself and society, seeks to test and perform new experiences and activities.	3	Skill
He uses innovations and inventions to produce goods and services and for the welfare of himself and society as a whole.	Developed human is an economic opportunity seeker.	12	
Gives great importance to the physical, mental and emotional health of oneself and society.	Developed human has the necessary capabilities for development and considers it necessary to provide it for all members of society.	8	
He will never give up on problems and will seek or find a new way to solve his problems and those of society.	Developed man is creative or cares about creativity and creating an environment to cultivate it.	9	
He is smart and creative, has genius, hopes or supports people with these qualities.	Developed human has special talents or provides the environment for cultivating these talents.	2	
He seeks to find newer, easier , and less costly ways to solve problems.	Developed human seeks to discover or invent new ways to advance oneself and society.	4	

Scott's (2012) method was used to calculate the reliability coefficient of this instrument. For the purpose, the content review checklist was distributed amon several subject matter experts, and their agreement coefficient was calculated.

$$\lambda = \frac{Po - Pe}{1 - Pe} \quad (1)$$

Where:

Expected agreement percentage Pe = 0.261

Observed agreement percentage Po =% 94.44

Reliability coefficient = 0.92

According to Scott's formula, the obtained coefficient for the content analysis form was equal to 0.92, and because it was above 70%, the agreement coefficient is acceptable.

After formulating the content review checklist and calculating its validity and reliability, content analysis was performed in a manner in which, at first, the Fundamental Transformation Document was studied completely and sentence by sentence. Afterwards, the themes of the expressions corresponding to and in line with the categorization system were identified and recorded in the checklist. Then the frequency of each component was counted and it was determined exactly how much each part of the document has paid attention to the dimensions of the developed human. This was done by the researcher and randomly checked by the supervisors to increase the validity of the findings (taking into account the similarity of the answers that were confirmed). It should be noted that the obtained data were analyzed using descriptive indicators in the Shannon entropy analytical process. This means that at first the frequencies of components in the content of the Fundamental Transformation Document were extracted and then inserted into the relevant table; Next, the research data were analyzed in the Shannon entropy analytical process (to normalize the frequency

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table data, calculate the information load of the categories and to obtain their importance factor and rank), three steps of which are explained as follows.

4- Shannon entropy method

In this research, Shannon entropy method (as a widely used method for calculating the weight and rank of indices) has been used. This concept has been developed in various scientific fields, including physics, social sciences and so on.

In this method, some steps are defined sequentially, which are explained as follows:

Step 1: Firstly, the decision matrix was formed. For the purpose, it is enough to get the evaluation of each option from the verbal expressions of each criterion for qualitative criteria, and to put the real number of that evaluation for the quantitative criteria. In the formula below, columns and rows are criteria and options of decision matrix, respectively. For example, X_{12} is the score of the first option compared to the second criterion.

$$\mathbf{X}=[\mathbf{x_{ij}}]_{\mathbf{n\times m}}=\begin{bmatrix} \mathbf{x_{11}} & \mathbf{x_{12}} & \cdots & \mathbf{x_{1m}} \\ \mathbf{x_{21}} & \mathbf{x_{22}} & \cdots & \mathbf{x_{2m}} \\ \vdots & \vdots & \vdots & \vdots \\ \mathbf{x_{n1}} & \mathbf{x_{n2}} & \cdots & \mathbf{x_{nm}} \end{bmatrix} \quad (2)$$

Step 2: Normalize the above matrix and call each normalized entry p_{ij}. Normalization is the division of each column by the sum of the columns.

Step 3: Calculate the entropy of each index: The entropy, Ej is calculated as follows and k as a constant value keeps the value of Ej between 0 and 1.

$$E_j = -k \sum_{i=1}^{m} P_{ij} \times Ln\, P_{ij} \qquad i = 1,2,\dots,m \tag{3}$$

where p(x) is the probability distribution of the random variable X. An increase in Shannon entropy increases uncertainty and decreases information about a random variable knowledge. Another aspect of Shannon entropy is its maximum entropy property for uniform distribution.

Step 4: calculate the value of dj (degree of deviation) that states how much relevant index (dj) provides useful information for decision making to the decision maker. The closer the measured index values are to each other, the less different the competing options are in terms of that index.

$$dj = 1 - Ej \tag{4}$$

Therefore, the role of that indicator in decision making should be reduced equally.

Step 5: calculate weight value, Wj. In fact, the standard weight is equal to each dj divided by the total number of **dj**s.

$$wj = dj / \sum dj \tag{5}$$

It should be noted that in the present study, the number of frequencies confirms the degree of importance and attention, so the weights are calculated based on **EJ**s.

5- Findings:

After determining the components and domains, and preparing and approving the checklists, all the obtained results of counting the frequency of components were collected in tables (**Tabel 2**, **Tabel 3** and **Tabel 4**). In this section, after offering these tables, the information and the results of their analysis are summarized and an answer to the research question is provided.

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Tabel 2. Frequency distribution of attention (to three domains) and sub-components of developed human in the transformation document
Source: Research Result

Component	Some manifestations of the following components	Introduction and generalities	Chapter 1	Chapter 2	Chapter 3	Season 4	Season 5	Chapter 6	Chapter 7	Chapter 8	Total
1- Human welfare (attitude)	Development of life					1	1	1			3
	Entrepreneurship		2								2
	Maximum use and pleasure										
2- Patriotism (attitude)	Respect for the people and the land and the flag							2			2
3- Efficiency (attitude)	diligence		1								1
	Get things done fast							1			1
4- Contrary to the tradition of inhibiting development (attitude)	Being the best at work										
	Strive for your destiny	1									1
5- Continuous improvement (attitude)	Increase your knowledge										
	Rejection of the status quo	1									1
6- Increase welfare with work (attitude)	Prefer more amount to less										
	Savings up										
7- The importance of obedience in welfare (attitude)	Implement innovations in society										
8- Condemnation of community poverty (attitude)	Increase purchasing power and revenue										
	Balanced income distribution										
9- Respect for human beings (attitude)	The importance of health, dignity and respect										
10-Science is a tool for	Improving the quality of	1	2				1	3			7

overcoming nature (attitude)	educational resources										
11-Value of resources (attitude)	No waste of resources							2			2
	Importance to productivity										
12-The importance of human intellect (attitude)	Irreplaceable wealth wisdom		1		1						2
13-Productivity (knowledge)	Importance to scientists		1								1
	Supports productivity in all sectors										
14-The importance of knowledge in overcoming nature (knowledge)	Use science to serve nature										
15-Importance to the concept of development (knowledge)	Teach the concept of development to others	1									1
16-The role of capital types in development (knowledge)	It cares about investing in the community										
17-Is knowledgeable (knowledge)	Has been educated	1									1
18-The importance of capital accumulation (knowledge)	Reinvest to increase capital										
	Pro a strong banking system										
19-Scarcity of resources (knowledge)	It does not waste resources										
	It is the protector of the environment					1		1			2
20-Experience (skill)	It is bold and risky										
21-Economic Opportunity (Skills)	Application of the invention to increase production and prosperity										
22-Capable (skill)	It cares about physical, mental and intellectual health		1					1			2
23-Creative (skill)	Finds a new way		1		1			1			3
24-Special Talent (Skills)	He is smart						1	3			4

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25-Inventing new methods (Skills)	Find a new way for society to progress										
Total		5	9	0	2	2	3	15	0	0	36
Percent%		13.9	25	0	5.6	5.6	8.3	41.7	0	0	100%

Tabel 2 identifies the number of components enumerated according to the three domains of the developed human being (attitude-based, knowledge-based, skill-based) and its subcomponent. For the attitude-based domain, a total of 22 frequencies of developed human components (60%) have been counted. In knowledge-based domain, a total of 5 frequencies of developed human components (14%) are considered. In skill-based domain, a total of 9 frequencies of developed human components (25%) are considered. The highest percentage of frequency is related to the attitude-based domain (the set of objectives that involve matters related to tendency, value, emotional effects and beliefs and the expected ideas, and pupils should also reinforce his/her desires, feelings, attitudes and beliefs about the subject matter).

Tabel 3 shows the frequency of components and sub-components developed of human according to the different chapters of the Fundamental Transformation Document.

Tabel 3. Frequency distribution of attention to components and sub-components of developed human in the Fundamental Transformation Document of Iranian education system
Source: Research Result

Item No.		1		2		3	4		5		6		7		8	9	Total	
1 Components	Document chapters	Introduction and generalities		season 1		Chapter 2	Chapter 3		Chapter 4		Chapter 5		Chapter 6		Chapter 7	Chapter 8		
1 Human welfare		0		2	Is an entrepreneur	0	0		1	He seeks prosperity and the expansion of livelihood	1	To Follow Welfare And	1	To Follow Welfare And(	0	0	5	To Follow Welfare And ... creating employment and entrepreneurship A, B
2 Patriotism		0		0		0	0		0		0		2	Respect for water, soil, flags and people	0	0	2	Respect To Water And D

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3 efficiencies	0		1	He tries to increase production and hard work	0	0		0		0		3	Avoid wasting time	0	0	2	Increase production with hard work - Prevent From ... E, F
4 Contrary to the tradition of developmen t inhibition	1	He does not leave his destiny to fate	0		0	0		0		0		0		0	0	1	He is against the traditions that forbid progress
5 continuous improveme nts	1	Hedoes not stand still and does not accept the status quo	0		0	0		0		0		0		0	0	1	Seeks continuous improvement J
6 Increase welfare with work	0		0		0	0		0		0		0		0	0	0	
7 The importance of obedience in welfare	0		0		0	0		0		0		0		0	0	0	
8 Condemnati	0		0		0	0		0		0		0		0	0	0	

on of community poverty																	
9 Honoring human beings	0		0		0	0		0		0		0		0	0	0	
10 science tools to overcome nature	1	It is important to study science	2	He cares about education	0	0		0		1	Giving importance to science and research	3	Importance to give To	0	0	7	Importance to give To Q
11 Valuable resources	0		0		0	0		0		0		2	No waste of resources and efficiency	0	0	2	No Waste Sources R
12 The importance of human intellect	0		2	Wisdom is the supreme wealth and cares about the position of teacher, professor and scientist	0	1	The wisdom of irreplaceable wealth	0		0		0		0	0	3	The wisdom of irreplaceable wealth and giving importance to scientists T, V
13 Productivity	0		0		0	0		0		0		0		0	0	0	

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14 The importance of knowledge in overcoming nature	0		0		0	0		0		0		0		0	0	0	
15 Importance to the concept of developmen t	1	Knows the concept of developm ent	0		0	0		0		0		0		0	0	1	Trying to teach the concept of development to others
16 The role of capital types in developmen t	0		0		0	0		0		0		0		0	0	0	
17 He is All-Knowing, All-Aware	1	Educated and recomme nds to others	0		0	0		0		0		0		0	0	1	Educated and encourages education a
18 The importance of capital accumulatio n	0		0		0	0		0		0		0		0	0	0	

19 Scarcity of resources	0		0		0	0		1	He is the protecto r of the environ ment	0		1	Environme ntal Protection	0	0	2	Preservation Environment Jiy f
20 to experience	0		0		0	0		0		0		0		0	0	0	
21 Economic Opportunity	0		0		0	0		0		0		0		0	0	0	
22 powerful	0		1	He cares about the health of body, mind and intellect	0	0		0		0		1	The importance of physical and mental health	0	0	2	Importance Health h
23 Creative	0		1	Is an inventor	0	1	Is an invent or	0		0		1	He is an inventor and he is not disappoint ed and finds a new way	0	0	3	Inventor Been And j
24 special talents	0		0		0	0		0		1	Intellig ent and creativ e	3	With Intelligence And creative	0	0	4	With Intelligence And Creative l

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Inventing new methods	0		0		0	0		0		0		0		0	0	0	
Frequency	5		9		0	2		2		3		15		0	0	36	
Percent%	13.9		25		0	5.6		5.6		8.3		41.7		0	0	100%	

Furtherly, in order to normalize the data and determine the information load and their importance factor, Shannon entropy method has been used. To apply the Shannon entropy method, at first, we draw a table of data related to the study of developed human components in Excel software and then we normalize the data. Next, using the formula in the second step of Shannon method, Entropy or amount of information load of each index (EJ), Degree of deviation of each index (DJ), weight of each index (WJ) and finally rank of importance of each component (RANK) in the transformation document for each of the components, the data will be evaluated. The results are presented in Table 6. It should be explained that, since the rankings are based on the subject of research, in terms of frequency, so in the entropy method, EJs are taken into consideration as the basis for calculating weights than DJs.

Tabel 4. Shannon entropy results for examining the degree of attention to human developed components in the fundamental transformation document
Source: Research Result

1 Human welfare	5	0.732	0.151	**2**
2 Patriotism	2	0.315	0.065	**6**
3 Importance of efficiency	2	0.315	0.065	**6**
4 Denial of false traditions	1	0	0	**11**
5 continuous improvement	1	0	0	**11**
10 science tools to overcome nature	7	0.885	0.183	**1**
11 Valuable resources	2	0.315	0.065	**6**
12 Gives importance to human intellect	3	0.5	0.103	**4**
15 knows the concept of development	1	0	0	**11**
17 Adequate mastery of development knowledge	1	0	0	**11**
19 He knows the scarcity of resources	2	0.315	0.065	**6**
22 He has the potential for development	2	0.315	0.065	**6**
23 He is creative	3	0.5	0.103	**4**
2 He has a special talent	4	0.630	0.130	**3**

Question: What is the level of attention to the 25-item components of developed human in different chapters of the Fundamental Transformation Document ?

As can be seen, based on the results obtained from Shannon entropy, the degree of attention and rank related to the importance of each developed human component in the Fundamental Transformation Document is as follows:

The tenth component (developed man believes in science and knowledge as the only tool to dominate nature and the environment, however without harming it) with an information load of 0.885 and an importance factor of 0.183 has been given the most importance.

The word counting method was also used to make the results clearer. The results of this word-counting are given in the table below:

Tabel 5. Word counting on the fundamental transformation document of Iranian education system.
Source: Research Result

Percentage%	Economic words in question	Total numbers of words in the document	Reference	Item No.
1,035	113	10914	Fundamental Transformation Document…	**1**

As can be seen from the results of the table, out of the total number of words counted in the text of the eight chapters of the document, about 1% is about the desired components of the research, namely, the characteristics of the developed human.

To examine the reliability of obtained results from the research tests, we proceeded to select several components not relevant to the research topic, to compare with the research results, the results of which are as follows (Note that the selected components are among the most frequent components in the Transformation Document, some of which are also mentioned in the Literature Review section).

Tabel 6. Comparison of the frequencies of some important and fundamental concepts in the transformation document with the developed human components
Source: Research Result

Frequency	Some of the concepts and components used in the Fundamental Transformation Document	Row
58	The word of Islamic standard system	1
176	The word and concept of ethics and religious and divine education	2
38	The word of Velayat Orientation	3
70	Paying attention to the branches of religion, chastity and hijab	4
12	The word of Mahdism and Waiting (for Mahdi)	5
275	Words and themes of Hayat Tayyeba (good life)	6
36	Total number of the themes about 25 components of developed human	7

As it is clear from the results of the frequencies in the table, there is a big difference between the amount of attention to categories such as Hayat Tayyeba (good life) and Foru'oldin (lthe branches of religion), hijab and chastity, etc. with the level of attention to the 25 counted components of developed human. Nevertheless, most of these other categories are obtained using word-counting and have been as both co-word and co-theme for developed human components. As mentioned in the research method, the unit of counting in this study is frequency, so as a comparison based on this criterion, the amount of attention to the components of the developed human is small compared to other categories.

Here, using the data shown in the table above for the Shannon entropy process, the importance factors and information loads of the selected control categories are calculated.

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Tabel 7. Calculated entropy of selected control categories in the fundamental transformation document
Source: Research Result

The title of Components	Frequencies	Entropy or information load of each index (rounded)	Weights or importance factor (rounded)	Ranks (Obtained based on importance factors)
Islamic standard system	58	2.3	0.161	4
Ethics and religious and divine education	176	2.9	0.205	2
Velayat Orientation	38	2	0.144	5
Branches of religion, chastity and hijab	70	2.2	0.168	3
Hayat Tayyeba	275	3.1	0.223	1

As can be seen from the results obtained in Table 7, Hayat Tayyeba with information load of 3.1 and importance factor of 0.223 has gained the highest level of attention and **guardianship Orientation (Velayat Madari)** with information load of 2 and importance factor of 0.144 has received the lowest level of attention from among the five selected control categories in the Fundamental Transformation Document.

Here, to make the results clearer, a table is provided to compare the results of the research variables in terms of frequency as well as entropy results and importance factors with the results obtained from (selected control variables).

(In the case of the research components in the last row of the table, only the highest importance factor and information load is given among the 25 research components):

Tabel 8. Comparison of the frequency of developed human components with other selected important control components
Source: Research Result

Frequencies	Entropy or information load of each index (rounded)	Weights or importance factor (rounded)	Ranks (Obtained based on importance factors)
Islamic standard system	58	2.3	0.161
Ethics and religious and divine education	176	2.9	0.205
Velayat Orientation	38	2	0.144
Branches of religion, chastity and hijab	70	2.2	0.168
Hayat Tayyeba	275	1.3	0.223
The components of developed human of our study	36	0.885	0.183

As can be seen from the results of the above table, the frequency of only five components (Islamic standard system, morality and religious education, guardianship-orientation, branches of religion and chastity and Hijab, Hayat Tayyeba) is 617 times, despite they has been obtained using word counting and not theme-based, while the frequency obtained for 25 components of developed humans is only 36 times, and the highest information load and importance factor related to developed human is less than most of these components, which it is solely a reason for the negative response to the research question.

6- Summary and Conclusion

Based on the obtained results, with regard to attitude-based, knowledge-based and skill-based domains, a total of 22, 5 and 9 frequencies are counted, which they account for 60%, 14% and 25% of the developed human components, respectively.

As a result, the highest percentage of frequency is related to the attitude-based domain and the lowest percentage of attention is related to the knowledge-based one.

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Attitudes, values and even skills should be formed based on the knowledge and awareness of people and in fact they should result from it, but as the results of research showed in the Transformational Document, science and knowledge have not been paid attention as much as the attitudes.

Based on the results obtained from Shannon entropy, the degree of attention and rank related to the importance of each component of developed human in the Fundamental Transformation Document is as follows:

The component of "developed human believes in science and knowledge as the only tool to overcome nature and the surrounding environment, of course with environmental considerations" with a importance factor of 0.183 and information load of 0.885 is given the most importance and it has been ranked first.

The lowest importance factor is related to the components of "tradition breaker, continuous progress, knows the concept of development, is knowledgeable and aware" each with zero information load and importance factor.

Given the small number of frequencies counted in all three areas of education, which are in fact various dimensions of human components developed, compared to competing concepts and categories in Table 10 (the components such as: Islamic standard system, ethics, divine and religious education, guardianship-orientation, etc.), it seems that in the Fundamental Transformation Document, not enough attention has been paid to the components of human beings, and therefore, this lack of attention and importance has been extended to the text of selected books. As a result, with this amount of attention, they will not be able to convey the sense of necessity of cultivating developed human beings who produce economic growth and prosperity to textbooks and, as a result, students.

Regarding word counting, the results showed that about 1% of the total content of the document has dealt with the subject of research, namely the characteristics of the developed human being.

Comparison of the importance coefficients of selected control categories (entropy table No. 9), that is 5 categories of "Islamic ethics and education, branches of religion and hijab, chastity and good life, orbital province and Islamic standard system", versus the coefficients of importance and information load of human development components, the findings indicate that the information load and importance factors obtained from the entropy of selected categories are far higher than the human components developed. The larger the entropy of a number variable, the higher its weight and rank. And because initially, according to the definitions in the third chapter, high frequency of a word or theme indicates more attention and importance given to a component in a text message (book or any other media), so based on the results it can be judged that the higher coefficients obtained from the entropy of competing components indicated their greater importance from the point of view of the authors of the Fundamental Transformation Document.

If the results obtained according to Table (2), the ranking of human components developed based on the priorities set by the researcher, which was ranked according to the priorities and needs of the country and with the advice of a number of experts, are compared and interpreted, it should be said: a component that has won first rank in the entropy test (developed man believes in science and knowledge as the only tool to overcome nature and the environment, of course, with environmental considerations), it is ranked fourth in importance in the ranking table,. Therefore, not only the frequency number and attention to developed human components, but also the order of importance of each of them has not been sufficiently and expertly paid attention, and therefore it would be far from expected that such planning in upstream documents could provide manpower with developmental thinking in the education system.

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As a result, the frequencies, percentages and poor results obtained indicate that the Fundamental Transformation Document pays little attention to these components and since textbooks in the Iranian education system have been prepared and compiled based on this document, so about the question that whether formal upstream educational resources in Iran can nurture human beings with developed thinking or not? It must be said, no.

Raising a developed human being who can be the source of growth, development and progress of society in the future, requires far more importance and attention than the results of what has been tested.

As a final point, it seems that the realization of developed human requires a human-centered view and more attention to human material life and needs, of course, religion itself is not indifferent to this issue. In Islam, both material and spiritual aspects of human beings have been considered, and in principle, Islam is a multifaceted religion and has never condemned or prohibited efforts to improve human material life, but many verses and hadiths recommend hard work for meeting human needs in it, but it seems that the authors of the Transformation Document are too focused only on the spiritual and otherworldly needs of human beings, and this way of thinking and attitude can be clearly seen and felt in the text of the document.

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The Effect of Economic Policy Uncertainty on Oil Prices (Case Study: OPEC Countries)

Parvaneh Pordel*, Marziyeh Esfandiari **

**Ph.D Candidate, Department of Economics, University of Sistan and Baluchestan, Zahedan, Iran.*
***Associate Professor, Department of Economics, University of Sistan and Baluchestan, Zahedan, Iran (Corresponding Author).*

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CORRESPONDING AUTHORS:
Email: m.esfandiari@eco.usb.ac.ir
0000-0003-3704-6240

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Postal address:
University of Sistan and Baluchestan, Daneshgah Blvd, Zahedan, Postal Code:98167-45845, Iran

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ABSTRACT

In this paper, we investigate the relationship between the economic policy uncertainty (EPU) and oil prices in OPEC countries utilizing a nonparametric panel data model to allow the data to outfitter the shape of functional form. The change in oil price reflects the changes in fundamental and non-fundamental factors. Using yearly data from OPEC countries from 2003 to 2017, we find that EPU has a positive and significant effect on price. The research findings show renewable energies, oil price expectations, and EPU are the most influential factors, respectively. So policymakers should devote more attention to fundamental aspects. The planning and establishment of the necessary infrastructure for the extensive use of renewable energies will lead to a significant reduction in oil prices. Although the research findings indicate that renewable energy and oil are substitutes, oil and gas will continue to grow in the decades ahead. Also, the rise in the EPU will lead to an increase in oil prices. In this regard, policy authorities try to mitigate the adverse effects of oil price increases, which in turn reduces the success of those policies and causes an increment in economic policy uncertainty.

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1- Introduction

Oil, the primary source of energy and the motor to grow economically, is an essential factor behind the process of production. The consumption of oil has increased significantly with the modernization of the economy (Basher & Sadorssky, 2006). In the field of oil and gas, current policies of the country include increasing the capacity of protected oil production in proportion to the existing reserves with more economic, security, and political power, exploiting the regional and geographical situation of the country for buying and selling, processing, refining, exchanging and transferring oil and gas to domestic and global markets, and replacing the export of oil and gas and petrochemical products with exporting crude oil and natural gas. Despite that, the components affecting the production volume and price of oil are not decided by economic policymakers, which affects the economy of Iran and oil-exporting countries. Rising oil prices increase production costs, import, oil products, and inflation, which are obstacles to GDP increases for countries that import oil (Cavalcanti & Jalles, 2013) and can reduce consumption, investment, and, consequently, the economic growth as well (Loungani, 1986). Earlier research indicates that the pricing of each commodity is determined by the market mechanism and the interaction of supply and demand of that commodity is affected by various components. Demand depends on consumer income, the price of related commodities, and price expectations in addition to the price of the commodity. Also, the amount of supply depends on commodity prices, production costs, and price expectations. Therefore, the price is affected by the factors affecting supply and demand. In general, the factors can be divided into two main groups: fundamental factors and non-fundamental factors. Oil is regarded as an asset and a commodity, so changes in fundamental and non-fundamental factors alter oil prices. Fundamental factors comprise supply and demand, while non-fundamental factors cover risks and uncertainties, psychological, political, and geopolitical factors, and stock exchange and speculation activities in oil financial markets, which cause fluctuations in oil prices. Uncertainty in an

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economic system can be characterized by high fluctuation among the economic variables. The interaction between oil performance and macroeconomics has been noticed by many researchers.

Comprehension of the effects brought about by oil shocks is essential to formulate a proper response to policies. These results probably are dependent on the source of the change in oil prices and vary among states. Recent studies suggested that the influences of oil shocks on the US and EU countries change impressively depending on the source and cause of oil price fluctuations (Kilian, 2009; Peersman & Van Robays, 2009b). For example, it is expected that exogenous disruptions in the supply of crude oil leading to raised oil prices will lead to lower economic activity and higher inflation in oil-importing countries. On the other hand, the rise of oil prices can be a consequence of the growing oil demand that reflects worldwide economic expansion or precautionary motives that will have potentially varied influences on output. The identification constraints can be obtained from a simple model of supply and demand in the oil market. First, a shock in the oil supply negatively correlates with oil prices and its production. For example, such shocks can result from production disruptions because of changes in production quotas set by the Organization of Petroleum Exporting Countries (OPEC) or military conflicts. After an adverse oil supply shock, world economic activity will either slow down or remain unchanged. Second, the occurrence of demand shocks will lead to a change in oil production, and oil prices will move in the same direction, as demand-driven price rises typically follow more outstanding production of oil in oil-exporting countries. Here we define such a shock as the oil demand shock, which is rooted in higher economic activity. As a result, this shock is characterized by a positive movement between world economic activity, oil prices, and oil production. Fears about the future of crude oil supply or rising oil prices based on hypothetical motivations are clear examples of it. Unlike the demand shock caused by economic activity, shocks because of oil-specific demand because of uncertainty can not have a positive outcome on economic activity globally. Therefore, the final impact on global

activity can be harmful even due to rising oil prices (Baumeister, Peersman & Van Robays, 2010).

In recent years, the rapidly growing literature on nonparametric econometric methods has been a solution to the problems of parametric specification error in econometric regression models. Nonparametric regression methods do not require the researcher to assume and determine a functional form for the relationship between explanatory variables and dependent variables. Thus, the functional form is specified by the data instead of the researcher making arbitrary decisions. Therefore, in the present study, considering the role and importance of OPEC in the oil supply, demand, and oil prices and its effect on the growth and wealth in the world, factors affecting the determination of OPEC oil prices with an emphasis on EPU as a representative of non-fundamental factors affecting oil prices are investigated for a selection of OPEC member countries during 2003-2017 using non-parametric regression.

2- Review Literature

Concerns about political uncertainty have been exacerbated by the global financial crisis, the eurozone chain crisis, and partisan political divisions in the United States. For instance, the Federal Open Market Committee (2009) and the International Monetary Fund (2012, 2013) advise that uncertainty about fiscal policies, regulations, and monetary policy have contributed to a sharp economic downturn in 2008-09 and the slow improvement of the future. To examine the role of policy uncertainty (Baker, Bloom & Davis, 2016), they first developed an EPU index (EPU) for the United States and examined its evolution. This index is based on the media and shows that such uncertainty has a negative, lasting effect on economic activity. Several studies have examined the impact of EPU on employment and industrial production, unemployment rate (Caggiano, Castelnuovo & Figueres, 2014 and 2017) stock market fluctuations, and returns (Kang & Ratti, 2013a; 2013b; You, Guo, Zhu & Tang, 2017). Another branch of studies in this field examined the relationship between EPU and asset prices

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(Brogaard & Detzel, 2015) and the growth of bank lending (Bordo, Duca & Koch, 2016). Evidence shows that EPU has a negative relationship with business cycles and exacerbates the effects of the recession by postponing firms' decisions to invest and hire (Bloom, 2014). The impact that oil prices have on EPU is considered and evaluated in various studies. Hamilton (1983) proved that oil price shocks affect stock returns, inflation, and GDP. Recent studies have concentrated on the channel of the business cycle through negative oil shocks and their impact on macroeconomics. Hamilton (2003) shows that oil prices fall in the event of a recession in the United States. Barrero, Bloom & Wright (2017) based on the study showed that oil price fluctuations have a short-term effect on uncertainty. Also, Baker et al. (2016) show that EPU affects oil prices. So that the uncertainty of economic policies can be affected through the media, showing that according to this index, the international financial crisis has intensified EPU. Bloom (2014: 28 (2)) relies on the effectiveness of economic policy with business cycles. The results of the research show that uncertainty with delay in investment decisions has a negative impact on the employment of firms and exacerbates the recession. It shows that this uncertainty has the effect of recession through delay in investment decisions and employment of enterprises and increases it by weakening economic policies. Antonakakis, Chatziantoniou & Filis (2014) examined the dynamic relationship between changes in oil prices and the EPU index; they showed that EPU (oil price shocks) negatively responds to increased demand for oil prices (fixed economic policy shocks). Rehman (2018) examines whether oil shocks predict EPU, and concludes that the economic uncertainties of India, Spain, and Japan respond to global oil price shocks. Seifollahi(2018) investigates the effect of oil price uncertainty on economic growth using the (GMM) method between 1961-2015 in oil exporting and oil importers countries. The esults show that oil prices uncertainty have a negative effect on economic growth both in the group of oil exporting countries and in the group of oil importing countries. However, demand shocks cannot trigger any change. Hailemariam, Smyth &

Zhang (2019) examined the relationship between oil prices and the EPU. Their results show that the oil price coefficient becomes negative when the demand for oil prices increases on a global scale. Also, specific non-parametric estimates in each country show that these functions and routine factors are increasing over time. Zhang & Yan (2020) investigated the possible effect of EPU (EPU) on crude oil prices. Their experimental results suggest that, first, almost all the US EPU indices and WTI returns over the sample period, are adverse. Second, in the frequency range of 1-6 months and 6-12 months, almost all the EPU indices can have significant effects on WTI returns, while in the frequency range of 12-24 months, only the uncertainties about monetary policy, National Security, and Regulation Policy may significantly affect WTI performance. The effect of the US EPUs on WTI performance seems more remarkable, particularly in the face of the global financial crisis. Darmawen et al. (2021) studied the effect of changes in world oil prices on inflation in Indonesia and they adopted a nonparametric regression approach to find that the world oil price changes affected Indonesia's inflation less seriously. Wen et al.(2022) examined the impact of economic policy uncertainty on economic growth in Pakistan. the results of the nonlinear model show that the positive effects of economic uncertainty have a negative effect on short-term economic growth and the positive effect of economic uncertainty is more than the negative effect of economic policy uncertainty. Ansari and Rezazadeh (2023) provide important evidence on the short-run relationship between various uncertainty shocks and the Iranian macroeconomy. In the long run, the results show that economic news from the US government is the least important parameter for domestic production and Iran's macroeconomic uncertainty is the most important; Exchange rate and oil market shocks. Shocks in international financial markets have an asymmetric effect on the money supply, and a decrease in energy market uncertainty can lead to an increase in the money supply.

Given that the volume of oil reserves in OPEC member countries is almost four times that of non-oil exporting countries,

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OPEC decisions and policies in response to oil market realities affect oil prices. These decisions are influenced by important factors of oil demand and supply and global uncertainties. In this regard, the present study tries to examine the effect of global EPU on OPEC oil prices. This study differs from others in two ways. EPU in this study is media-based according to the method propped by Baker et al. (2016). Besides, the economic theory provided little information about the functional form of the relationship between dependent and independent variables.

3- Model and Data

The real oil price is the dependent variable, and independent variables include EPU, industry value-added index, real interest rate, oil rents, renewable energy, and oil price expectations.

Table1.Variables
Source: Resarch Result

Real price of OPEC oil (OPEC oil basket)	https://www.opec.org/opec_web/en/
Policy Uncertainty Index (Global)	https://www.policyuncertainty.com/
Oil rents	https://data.worldbank.org/
Industry value added	https://data.worldbank.org/
Real interest rate	https://data.worldbank.org/
Renewable energy	https://www.oecd.org/
Oil price expectations	https://www.eia.gov/outlooks/steo/report/prices.php

In this study, the nonparametric method is used to investigate the effect of uncertainty on the real price of OPEC oil. According to the literature, parametric models having restrictive assumptions on the functional form have been used to examine the relationship between oil prices and EPU. The downside with parametric models is because of the biased and inconsistent estimates, as a result of misspecification if there was not any prior knowledge about the functional form (Hailemariam et al, 2019).

According to the modeling strategy of Li, Chen & Gao (2011) and Silvapulle, Smyth, Zhang & Fenech (2017), the proposed

econometric model linking the EPU index to the real oil price is as follows:

(1) $$Y_{it} = f_t + \beta_{t,1}UN_t + \beta_{t,2}RE_{it} + \beta_{t,3}IND_{it} + \beta_{t,4}RR_t + \beta_{t,5}OR_{it} + \beta_{t,6}OPE_t + \alpha_i + e_{it}$$

the following relation is established:
Xit = (, RE_{it} , , RR_t , , OPE_t)
This model is written as a matrix as follows

(2) $$Y_{it} = f_t + X_{it}^t\beta_t + \alpha_t + e_{it}, \quad i = 1,...,N, t = 1,...,T$$

That Y_{it} is the real oil prices, f_t is trend functions of unknown country-specific, UN_t is the EPU index, OPE_t is oil price fluctuations, IND_{it} is industrial production index, RR_t is real interest rates, RE_{it} is renewable energy, and OR_{it} is oil rent.

α_1 shows unseen individual effects, e_{it} is an error term that is fixed and independent of regressions. $\beta_{t,j} = \beta_j(t/T)$ and $f_t = f_i(t/T)$ are variable vectors with time and trend functions; $f(0)$ and $\beta_j(0)$ are unknown smooth functions. To identify, we assume that $\sum_{i=1}^{N}\alpha_i = 0$.

To estimate the trend functions, f_t and time-varying coefficients, $\beta_{t,j}$ which measures the impacts of oil price fluctuations on the actual oil price in Equation(3), we use the LLDVE approach which was proposed by Li et al. (2011). To accurately explain the LLDVE estimator, the following symbols are introduced.

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$$
\begin{aligned}
&Y = (Y_{11},...,Y_{1T},Y_{21},...,Y_{2T},...,Y_{N1},...,Y_{Nt})^{\mathrm{T}},\\
&\bar{B}(X,\beta) = (X_{11}^{\mathrm{T}}\beta_1,...,X_{1T}^{\mathrm{T}}\beta_{\mathrm{T}},...,X_{N1}^{\mathrm{T}}\beta_1,...,X_{NT}^{\mathrm{T}}\beta_T)^{\mathrm{T}},\\
&\bar{e} = (e_{11},...,e_{1T},e_{21},...,e_{2T},...,e_{N1},...,e_{Nt})^{\mathrm{T}},\\
&\bar{f} = \bar{I}_N \otimes (f_1,...,f_T)^T = \bar{I} \otimes f,\\
&\alpha = (\alpha_2,...,\alpha_N)^T,\\
&D = (-I_{N-1}, I_{N-1})^T \otimes \bar{I}_T,
\end{aligned}
\tag{3}
$$

Where $\bar{I}_K$ is a vector $K \times 1$ and $\otimes$ is the Kronecker product.

For estimating the coefficients and functions of the variable using the LLDVE approach, here the variable vector can be defined with added time as $\beta_*(\tau) = [f(\tau), \beta_1(\tau),..., \beta_d(\tau)]^t$ and assume that β_* has first- and second-order derivatives. After Taylor's expansion, the following relationship is established:

$$
\beta_*(t/T) \approx \beta_*(\tau) + \beta_*'(\tau)(t/T - \tau) \tag{4}
$$

Where $\beta_*'(\tau)$ is the first derivative of $\beta_*(\tau)$ and the following relation is obtained:

$$
\bar{f} + \bar{B}(x,\beta) \approx \bar{M}(\tau)\left[\beta_*^{\mathrm{T}}(\tau)(\beta_*'(\tau))^{\mathrm{T}}\right]^{\mathrm{T}}
$$

Hence the following relationship is established:

(5)

$$\tilde{M}^{T}(\tau)=\left[M_{1}^{\mathrm{T}}(\tau),M_{2}^{\mathrm{T}}(\tau),...,M_{N}^{\mathrm{T}}(\tau)\right]^{\mathrm{T}}$$

$$M_{i}(\tau)=\begin{pmatrix}1 & X_{i1}^{\mathrm{T}} & \dfrac{1-\tau\mathrm{T}}{\mathrm{T}h} & \dfrac{1-\tau\mathrm{T}}{\mathrm{T}h}X_{i1}^{\mathrm{T}}\\ \cdot & \cdot & \cdot & \cdot\\ \cdot & \cdot & \cdot & \cdot\\ 1 & X_{iT}^{T} & \dfrac{T-\tau T}{\mathrm{T}h} & \dfrac{T-\tau T}{\mathrm{T}h}X_{iT}^{\mathrm{T}}\end{pmatrix},$$

$$i=1,2,...,N$$

The parameters are estimated by minimizing the weighted squares in equation (6) concerning α and $\left[\beta_{*}(\tau),h\beta_{*}^{'}(\tau)\right]^{T}$. Therefore, the following relation is established:

(6)

$$\min[\tilde{Y}-\tilde{M}(\tau)\left[\beta_{*}(\tau),h\beta_{*}^{'}(\tau)\right]^{T}-D\alpha]^{T}\tilde{W}(\tau)[\tilde{Y}-\tilde{M}(\tau)\left[\beta_{*}(\tau),h\beta_{*}^{'}(\tau)\right]^{T}-D\alpha]$$

Where $\tilde{W}(\tau)=I_{N}\otimes W(\tau)$ the core weight matrix is as follows:

(7)

$$W(\tau)=diag\left\{\frac{1}{h}k\left(\frac{1-\tau T}{Th}\right),...,\frac{1}{h}k\left(\frac{1-\tau T}{Th}\right)\right\}$$

K(0) is the function of the kernel and h is the bandwidth.

Given the first-order condition (6) concerning α, we obtain the following relation:

(8)

$$\hat{\alpha}_{\tau}=d\left[\tilde{D}^{\mathrm{T}}\tilde{W}(\tau)\tilde{D}\right]^{-1}\tilde{D}^{T}\tilde{W}(\tau)\left[\tilde{Y}-\tilde{M}(\tau)\left[\beta_{*}^{\mathrm{T}}(\tau),h(\beta_{*}^{'}(\tau))^{\mathrm{T}}\right]^{\mathrm{T}}\right]$$

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By substituting α with $\hat{\alpha}$ in Equation (6) and minimizing concerns to $\left[\beta_*^T(\tau), h\left[\beta_*'(\tau) \right]^T \right]^T$ and estimating the LLDVE, $\tilde{\beta}_*(\tau)$, $\beta_*(\tau)$ is as follows:

(9) $$\hat{\beta}_*(\tau) = (I_{d+1}, 0_{d+1})(\tilde{M}^{\mathrm{T}}(\tau)\tilde{W}^*(\tau))\tilde{M}(\tau))\tilde{M}^{\mathrm{T}}(\tau)\tilde{W}^*(\tau)\tilde{Y})$$

Where $I_{d\times 1}$ is the identity matrix of $(d+1)\times(d+1)$, $0_{d\times 1}$ is matrix 0 of the relation $(d+1)\times(d+1)$, $\hat{\beta}_*(\tau) = \left[\hat{f}(\tau), \hat{\beta}_1(\tau), ..., \hat{\beta}_d(\tau) \right]^{\mathrm{T}}$, $\tilde{W}^*(\tau) = \tilde{K}^{\mathrm{T}}(\tau)\tilde{W}(\tau)\tilde{K}(\tau)$ and $\tilde{K}(\tau) = I_{NT} - D(D^{\mathrm{T}}\tilde{W}(\tau)D)^{-1}D\tilde{W}(\tau)$.

Note that for each τ, $\tilde{K}(\tau)D\alpha = 0$.

In this study, the specific trend functions can be estimated from the residuals.

(10) $$\hat{e}_{it} = Y_{it} - \hat{f}(t/T) - X_{it}^{\mathrm{T}}\hat{\beta}_t - \hat{\alpha}_i$$

In particular, for the cross-section i^{th}, the trend function, $\hat{m}_i(t/T)$ can be calculated by using a local linear regression of $\hat{e}_{it}$ at $\tau = t/T$.

(11) $$\hat{e}_{it} = m(t/T) + \varepsilon_{it}$$

Where ε_{it} in $t = 1, 2, ..., T$ are independent errors with zero mean.

Following the findings of Sun, Carroll & Li (2009) and Silvapulle et al. (2017), we use cross-validation to select bandwidth. This method automatically selects the optimal bandwidth. We use the bootstrap approach to create non-parametric confidence bands for time-varying trends and coefficient functions according to the findings

of Mammen (1993) and Silvapulle et al. (2017). The first step is obtaining the remainder of the detrending of (5), $\varepsilon_{it} = \hat{e}_{it} - \hat{m}_i(\tau;b)$ where for $i = 1,2,...,N$, the relation $i = 1,2,...,N$ is established. In the next step, we re-sample the remaining detrending $\hat{\varepsilon}_t^* = \hat{\varepsilon}_k$ where k is randomly selected from $\{1,...,T\}$ by replacing and creating a bootstrap sample of Y_{it} through the following equation:

$$Y_{it}^* = \hat{f}(1/T) + X_{it}^T \hat{\beta}_t + \hat{\alpha}_i + \hat{m}_i(\tau;b) + \hat{\varepsilon}_t^*$$

Using the bootstrap sample $\{Y_{it}^*, X_{it}\}$, we estimate the usual time-varying trend functions $\hat{f}(t/T)$, coefficient functions $\hat{\beta}_t^*$, and proprietary trend functions using the LLDVE method. The last step is repeating the above method 1000 times and obtaining a 90% confidence band to estimate the usual trends and coefficient functions.

4- Research findings

This section provides the results of nonparametric tests including the Kolmogorov-Smirnov and Kruscal-Wallis tests and The Kernel regression[1](Local linear estimator) results.

The Kolmogorov-Smirnov test compares a known hypothetical probability distribution (e.g. the normal distribution) with the distribution generated by the data. As can be seen in Table 1, the P-VALUE is less than 5% and it can be concluded that the data used in the present study do not have a normal distribution. So, the estimation with parametric models can be biased and inconsistent, as a result of misspecifications if there were not any prior knowledge of the functional form**.**

[1] Epanechnikov type of kernel functions is used in this study

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Table2. Kolmogorov-smirnov test
Source: Resarch Result

One-Sample Kolmogorov-Smirnov Test										
			id	op	un	Ope	ind	or	rr	re
N			354	354	354	354	354	354	354	354
Normal Parameters[a,b]	3.50		72.78	116.52	24.51	3.86	22.50	9223.37	27.76	27.76
	1.71		30.01	45.12	8.57	9.79	15.18	9223.37	30.60	30.60
Most Extreme Differences	0.14		0.14	0.15	0.11	0.18	0.07	0.41	0.30	0.30
	0.14		0.10	0.15	0.11	0.18	0.07	0.41	0.30	0.30
	-0.14		-0.14	-0.10	-0.11	-0.16	-0.07	-0.26	-0.18	-0.18
Test Statistic			0.14	0.14	0.15	0.11	0.18	0.07	0.41	0.30
Asymp. Sig. (2-tailed)			.000c	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monte Carlo Sig. (2-tailed)	.000d		0.00	0.00	0.00	.000d	0.04	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	.000
	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	.000

The Kruskal-Wallis H is a nonparametric test based on rank, which can be used to determine whether there exist statistically significant differences between two or more groups of independent variables on a continuous or dependent one. Given the concept of the Kruskal-Wallis test, we want to answer the question of whether the effect of different factors on oil prices is the same in OPEC countries. According to Table 3, oil rent, real interest rate, oil price expectations, and industry value added have different effects on oil prices in OPEC member countries. The mean of the variables and the corresponding ranking of countries are given in Table 4. Nigeria is the highest in renewable energy. Iraq has the highest rank in oil rent, real interest rate, and industry value added.

Table3. Kruskal-Wallis test
Source: Resarch Result

			op	un	ope	Ind	or	rr	re
Kruskal-Wallis H			.0	.0	.0	47.7	266.9	251.3	329.9
Df			5	5	5	5	5	5	5
Asymp. Sig.			1.0	1.0	1.0	.000	.000	.000	.000
Monte Carlo Sig.	Sig.		1.0	1.0	1.0	.000	.000	.000	.000
	95% Confidence Interval	Lower Bound	1.0	1.0	1.0	.000	.000	.000	.000
		Upper Bound	1.0	1.0	1.0	.000	.000	.000	.000

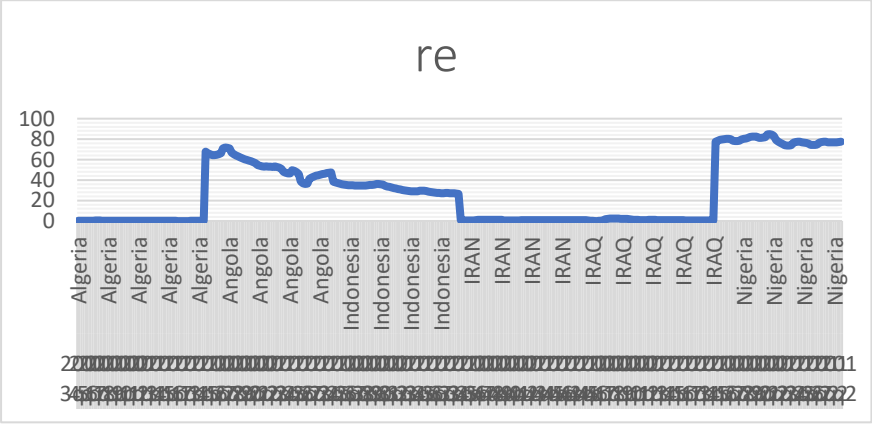

Figure1. Kruskal-Wallis test
Source: Resarch Result

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Table4. Kruskal-Wallis test for renewable energy index for 6 OPEC countries in the period 2003: q1 to 2017: q3
Source: Resarch Result

Number of observations	country	Renewable energies(Mean)	real interest rate(Mean)		Oil rent(Mean)		Industry value added(Mean)		
			Mean		Mean		Mean		
59	Algeria	33.56	91.64		188.00		122.07		
59	Angola	265.83	133.97		245.88		198.63		
59	Indonesia	207.17	117.05		34.07		202.56		
59	Iran	114.39	266.22		188.27		169.85		
59	Iraq	119.05	324.78		305.54		231.32		
59	Nigeria	325.00	131.34		103.24		140.58		

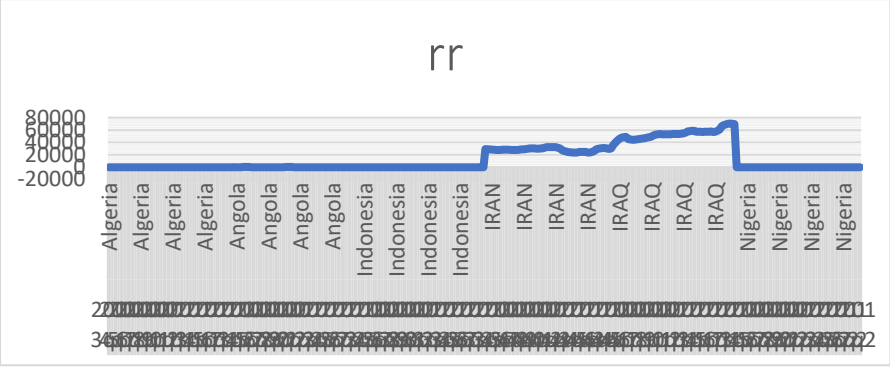

Figure2. Kruskal-Wallis test for real interest rate
Source: Resarch Result

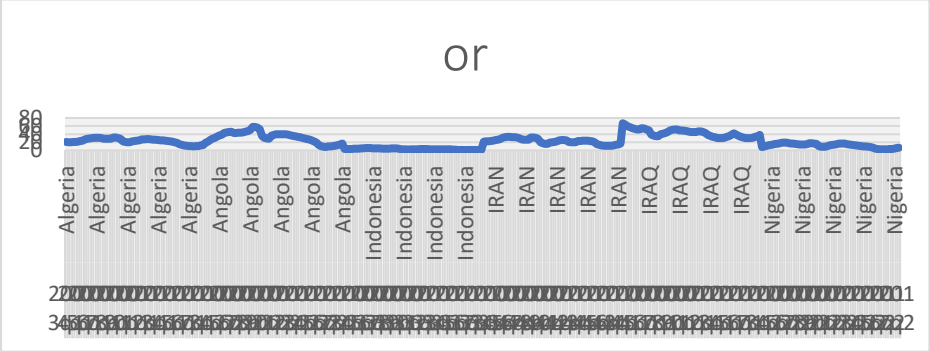

Figure3. Kruskal-Wallis test for oil Rent
Source: Resarch Result

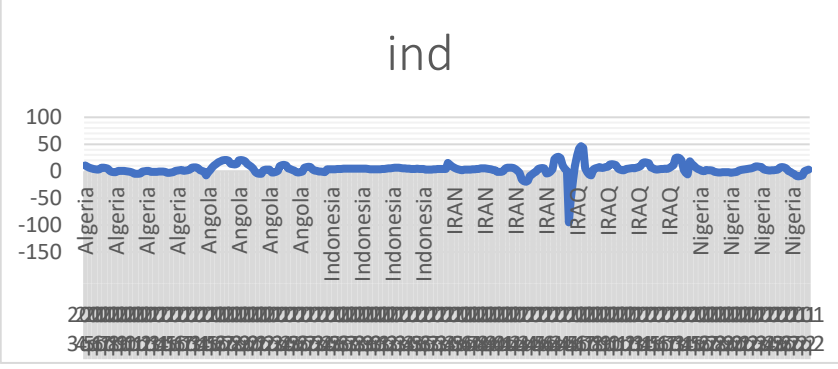

Figure4. Kruskal-Wallis test for industry index
Source: Resarch Result

Using the kernel local linear regression estimator, the extent and direction of the effect of global EPU on oil prices are estimated. There are two hypotheses are examined as follows:
Global EPU has a positive impact on oil prices.

Among the explanatory variables, EPU is the most influential factor.

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Table5. Core regression: Local linear estimator
Source: Resarch Result

Local-linear regression Kernel: epanechnikov Bandwidth: cross validation	Number of obs = 327 R-squared = 0.9678	
Log op	Estimate	Z(P>|Z|)
Mean Log op	4.210966	
Effect Log un	0.3522596	2.6(0.0000)
Ope	0.420129	49.0(0.0000)
L rr	-0.0003032	-0.1(0.9000)
Or	0.0209778	0.8(0.4000)
L ind	0.0169741	2.2(0.0000)
L re	-1.228478	-3.2(.0000)

Based on Table 5, the results show that there is a positive and significant relationship between oil prices and EPU. According to the findings, it can be concluded that for oa one percent change in the EPU index, the variable of oil price will change by 0.35 percent. For one unit change in the oil price expectations index, oil prices increase by 42%. Real interest rate and oil rent index do not have any significant effect on oil prices. One percent increase in the industrial value-added elevates the oil price by 1.6 percent; also, renewable energies reduce the oil prices by 12 percent.

The fundamental factors of oil supply and demand and non-fundamental factors comprising of financial market conditions, speculation, and geopolitics have significant impacts. On the other hand, factors such as the industrial value-added in each country, alternative energy sources, oil rents, and oil price expectations are among the fundamental factors, and the US Federal Reserve real interest rate and EPU are among the non-fundamental factors.

Estimation of the model by nonparametric method shows that renewable energy has the greatest effect on oil prices. As the quota of renewable energy in the energy supply increases, OPEC oil prices fall due to declining demand. The industrial value-added has a positive and significant effect on oil prices because, with more industrial activities, the oil demand has increased, which elevates oil prices. Oil rents have a positive and significant effect on oil prices as the difference between oil income and oil extraction costs. Due to the determination of oil quotas and oil prices in OPEC member countries, the oil industry profit rises by reducing oil extraction costs. Oil price expectations, like market expectations for any commodity, affect prices. Expectations of rising oil prices will lead to higher oil prices due to increased precautionary oil demand. According to the research findings, an increase in the Federal Reserve's real interest rate will lead to lower oil prices. On the one hand, raising interest rates increases the cost of maintaining oil on board, and on the other hand, it reduces the net present value of future profits, hence increasing the oil supply. Rising interest rates on the Federal Reserve will reduce the price of savings bonds, treasury bills, and stocks. Thus, the profitability of speculative activities in the savings bond market leads to the transfer of cash flow from commodity exchanges such as oil and its derivatives and agricultural products to the savings bond and treasury markets. As a result, oil prices fall. The emergence and spread of EPU will lead to higher oil prices. Since oil has assets in addition to physical and commodity aspects, with the increase of EPU, the possibility of restricting the future supply of oil, as well as increasing precautionary demand and speculation of oil, increases oil prices. Therefore, the unique situation of OPEC member countries means that the uncertainty of global economic policies is not a significant factor affecting oil prices, and the development of alternative energies has a significant effect on oil prices. This necessitates a change in policy and precise planning in oil-rich countries to use alternative fuels and produce oil products instead of selling crude oil.

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5- Concluding Remarks

The present study aimed to investigate the impact of EPU on oil prices in selected OPEC countries. We have examined the effect of fundamental and nonfundamental factors on oil prices in the selected OPEC countries using a nonparametric panel data model. This technique allows determining the shape of the function using the data instead of imposing assumptions. The results show that among the fundamental factors, renewable energies and oil price expectations are the most influential factors. Also, EPU has a positive and significant impact on oil prices. However, the impact of renewable energy is more effective than EPU as a non-fundamental factor. The results align with (Gudazi Faahani & Abbasinejad,2023), (Hamidi et al.,2019) and (Jang & Yan,2020).

The emergence and expansion of the economic policy led to an increase in oil prices. Since oil is an asset in addition to its physical aspects, oil prices are likely to rise with higher EPU, the limitation of future oil supply as well as increasing discretionary demand and oil speculation. Therefore, the unique conditions of OPEC member states make it incumbent on the global economic policy as the most important factor affecting oil price, and the rise of alternative goods has had more effect on the oil price, which requires the necessity of changing politics in oil-rich countries towards producing oil products.

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Evaluating the Efficiency of Circular Economies in Persian Gulf Countries in Terms of Municipal Solid Waste Management

AbdoKarim Hosseinpoor*, Ahmad Ghorbanpour ** ,Hamid Shabandarzadeh ***

** Assistant Professor of Economics, Business and Economics School, Persian Gulf University, Bushehr, Iran (Corresponding Author).*
*** Asistant Professor of Industrial Management, Business and Economics School, Persian Gulf University, Bushehr, Iran.*
**** Associate Professor of Industrial Management, Business and Economics School, Persian Gulf University, Bushehr, Iran.*

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CORRESPONDING AUTHOR'S:
Email: k.hosseinpoor@pgu.ac.ir
0000-0002-8810-2129

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ABSTRACT

In the last few decades, the control of environmental issues, including waste, has been an important part of human duty in maintaining human health, which has a special place in new science and technology according to economic health standards. The use of circular economy practices has been proposed as a new approach for urban solid waste management. The purpose of this study is to provide a data envelopment analysis (DEA) approach to measure the performance of the Persian Gulf countries in the management and exploitation of municipal solid waste (MSW). A careful study of the existing literature shows that there is little knowledge of CE and MWSM, especially in the discussion of improving the circular performance of countries in the field of MSW. Therefore, measuring the performance of countries in this field can be very important. This research is applied in terms of purpose and descriptive survey in terms of data collection. The statistical population is the Persian Gulf countries. In this research, the MSW production per capita and the three dimensions of social progress index "basic human needs", "basics of well-being" and "opportunity" are used as input and recycling as output in the model. Data on MSW generation and recycling rates were obtained from the World Bank and data on the three SPI indicators were extracted from the Essential Social Progress website. The data of this research is for the year 2021. The DEA model was implemented in LINGO Softer.

The results show that the countries of Kuwait and the United Arab Emirates respectively have the highest circular economy performance compared to other countries in the Persian Gulf. Data analysis shows that according to the statistics of the World Bank, these three countries recycle 21% and 20% of production waste, respectively. Of course, they perform well in input indicators compared to other countries. It should be noted that these results can be somewhat influenced by the conditions of the Covid-19 pandemic. For example, Iran will produce more solid waste with more population and compliance with health protocols. This could have caused it to fall to fourth place. Although their performance in these indicators is much lower than some European countries such as Slovakia. According to the results, it is suggested that other Persian Gulf countries improve their performance in recycling.

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1- Introduction

In the last decade, concern about the environment has increased increasingly around the world. One of the serious environmental challenges is urban solid waste, the management of which has been raised as one of the main concerns of human societies. According to the World Bank, by 2025, more than 1.4 billion people will live in cities around the world, and each of them will generate an average of 1.42 kilograms of municipal waste per day. Estimates show that municipal waste worldwide triples every year. The annual generation of municipal waste worldwide has increased from 0.68 billion tons to 2.2 billion tons. Based on available data from countries up to 2012, the World Bank has published a report focusing on municipal solid waste generation. Waste is materials or objects that are discarded or thrown away. Solid waste is waste or discarded materials and objects obtained from industrial, commercial, mining, agricultural, and general daily activities (Ugwu, Ozoegwu & Ozor, 2020). Solid waste is one of the serious environmental issues in developed and developing countries. Solid waste management is a major challenge in urban areas around the world, especially in developing countries. The main reason for this challenge is the rapid population growth along with the expansion of cities, the reduction of financial resources, and the weakness of urban planning. Human activities and changes in lifestyle and consumption patterns have led to an increase in waste production rates (Bovard & ilanloo, 2019). Controlling environmental pollution, including waste, is an important part of human duty in maintaining human health, which has a special place in new sciences and techniques according to economic health standards. Waste production is inevitable in human daily life and population increase will increase it. Municipal solid waste is defined as waste generated by human, commercial, and construction activities that are collected and treated by municipalities (Xiao, Dong, Geng, Tian, Liu, & Li, 2020). The main composition of these wastes is almost the same in different countries of the world. However, the amount of production waste, density, and share of each

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part of it is different from country to country and city to city. This difference is caused by economic development, geographical location, weather conditions, and cultural and social considerations (Afshar Kazemi, Eftekhar & Omrani, 2014). About, 2.01 billion tons of municipal solid waste is produced annually in the world, of which at least 33% is not environmentally managed. Worldwide, waste generated per person per day averages 0.74 kg but varies widely from 0.11 to 4.54 kg. Of course, it is predicted that by 2050, the amount of waste produced in the world will increase to 3.40 billion tons, which is equivalent to 2 times the population growth in that year. The East Asia and Pacific region produces the most waste in the world at 23%, while this number for the Middle East countries is about 6% as shown **Figure 1**. Of course, it is expected that the total waste production in this region will more than double by 2050. It is worth noting that in these areas, more than half of the waste is discarded without reuse. This waste growth will bring many adverse environmental, health, and welfare consequences. Therefore, it requires basic measures.

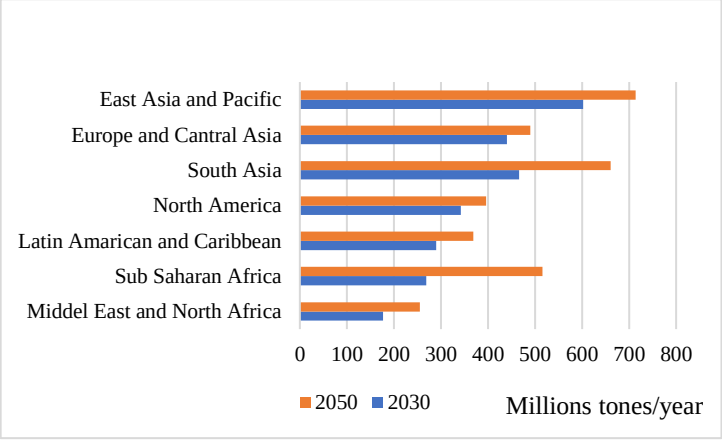

Figure 1. Forecast of waste generation
Source: world bank (2021)

The Persian Gulf region includes the eight coastal countries of Iran, Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, and United Arab Emirates. The most populous and least populous countries are Iran and Bahrain, respectively. Researchers found that countries such as Saudi Arabia, United Arab Emirates, Kuwait, and Qatar that consume more natural resources tend to produce more waste (Umar, 2020).

Studies show that about 65% of waste in the Persian Gulf region is not managed. Ghayebzadeh et al. (2020) showed that the coastal countries of the Persian Gulf produced about 1634.9 kilotons of plastic waste in 2016, which is expected to increase to 531.6 kilotons by 2030. As a result, the associated cumulative environmental impacts could be more severe. It can be emphasized that all the countries located in the coastal areas of the Persian Gulf need to improve their waste management.

In this situation, there is a need for a model to transition from the traditional linear state of the economy and replace its stable state. A circular economy as an efficient tool can reduce environmental impacts and prevent increased costs, delays, and other consequences. In recent years, the use of circular economy practices has been proposed as a new approach to the management of urban solid waste. Geissdoerfer, Savaget, Bocken & Hultink, (2017) define the circular economy as regenerative and consider it a model that reduces waste production and emissions. This system focuses on reducing the use of raw materials, protecting material sources, and reducing the carbon footprint (Murray, Skene & Haynes, 2015). In the circular economy, various measures such as recycling, use of second goods, etc. are emphasized. If they are followed in the waste management system, they will create many benefits. For example, recycling reduces the pollution from waste incinerators and reduces the pollution of water resources due to leachate. Also, less waste will be buried and burned, and fewer raw materials will be extracted from mines. In developing countries, less than 10% of municipal waste is recycled and only a small amount of these recycled materials have acceptable standards. It is important to promote efficient and environmentally friendly waste

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management. Increasing the rate of recycling and management of the collected waste can contribute to environmental and circular performance in countries, especially developing countries. To this end, it is vital for policymakers and scientists to be able to measure waste management performance and also assess whether the analyzed countries are on the right track to more efficient use of recycled materials. The main question of this research is: How is the efficiency of the circular economy of each of the Persian Gulf countries?

For this purpose, in this research, the research literature and the background of circular economy and urban solid waste have been examined. Then the methodology is stated. In the following, the findings are presented, and at the end, conclusions and research and practical suggestions and limitations are presented.

2- Literature review

In all countries, based on the growth of population and economy, the amount of waste production is increasing annually. Also, the amount of waste produced, its composition, and its origin differ among countries and are related to the structure of the economy and the level of investment in innovation and technologies. In this section, urban solid waste management and sustainable economy as well as the empirical background in the above fields are presented.

2-1- Municipal Solid Waste Management

In the past decades, especially since 1990, the amount of municipal solid waste production has increased according to private consumption costs and GDP. The amount and composition of urban waste in different countries are different according to consumption levels and patterns, urbanization rate, income level, lifestyle, and national waste management practices. Ten years ago, there were 2.9 billion urban residents, producing about 0.64 kg of MSW per person per day (0.68 billion tons per year). The report estimates that today these amounts have increased to about 3 billion people, producing 1.2 kg per person per day (1.3 billion tons per year). By 2025, this amount is likely to

increase to 4.3 billion urban dwellers, who generate about 1.42 kg per person per day of municipal waste (2.2 billion tons per year) (Hoornweg & Perinaz, 2012). MSWM refers to the activities and actions such as storage at source, collection, transportation, treatment, and final disposal that are required to manage MSW from origin to final destination. As a provision of urban governance, the public, environment, and attractiveness of a city depend on it (Wilson et al. 2013).

2-2- Circular Economy

The environment uses resources such as materials, water, and energy. The products and services and waste are produced. The production of waste in excess of the absorption capacity disrupts the ability of the environment to provide input resources and will ultimately cause their reduction(Hosseinpoor & ghorbanpour, 2023). The circular economy will create new resources as a closed-loop system by recycling the produced waste (McDonough & Braungart, 2013). For the first time, the concept of circular economy was introduced by Boulding in 1966. Pearce & Turner(1989), introduced the circular economy under the concept of environmental economy, which promotes competitiveness and sustainable development. Grafstrom &Aasma (2021), the circular economy promotes economic performance through waste recycling and cost reduction. Also, Keulen & Kirchherr (2017), states that in the circular economy, it focuses on reuse of materials, reduction of waste and recycling.

Recently, various researches have been conducted in this field. In 2021, Rafew & Rafizul investigated the capacity of producing, collecting, treating and burying municipal waste with a system dynamics approach until 2050, and the results showed that the per capita waste production will increase to 0.561 by the end of the year. Therefore, it is necessary to increase the budget for the development of wastewater treatment facilities. Bertanza, Mazzotti, Gómez, Nenci,

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Vaccari & Zetera (2021) addressed a topic called circular economy implementation in municipal solid waste management in an average Italian city with the aim of evaluating municipal waste management strategies in the city of Brescia over a 30-year period. The results of the study show that the separate collection is saturated with street containers by about 40%. The creation of incinerators eliminated the direct disposal of waste in landfills. With the introduction of the new collection system, separately collected waste increased by more than 73%, the amount of waste collected per capita decreased from 685.3 kg per year to 579.6 kg per year, a significant decrease in recyclable materials in unsorted waste was gained.

2-3- Social Progress Index

In the field of waste management, in addition to technical, institutional and financial issues, social progress index(SPI) will also be very useful and effective. social progress indicators such as education and public health and advertising will have a great impact on the collection of recyclable waste and thus the recycling rate.

2-4- A review of experimental studies

In the field of this research, several studies have been conducted in recent years, which include:

Marques & Teixeira (2022) in a study evaluated the performance of municipal waste in the European Union using DEA. The results show that policies should focus on environmental awareness through education, strengthening the human development index. Rios et al (2021) studied the environmental performance of European Union-28 (EU-28) members in municipal waste treatment. The results show that there is a positive relationship between environmental performance and the level of economic development. Abou Taleb & Farooque (2021) in research titled Towards a circular economy for sustainable development: using full cost accounting for urban waste recycling with

aim of investigating different accounting approaches and scenarios for sustainable urban waste management were investigated to find the most. The results of this study show that the system used in this study has the lowest waste costs and creates more economic and social incentives for households and brings environmental benefits. These findings have various implications for policymakers, government councils, waste managers, businesses, and communities in adopting plans for cost-effective, profitable, and socially acceptable waste reuse and recycling. Such a valuable addition to municipal solid waste management can contribute to sustainable environmental and social development in emerging markets and move towards a circular economy model. Yeh (2020) studied the dynamic inefficiency analysis of electricity revenue of municipal waste incinerators in Taiwan using data envelopment analysis. The analysis shows that the technical, income and allocation efficiency of public power plants is lower than that of private power plants. Xiao, Dong, Geng, Tian, Liu, & Li, (2020) investigated the issue of policy influence on municipal solid waste management in Shanghai with a system dynamics approach. The purpose of this research is to simulate the impact of different policies on urban solid waste management from a dynamic and complex perspective, and in this research, the entire process of waste production, separation, collection, and final treatment has been investigated in seven scenarios. The results show that economic policy has a great impact on the future municipal solid waste management. If the GDP growth rate decreases by 1%, municipal solid waste generation will decrease by 3.25 million tons in 2035. The municipal solid waste segregation policy reduces the total demand for landfills but increases the demand for food waste treatment facilities. The policy of the treatment method will not play many roles in reducing the total demand for landfill. Finally, the consequences of considered economic and demographic policies, strengthening the capacity of biochemical

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treatment, and comprehensive use of waste are suggested. In this research, it is predicted that this dynamic model and policy implications can help the municipal solid waste management of 45 other Chinese cities that plan to implement segregation regulations soon or even other global cities. In a study, Fatima, Chaudhry & Batool, (2019) evaluated the environmental effects of the urban solid waste management system in northern Lahore. The results of this study showed that about 10% of organic waste is composted by public facilities provided by the government. About 41 percent of the recycled materials are sold by households to junk shops, and 28 percent are sorted by conservation workers at dumpsites. According to the results, it was found that the existing system pollutes the environment in different ways. Bjørnbet, Skaar, Fet &Schulte, (2021), conducted a study to investigate the improvement of the sustainability performance of manufacturing industries through the circular economy. The results showed that circular economy measures can improve sustainability indicators. Grafstrom &Aasma (2021) found in a study that technological, organizational, market and cultural barriers are very important in the transition to circular economy. In their research, Kumar et al. (2021) identified lack of government support and lack of specific policies and protocols as the most important barriers facing the fourth generation industry of Indian multinationals. Moreno et al. (2021), considered the indicators of green purchasing and waste management, recycling and the use of green energy to be the most important performance indicators of the circular economy of Spanish companies. Prada et al. (2021) considered research and development in the environment and energy very important in the transition to a circular economy.In a study, Abokersh et al. (2021) presented a model for evaluating sustainable energy from the point of view of circular economy indicators. The results showed that reuse and recycling should always be pursued in order to meet environmental requirements

and achieve sustainability. Karayılan et al. (2021) during a study, investigated and evaluated circular economy practices in the value chain of plastic industries. The results showed that the observance of circular practices in the value chain of plastic industries can improve environmental performance and finally economic performance.

According to the above, it can be said that there are few studies in the field of combining the two concepts of CE and MWSM, especially in the discussion of improving the periodical performance of countries in the field of urban waste management. Therefore, measuring the performance of countries in this field can be very important.

3- Methodology

The purpose of this study is to evaluate the efficiency of circular economies in Persian Gulf countries in terms of Municipal Solid Waste Management. This research is applied in terms of purpose and descriptive survey in terms of data collection. Its statistical population was formed from Persian Gulf countries. In this research, the per capita value of MSW production and the dimensions of the social progress index "basic human needs", "basics of well-being" and "opportunity" are used as input and recycling as output in the model. SPI indicators show how well society can cover the needs of its members and improve their quality of life. In each of the dimensions, the performance of each country is presented on a scale of 0-100, where a score of 100 indicates the best performance. The use of social dimensions along with the economic dimension indicates the management of MSW with combined indicators such as human development and SPI. which shows the prevailing social and economic conditions, have a lot to do with it (Giannakitsidou et al, 2020). The data of the indicators used in this research were collected from social progress imperative centers and the World Bank. Briefly, the steps of the research are given in **Figure 2**.

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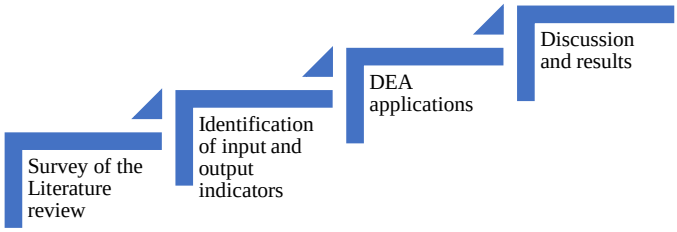

Figure 2 . Research method
Source: Resarch ResultIn

this paper, the circular economy indicators of Giannakitsidou et al (2020) are used. In the next step, the DEA model is used for evaluating the efficiency of circular Economies in Persian Gulf countries. In 1978, this approach was first presented by Charnes et al , which has been used to measure the efficiency and productivity of units due to its high flexibility and adaptability in various economic fields (Abolhasani Hastiani, Amini Milani, Sharif Moghaddasi, & Bayat, 2024). But it was less used in solid waste management (Emrouznejad & Yang, 2017). This approach measures the operational efficiency of decision making units in the form of a linear programming model(Giannakitsidou et al, 2020). The objective function and constraints of this model is as follows(Tsai et al., 2016; Charnes et al., 2006):

$$\text{Max } P_d = \sum_{oc=1}^{n} u_{oc}\, y_{d.oc}$$

$$st$$

$$\sum_{oc=1}^{n} u_{oc}\, y_{d.oc} - \sum_{ic=1}^{m} v_{ic}\, x_{d.ic} \le 0 \quad . \quad j = 1.\cdots.n$$

$$\sum_{ic=1}^{m} v_{ic}\, x_{d.ic} = 1$$

$$v_{ic} \ge 0\,.u_{oc} \ge 0. \quad ic = 1.\cdots.m \quad . \quad oc = 1.\cdots.n$$

In the above model, which is called the input-oriented CCR model, The efficiency of countries is denoted by P_d, and d = 1, 2,...s. $x_{d.ic}$,$y_{d.oc}$,v_{ic} and u_{oc} indicate the input and output and the weight of them in the model, respectively. In this research, the above linear programming model is solved with Lingo version 18.0 software.

4- Finding

In our study, the DMUs are the Persian Gulf countries under evaluation as shown in **Table 1.** The Persian Gulf Countries(DMUs)

Table 1. The Persian Gulf Countries(DMUs)
Source: Resarch Result

Persian Gulf Countries	DMUs
Iran	DMU_1
Iraq	DMU_2
Qatar	DMU_3
Kuwait	DMU_4
Bahrain	DMU_5
United Arab Emirates	DMU_6
Saudi Arabia	DMU_7

In this research, MSW production value per capita and social progress indexs as inputs and recycling as outputs are used as Giannakitsidou et al (2020) as shown in **Table 2**. Indicators of CE performance(CEP)

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Table 2. Indicators of CE performance(CEP)
Source: Resarch Result

Indicators of CEP	Input/output
MSW generated per capita	Input
Basic human needs	
Foundations of wellbeing	
Opportunity	
Recycling rate of MSW	Output

The data related to waste generated per capita and its recycling rate were extracted from the World Bank and the data related to three indicators of SPI were extracted from the social progress imperative website in 2021 as shown in **Table 3**. Data related to indicators

Table 3. Data related to indicators
Source: Resarch Result

	MSW generated per capita (ton/population)	Basic human needs	Foundations of wellbeing	Opportunity	Recycling rate of MSW
Iran	0.207	0.013	0.015	0.022	0.05
Iraq	0.316	0.014	0.018	0.023	0.05
Qatar	0.357	0.012	0.015	0.022	0.03
Kuwait	0.394	0.011	0.013	0.017	0.21
Bahrain	0.637	0.012	0.014	0.024	0.08
United Arab Emirates	0.610	0.011	0.014	0.019	0.2
Saudi Arabia	0.450	0.012	0.015	0.024	0.15

It should be noted that among the input variables, the variable of waste production per capita has a negative nature and the SPI indicators have a positive nature. For this purpose, the values of SPI indices are reversed and included in the model. In the above table, the numbers related to these indicators are reverse values. The input-oriented CCR model has been implemented within the LINGO Softer environment. By solving linear programming problems, the optimal value of the objective function was obtained for each DMU as shown in**Table 4**. Score of DMUs

Table 4. Score of DMUs
Source: Resarch Result

	EC performance	
	Score	Rank
Iran	0.453	4
Iraq	0.296	6
Qatar	0.157	7
Kuwait	1	1
Bahrain	0.353	5
United Arab Emirates	0.952	2
Saudi Arabia	0.654	3

As shown above, the countries of Kuwait (1), United Arab Emirates (0.952), Saudi Arabia (0.654) and Iran (0.453) respectively have the highest circular economy performance compared to other countries in the Persian Gulf. The objective of this study is to analyze DMUs efficiency from the perspective of variable returns to scale(VRS). This means that the decision makers of the countries under study should know that reducing the input of the model does not lead to a proportional change in the outputs. Next, the EC performance of the Persian Gulf countries is shown in **Figure 3**. The EC performance of the Persian Gulf countries

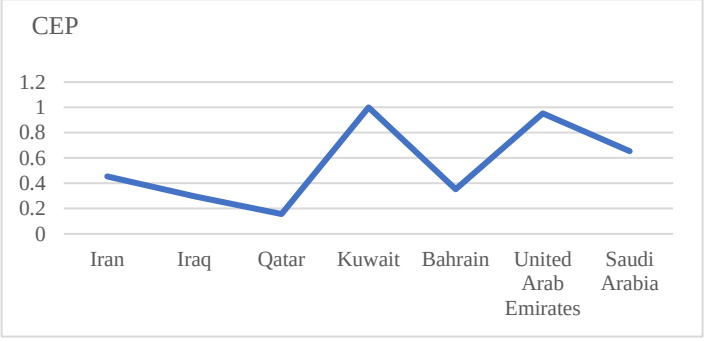

Figure 3. The EC performance of the Persian Gulf countries
Source: Resarch Result

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As shown in the figure above, the countries of Kuwait and the United Arab Emirates respectively have the highest circular economy performance compared to other countries in the Persian Gulf.

5- Conclusion

In the last few decades, some triggers such as global warming, climate change, greenhouse gas emissions, acid rain, etc. have caused governments to move towards a new paradigm of environmentalism in order to reduce environmental degradation. The purpose of this study is to provide a data envelopment analysis approach (DEA) to measure the performance of the Persian Gulf countries in the management and exploitation of municipal solid waste (MSW). This research is applied in terms of purpose and descriptive survey in terms of data collection. Its statistical population was formed from Persian Gulf countries. In this research, the per capita value of MSW production and the three dimensions of the social progress index "basic human needs", "basics of well-being" and "opportunity" are used as input and recycling as output in the model. DEA model is used for evaluating the efficiency of circular Economies in Persian Gulf Countries This technique seeks to maximize the ratio of the weighted sum of the outputs to the weighted sum of the inputs. The data relating to waste generated per capita and its recycling rate were extracted from the World Bank and the data related to three indicators of SPI were extracted from the social progress imperative website. The DEA model was implemented within LINGO Softer. The results show the countries of Kuwait and the United Arab Emirates respectively have the highest circular economy performance compared to other countries in the Persian Gulf. A careful study of the existing literature shows that there is very little knowledge of CE and MWSM, especially in the discussion of improving the periodic performance of countries in the field of municipal waste management. Therefore, measuring the performance of countries in this field can be very important. Studying the data shows that according to the statistics of the World Bank, these countries recycle 21% and

20% of the produced waste, respectively. Of course, they perform well in the input indicators compared to other countries.

This result is consistent with the findings of the study of Alipour & Parnian (2021). In that study, the United Arab Emirates and Kuwait ranked first and second, respectively, in terms of environmental performance. Like this study, Iran ranked fourth. It is worth noting that SPI indicators were not considered in that study. Also, in the study of Nikbakht et al (2022), United Arab Emirates ranked first among other Persian Gulf countries in terms of environmental performance index.

Although their performance is much lower than that of some European countries such as Slovakia in these indicators as shown in Giannakitsidou et al(2020) study. As the data analysis shows, per capita waste generation in Iran is much lower than other countries. Iran has an average performance in terms of SPI indicators. But in terms of circular performance, it has been assigned the fourth rank. The reason for this is its very low recycling rate. Policymakers should use advertising, education, etc. to increase the amount of recyclable waste collection. In order to improve their performance, countries need to reduce waste generation while increasing recycling rates. Education and public investment can help in this regard. Also, they should improve their performance in terms of SPI indicators. Countries also improve access to basic medical care, food, water and housing. Also, they should provide citizens access to basic education and even advanced education for those in the country who wish to increase their knowledge and skills. According to the results, it is suggested that other Persian Gulf countries improve their performance in recycling. The data of these countries shows that they recycle nothing less than 10% of their production waste. It is suggested to evaluate the performance of Persian Gulf countries with European countries in order to better explain their performance. Also, it is suggested to use other indicators such as reuse in calculating the performance of the circular economy. Since the discussion of environmental management and circular economy at the level of the studied countries is new. For this purpose, the data of these countries, especially the recycling rate index and SPI

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indices, in the past years are not much different from the current year and practically will not reach a comparable output. For this purpose, it is suggested that future researchers can study in the same field in different years with a time interval of 5 years and compare the results of different years. However, there is no doubt about the validity and reliability of this study. But more thought is needed in generalizing the results.

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Prioritization of The Economic Sectors of Isfahan Province from The Perspective of The Importance of Water Resources and Considering The Three Goals of Social, Environmental and Economic Sustainable Development

Zahra Nasrollahi,* Elham Operajouneghani**

** PhD student in Economics, Economic Department, Faculty of Administrative Sciences & Economics, University of Isfahan, Isfahan, Iran. (Corresponding Author)*
*** Professor of economics, Faculty of Economics management and Accounting, Department of Economics, Yazd University, Yazd, Iran.*

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CORRESPONDING AUTHOR'S:	***Postal address:***
Email: **nasr@yazd.ac.ir**	***Pajohesh st, Yazd Univesity, Faculty of Economics management and Accounting, Yazd, Yazd, Iran.***
0000-0002-9537-136X	

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ABSTRACT

The purpose of this research, study seeks to prioritize the activities of Isfahan Province with sustainable criteria and by emphasizing the importance and limitation of water resources. For this purpose, first, the national input-output table of 2016 published by the Central Bank of Iran and the SFLQ method is used to prepare an input-output table for Isfahan Province. Then, the economic sectors of the province are prioritized with the TOPSIS method and six criteria including water consumption, energy consumption, pollution, job creation, inter-sector linkages, and value added. The results of the study show the importance of water consumption as a criterion. Prioritization with and without this criterion taken into account yields significantly different results. For example, in the prioritization of the sectors according to the water intensity criterion, the agriculture sector was in the twentieth place, while this rank was the second in the prioritization without considering that criterion. Also, in the sector of "manufacture of leather apparel", this criterion was downgraded from the ninth to the thirteenth rank considering the water intensity criterion. Similarly, the sectors of "manufacture of textiles" and "manufacture of rubber and plastic products" were ranked 7th and 9th, respectively, while the ranks of these sectors without considering the water intensity criterion were fifteen and twelve.

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1- INTRODUCTION

Scarcity and justice have always been the concerns of human beings. To make a choice between these two concepts, capitalist systems have given priority to scarce resources and the optimization of their use in the hope that economic growth will also provide justice. In recent decades, environmental degradation, increasing pollution, extinction of

various animal and plant species, climate change and global warming have cast doubt on the unbridled growth approach adopted by the capitalist system. This approach has proposed the idea of 'sustainable development' as a solution to those problems. The concept of sustainable development, which was proposed in 1980, was actually a response to the destructive environmental and social effects and to the concept of economic growth in general, in such a way that this opinion originated from environmental trends (Zakerian et al., 2014). Also Sustainable developmrnt instead of focusing only on the economic aspect of development, considers the social and environmental aspects of development along with its economic dimesion and takes into account the goal of economic growth in countries along with maintaining the conditions required for sustainable growth (maddah & mohamadnia sarvi, 2017). Based on this idea, it is possible to take advantage of development opportunities through the interaction and adaptation of social, environmental and economic goals. The approach focuses on sustainable development, which gives importance to the equitable distribution of economic growth benefits (social and environmental goals) and pays attention to scarcity (economic goals). On this basis Sustainable development is development that can continue for a long period of time without causing damage to the environment (Shafiei, 2018). These points bring one to the conclusion that, to exploit resources, not only economic interests but also social, environmental and economic goals should be taken into consideration.

Sustainable development is more important for developing countries, where achieving development is a priority and modern technological advancements have increased their distance from the developed world. In fact, with the consensus of the great powers to maintain environmental security and possibly lay future restrictions on the exploitation of environmental resources, on the one hand, and the negative consequences of ignoring environmental protection, on the other hand, it has become a necessity not a choice to pay attention to sustainable development. Because the needs and capabilities of different regions are different, it is not justified to use national plans at a regional level. Due to the dependence of all sustainable development

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goals on water resources, it can be said that water is at the heart of all aspects of sustainable development (Ait-Kadi, 2016). Since in recent years, the continuation of economic growth along with the development of urbanization and population growth has led to further destruction of the environment and the reduction of scarce natural resources, including water resources, this issue has led researchers to pay more attention to the environmental aspect of sustainable development. From the perspective of sustainable development, priority is given to activities that, while providing the most economic benefits, put the least pressure on water resources and the environment of the region (Nasrollahi & Zarei, 2017). In Iran as a developing country, environmental issues took on a wider and more visible dimension. Although Iran has devised measures to overcome environmental challenges, the gap with global indicators is large, and according to many activists in this field, Iran is approaching a multi-faceted environmental crisis (Rezayan ghayehbashi & Marzban, 2020). In fact, economic, political, cultural and social issues have a two-way relationship with the environment, and any policy adopted for the environment will have significant consequences on other areas. It is also clear that a lack of attention to environmental challenges brings irreparable costs to society. Therefore, the prioritization of economic activities is also considered by examining environmental issues. However, a review of the studies conducted in this field shows that most of these studies have emphasized the pollution aspect of economic activities and less have addressed the scarcity of natural resources, including water. Meanwhile, according to many researchers, the lack of water can endanger the growth and development of water-scarce areas (Okadera et al., 2015).

The location of Iran in the arid and semi-arid climatic region and the uneven distribution of rainfall have led to the aggravation of the water shortage in Iran, so that the increase in demand has faced the country with the limited supply of water resources. Due to the lower rainfall than the global average and the low efficiency of using water resources, the situation will become more complicated in the future. The importance of this issue in Isfahan province due to its economic

status and its location in the arid and semi-arid region of Iran is much higher than other provinces of the country, so that the water supply of this province has become one of the main concerns of the provincial officials. But the efforts that have been made in this field in previous years have been directed towards water supply (including water transfer plans from Chaharmahal and Bakhtiari, Khuzestan and Lorestan provinces), while today, in order to have sustainable access to water resources, demand-side management that improves water distribution and consumption as an alternative approach instead of increasing supply, has been considered (United Nations, 2006).

Therefore to prioritize the economic activities, it is necessary to pay attention to the water shortage issue and the other environmental considerations. In this regard, the present study has identified and prioritized the economic activities of Isfahan Province by using the criteria for different dimensions of sustainable development and with an emphasis on the importance of water resources. To this end, input-output models and the TOPSIS method are innovatively combined to provide a proper picture of prioritizing the economic activities in the province. The rest of this article is organized in several sections. The second section provides the research background. The third section presents the Background studies, and the forth section research method and the data. The findings of the study are put forth in the five section. The last section is dedicated to the conclusion of the study and suggestions for future research.

2- Research background

Limitation of resources is the main reason for the idea of prioritizing economic activities. Due to this problem in the economy, the growth and expansion of no economic sector is cost-effective. It causes a waste of capital at the national level, with the natural consequence of failing to achieve economic growth and development. The speed and quality of achieving this goal depends on the amount of investment and the economic sectors in which the investment is made. Certainly, the correct identification of the capable and efficient sectors that have

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priority helps to attain the goal. In fact, the first step to optimal resource allocation is to identify the key and prioritized sectors.

However, identifying key sectors is not easy. Is a key sector the one with the highest output or the one that creates the most exports or employment? It is quite clear that the choice of a measurement criterion greatly affects the results. Different sectors become 'key' ones under different assumptions and for different purposes. In the development literature, one of the criteria for selecting the priority sectors for investment is the amount of backward forward linkage of economic sectors. These sectors, as key sectors, should be prioritized in economic development programs due to their deep impact on the economy. Therefore, based on this point of view, the sectors that have high backward and forward links are known as key sectors of the economy, and in fact, the concentration of investment in key sectors provides the possibility of creating more incentives for faster growth of production, income and employment (Opera jouneghani & Nasrollahi, 1400).

In fact, what should be considered is that identifying key economic sectors is not a static process but a dynamic one. This is because, in addition to resource scarcity, which is always a challenge for societies, there is a change of priorities for various reasons. The over-exploitation of the environmental resources as a result of competition in production and consumption has caused a wide range of environmental problems. The increasing importance of environmental issues arising from economic activities has recently led to the expansion of traditional methods to calculate links by using the parameters of the environment and natural resources (Lenzen, 2003). One of the environmental parameters is water resources.

A review of the literature shows that most of the studies in the field have only used one or two criteria to prioritize economic activities. Also, as far as the authors of this study know, the research ever done in Iran has ignored the sustainable development criteria. The innovation of the present study is the use of sustainable development criteria to prioritize economic activities.

Based on the foregoing and due to the severe shortage of water resources in Isfahan Province, ignoring the limitations of these

resources in the development plans and investment priorities of the province can lead to decisions that are not in line with the goals of sustainable development in the region. Considering the dimensions of sustainable development, this study consists of the three categories of economic, social and environmental criteria, as depicted in **Figure 1**.

These criteria have been evaluated based on their importance. For example, considering the place of water in the 17 goals of sustainable development, which consider water as the heart of sustainable development, it is necessary to consider the water criterion.

Regarding the criteria of energy consumption and pollution, since the increasing dependence on energy has caused the interaction of this sector with other economic sectors and has made the speed of economic growth and development dependent on the level of energy consumption, and as a result of that and their consumption, the emission of greenhouse gases and pollution Increased, it is important to consider these indicators. On the other hand, since employment is one of the most important issues that must be considered as the first condition to achieve growth and development, then it is important to examine it. Also, the economic criteria of comparative advantage and inter-sectoral linkages as growth drivers in every region are important.

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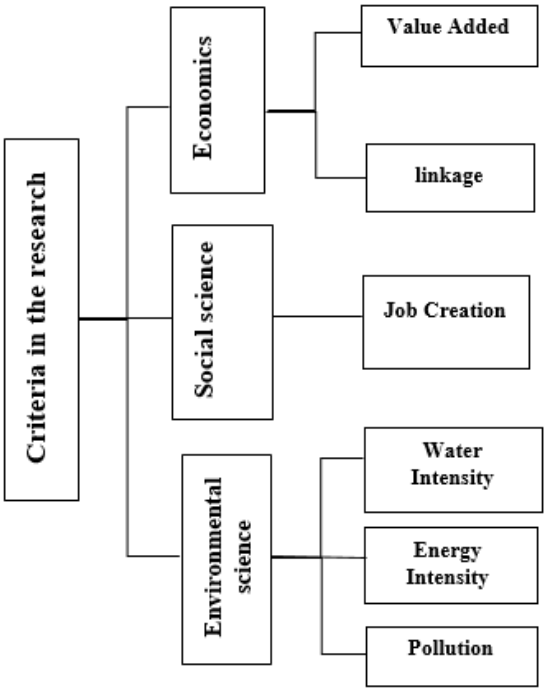

Figure 1. Criteria studied in the research based on the dimensions of sustainable development

3- Literature review

A review of previous studies in the field of prioritization of economic activities indicates that most of these studies have determined the priorities according to the theory of unbalanced growth and based on financial constraints (Nasrollahi & Zarei, 2017). In the continuation of this research, a review is presented of some internal and external studies conducted in the field of prioritizing economic activities according to sustainable development indicators.

With an emphasis on the theory of unbalanced growth and by considering environmental pollution, Jahangard (2015) used the input-output table of 14 sectors in 2006 to prioritize the economic activities in Iran. The researcher first identified the key sectors of the Iranian

economy according to the concept of backward and forward linkages and then calculated the backward and forward linkages of the environment by measuring the amount of pollutants emitted from the consumption of fossil fuels. Next, using a multi-criteria decision-making model, the backward and forward linkages of the economic activities were maximized and the environmental links were minimized. On this basis, the high-priority sectors were identified. The results showed that the "textiles", "clothing and leather", "oil refineries" and "other industries" sectors had the highest priority for investment. Also, considering the environmental pollution, the results of prioritization were different from the findings of traditional methods, which only consider inter-sector linkages.

Nasrollahi and Zarei (2017) integrated an input-output model to the analytic hierarchy process (AHP) to prioritize the industrial activities in Yazd Province. They did it with an approach to sustainable development and an emphasis on the importance of water resources. The prioritization was conducted with five criteria including water use, employment, inter-sector linkages, pollution and value added. According to the results, the sector of manufacturing electrical equipment and office machinery had a higher priority for investment than the other sectors.

Guo et al. (2018) used the input-output model and the demand elasticity approach to define the key sectors driving the energy consumption and CO2 emissions in China. The results indicated that the key economic sectors consuming substantial fossil energy and emitting tremendous amounts of CO2 were the manufactures of basic chemicals, building constructors, wholesale and retail trades, road transportation and real estate.

In their study, Teymouri et al. (2018) prioritized the investment in economic sectors with the aim of minimizing the emission of carbon dioxide and maximum the economic growth. For this purpose, they used the social accounting matrix of 2011 and calculated the direct and indirect carbon dioxide emitted from the production processes in the economic sectors and the production multiplier. Also, by normalizing these indicators and combining their indices, they determined the priorities for investment. The results showed that, in terms of the

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combined index, the sectors of food production, agriculture, construction and metal products had the highest production multiplier and the lowest amount of carbon dioxide emissions.

Alvandizadeh et al. (2019) identified investment bottlenecks and priorities in Sistan and Baluchestan Province. The numerical taxonomy and the Topsis model served to compare and rank those investment priorities. The numerical taxonomy was applied to 25 indicators of investment. Fishing, education and real estate sectors were found to be of the highest investment priorities, and hotels and restaurants had the next rank. The negative indices were eliminated, and the other 21 indicators had different weights according to their special status in the province and the theoretical foundations of investment. As the Topsis model suggested, fishing, real estate and agricultural sectors were of a higher investment priority than hotels and restaurants

Solangi et al. (2019) used the Analytic Hierarchy Process (AHP) and the fuzzy technique to evaluate the energy strategies for sustainable energy planning. It emerged that providing low-cost and sustainable electricity to residential, commercial and industrial sectors (WO5) was a highly prioritized energy strategy. In contrast, the use of coal resources to generate electricity (WO2) was prioritized as the least favored energy strategy.

Rahimdel and Nofarasti (2020) emphasized the importance of mines in economic growth and the high added value of this sector in investment. As they stated, it would be impossible to create a proper strategic vision and determine investment preferences in this vital economic sector without considering internal constraints such as water and energy resources. The present study aims to investigate the preferences of investment in Iranian minerals. To this end, hybrid models (MADM) are used, and energy consumption efficiency, water consumption efficiency and labor productivity are considered as the main decision criteria. The combined fuzzy-DEMATEL-TOPSIS and fuzzy-DEMATEL-PROMETHEE methods are also used to investigate the comparative advantages in the exploitation of the mineral resources in Iran. According to the results of this study, water efficiency and the

value added of production are the most important in prioritizing the mineral resources of the country. Moreover, gold, coal, copper, iron, kaolin, refractory clay, lead and zinc minerals are found to be of priority in succession

Pavlović et al. (2021) used FAHP[1] to assess the potential of renewable energy sources in the Serbian electricity sector. The weights were estimated according to the values of the energy indicators and expert judgments. It was shown that hydropower and biomass have the highest potentials among the available renewable energy sources.

In the review of the studies conducted in this field, it is clear that most of the studies have investigated the aspect of pollution and energy consumption of economic sectors and only one or two criteria are investigated, but in the current research, in addition to the pollution criterion, five other criteria of water and energy consumption, intensity of inter-sectoral communication, job creation and value added have also been investigated. On the other hand, in the studies conducted in this field, the issue has been investigated from the national dimension, and the regional dimension has been neglected. Therefore, according to the mentioned weaknesses, The present research has prioritized the economic activities of Isfahan province by combining the input-output approach and the TOPSIS method and by considering the six criteria of water consumption, energy consumption, pollution, intensity of inter-sectoral communication, job creation and added value, and emphasizing the importance of water resources.

4- Methodology

Therefore, the present study prioritizes the economic activities in the province of Isfahan by combining an input-output model and the TOPSIS method as well as considering the six criteria of water abstraction, energy consumption, pollution, intensity of inter-sectoral relations, job creation, and value added. **Figure 2** shows the research process.

[1] Fuzzy Analytical Hierarchy Process

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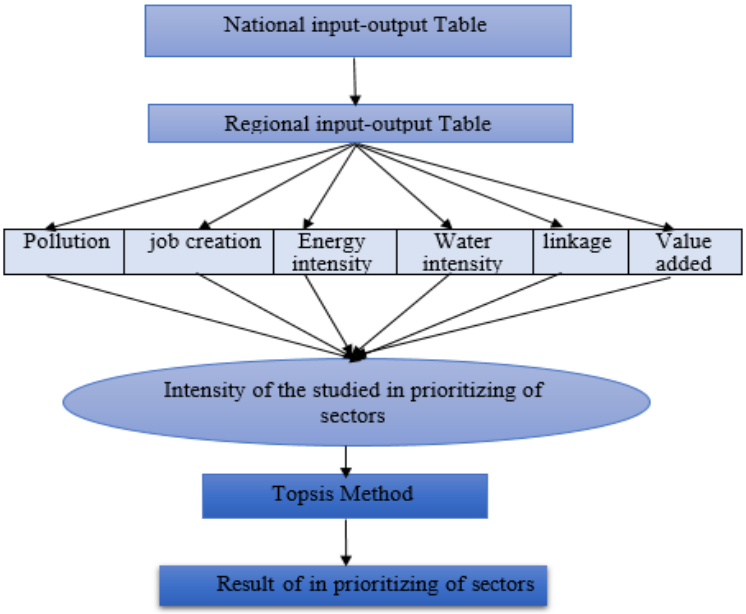

Figure 2. The general structure of the article and the research process

To achieve the objectives of the research, first, the national input-output table of 2016, the Central Bank data and the SFLQ quota method were used to prepare a twenty-sector input-output table for Isfahan Province. The sectors are introduced in **Tabel 1** The advantage of preparing a regional input-output table is that it is possible to identify each region's facilities and limitations of production and economical construction by relying on them and using them in the region's development and achieving national development with regional development (javaheri, Moradi & Fehgheh Majidi, 2023).

Tabel 1. Economic sectors in Isfahan Province
Source: Research findings

Sector	Activity number	Sector	Activity number
Manufacture of basic metals	11	Agriculture	1
Manufacture of fabricated metal products except machinery and equipment	12	Oil, natural gas and other mines	2
Manufacture of machinery and equipment not classified elsewhere	13	Food products, beverage and tobacco	3
Manufacture, repair and installation of subsidized products as well as electronic, optical and electrical equipment	14	Manufacture of textiles	4
Manufacture of motor vehicles and other means of transportation	15	Manufacture of leather apparel	5
Manufacture of furniture and n. c. e	16	Wood and its products	6
Electricity, gas and water supply	17	Manufacture of paper, paper products and printing devices	7
Construction	18	Manufacture of coke, refined oil products, nuclear fuels, and chemical materials and products	8
Transportation	19	Manufacture of rubber and plastic products	9
Other services	20	Manufacture of non-metallic mineral products	10

Then, using the internal multipliers of the province, the forward and backward linkages, direct and indirect water intensity, direct and indirect energy intensity, and direct and indirect employment of the economic sectors of the province were calculated. Shannon weighting method was also used to weight the criteria. Finally, the prioritization of the sectors in Isfahan Province was done with the TOPSIS method and the desired criteria. In the following sections, more details are

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provided on the methods and materials as well as the data collection in this research.

4-1- Shannon Entropy Method

Shannon entropy method served to determine the weight of each criterion in the study. This method is an alternative to using the opinions of experts, and it is advantageous in that the opinions and personal judgments of individuals are not involved in it; the weight of each criterion is determined based on a decision matrix (Dorostkar Ahmadi & Dehghani, 2020). There were a number of steps to determine the weights by Shannon entropy. First, all the decision matrices were normalized through Equation(1) and the value of E (entropy) was estimated using Equation(2).

(1) $$r_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}} \forall\, i, j$$

(2) $$E_j = -h \sum_{i=1}^{m} r_{ij} \times log\, r_{ij}$$

(3) $$h = \frac{1}{ln(m)}$$

In Equation(1) and Equation(2), x_{ij}, the values studied in the research and *m* and *n* represent the number of the sectors and indicators studied in the research.

Next, the weight vector was calculated, and the weight of each criterion was determined using Equation.

(4) $$W_j = \frac{(1-E_j)}{\sum_{j=1}^{n}(1-E_j)}$$

The results of these calculations are presented in Table (3).

4-2- Topsis Model

The TOPSIS model, as a multi-criteria decision-making method, is a simple but efficient method of prioritization. It is one of the best methods in which *m* options are evaluated by *n* methods (Fallahi et al., 2017).

This technique, which is a compensatory model based on MCDM methods, follows a mathematical logic. This logic first introduces a "positive ideal solution" and a "negative ideal solution". The positive one is a solution that increases the profit criterion and

decreases the cost criterion. In other words, the negative ideal solution has the opposite value of the positive one. Then, all the examined options are compared with the best and the worst options, and the linear distance of each option from the best option and the worst option is measured. Finally, the option at the most distance from the worst option and the least distance from the best option is selected as the best or the optimal option (Khatami Firouzabadi et al., 2013).

This technique is used to prioritize the identified options and select the best option. The important advantage of this technique is the use of criteria and indicators with different measuring units, which can be positive or negative in nature and intrinsic value, in other words, negative and positive indicators can be used in a combined form in this technique (Kiani Ghaleh no, 1400). In addition, in the TOPSIS method, the weight of all options and criteria is involved in decision-making, and no weight is ignored in this method, which is another advantage of this method (Khatami Firouzabadi et al., 2013). In the current research, because the investigated criteria have different units and include both positive and negative criteria, the TOPSIS method is considered a suitable method for prioritization.

The TOPSIS method can be described as a sequence of steps as follows:

1) Calculate the normalized decision matrix. This regards the formation of a decision matrix with a number of criteria and options. The criteria are placed in the columns and the options in the rows of the matrix.

(5) $$N_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} {x_{ij}}^2}}$$

2) Calculate the weighted normalized decision matrix. The weighted normalized value V_{ij} is calculated with Equation(5) where W_j is the weight of j criteria, and $\sum_{j=1}^{n} w_j$=1.

(6) $$V_{ij} = W_j N_{ij} \ldots\ldots\ldots i=1,\ldots\ldots,m, j=1,\ldots\ldots\ldots,n$$

3) Determine the positive ideal and negative ideal responses:

(7) $$A^{+} = \{(V_1{}^{+}, V_2{}^{+}, \ldots\ldots, V_n{}^{+})\} = \left\{\left(max_{V_{ij}}\middle| i \in O\right), \left(min_{V_{ij}}\middle| i \in I\right)\right\}$$

$$A^{-} = \{(V_1{}^{-}, V_2{}^{-}, \ldots\ldots, V_n{}^{-})\} = \left\{\left(min_{V_{ij}}\middle| i \in O\right), \left(max_{V_{ij}}\middle| i \in I\right)\right\}$$

Thus, the best response (A^{+}) is selected as the option that contains the highest values of the criteria, and the worst response (A^{-}) contains the smallest values. In Equation(6), *O* corresponds to the utility criteria, and I corresponds to the cost criteria.

4) Calculate the Separator Dimensions: Using the Euclidean criterion, the distance of each point from the ideal response (positive and negative) is estimated through Equation(7):

(8) $$d_i^{+} = \left[\sum_{j=1}^{n}\left(V_{ij} - V_j^{+}\right)^2\right]^{1/2} i = 1, \ldots., m$$

(The distance of option i from the positive ideal)

(9) $$d_i^{-} = \left[\sum_{j=1}^{n}\left(V_{ij} - V_j^{-}\right)^2\right]^{1/2}, i = 1, \ldots., m$$

(The distance of option i from the negative ideal)

5) Calculate the relative proximity to the ideal response. The relative proximity of option A_i to A^{+} is as Equation(8). There is also $R_i \in$ [0 to 1].

(10) $$R_i = \frac{d_i^{-}}{d_i^{-} + d_i^{+}}, i = 1, \ldots., m$$

6) Rank the priorities. Using R_i, the options can be ranked in a descending order. In other words, any option with a larger R_i has a higher priority (Moazzami Gudarzi et al., 2014).

5- The Data and Their Collection

The data of this research were of a library type and included the statistics of the economic sectors in Isfahan Province. They were analyzed in terms of six criteria. In order to match the data with the input-output table of the Central Bank in 2016, the statistics of that year was used. The method of collecting and calculating the data of each criterion is explained below.

5-1- Water Intensity and Energy Intensity

This research provides a more realistic picture of the water intensity of the sections by calculating the direct uses and the amount of the indirect water intensity. The direct water intensity of each activity was calculated as the quantity of the consumed water was divided by its output (Equation(9)). Then, the total water intensity (direct and indirect) for each activity was calculated with the input-output table of the province and Equation (10) (Zhao et al., 2009) as follows:

(11) $$w_j^d = \frac{w_j}{x_j}$$

(12) $$w_j^t = \sum_{i=1}^{n} w_i^d l_{ij}$$

where w_j ،x_j ، w_j^d w_j^t and n represent the amount of water consumption, output, direct water, the total water of each section j and the number of the sections in the input-output table of the province, respectively. The same procedure was used to estimate the amount of energy consumption.

The data on the water consumption in non-industrial sectors, including "agriculture", "services" and "mining", were obtained from the Jihad Agricultural Organization of the province, the Water and Sewerage Company of the province, and the reports from the Statistics Center of Iran. Also, water consumption in the two sections of "building" and "water, electricity, gas" was estimated by the adjustment of the national data to the output, assuming the same water productivity (ratio of output to water consumption) at the national and provincial levels. In the case of the industrial sectors, a share of water was allocated to each sector with the assumption that the consumption of each industrial sector in the province was the same as that in the whole country (announced by the Planning Deputy of the Ministry of Industry, Mines and Trade).

Regarding the amount of energy consumption in these sectors, the statistics on the consumption of five energy carriers including diesel, natural gas, gasoline, kerosene and liquefied gas were extracted for various economic activities at the national level and on the basis of the hydrocarbon balance in 2016. Moreover, to calculate the amount of

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energy consumed by the economic activities of the province, the national data were adjusted to the output. After the data collection, due to the existence of different units in each energy carrier, the units in the energy consumption sector were unified in terms of MMBTU. At this stage, the energy consumption of each sector was multiplied by the values in **Tabel 2** so as to obtain the amount of the energy consumption in each sector in terms of MMBTU.

Tabel 2. Conversion coefficients of all types of energy carriers per million BTU
Source: Deputy Minister of Electricity and Energy - Office of Planning and Macroeconomics of Electricity and Energy

Liquid gas	Kerosene	Gasoline	Natural gas	Diesel
42.69	34.11	31.89	40.93	35.82

Energy is consumed in two types of industries including workshops with 10 or more employees and those with fewer than 10 employees. Energy consumption in the former was extracted directly from the corresponding census in 2016. In the latter case, since the last corresponding survey was made in 2002, the energy productivity was assumed to be constant, and then the energy consumption of those industries in 2016 was estimated at a national level. Finally, the data were adjusted with regard to the output, and the energy consumption in the province was estimated.

The results of the calculations indicated that the agriculture sector was the greatest consumers of water. Also, the sectors of manufacture non-metallic mineral products and transportation in Isfahan Province emerged to be the greatest consumers of energy.

5-2- Linkages

Linkage indices show the severity of intermediary dependencies with other sectors (Banouei et al., 2007). In the present study, a traditional method has been used to estimate the linkages. With regard to conventional input-output relationships, the basis for measuring a backward or forward linkage in the traditional method is Equation (11),

where $x = [x_1, \dots \dots x_n]^t$ is the column vector of the gross output, z is the intermediary exchange matrix, $e = [1, \dots \dots, 1]^t$ is the identity matrix, $A = \lfloor a_{ij} \rfloor$ is the matrix of technical coefficients and $f = [f_1, \dots \dots . . f_n]^t$ is the final demand vector.

(13) $$x = ze + f \Rightarrow x = Ax + f$$

(14) $$a_{ij} = {}^{z_{ij}}/_{x_j}$$

Assuming that the technical coefficients are constant, the direct linkage is obtained based on the $A = \lfloor a_{ij} \rfloor$ matrix. The direct linkage index(13), called DBL, is obtained from the column of matrix A. This index indicates how much activity *J* should increase its purchase from the supply sectors if it wants to increase its outdated unit.

(15) $$DBL_j = \sum_{i=1}^{n} \frac{x_{ij}}{x_j} = \sum_{i}^{n} a_{ij}$$

Next, the Leontief inverse matrix is used to estimate the direct and indirect backward linkage indices. The sum of the column for each sector shows how much the output of that sector will increase directly and indirectly in the whole economy. It is calculated in terms of a one-unit increase in the final demand of sector j. This linkage index is obtained using Equation(14).

(16) $$DIBL_j = \sum_{i}^{n} l_{ij}$$

(17) $$L = (I - A)^{-1} \quad , \quad L = [l_{ij}]$$

The Gosh supply-oriented matrix is used to estimate the forward linkage index. Its production level is formulated as Equation(16):

(18) $$x' = \acute{e}z + \acute{v} \Rightarrow \acute{x} = \acute{x}B + \acute{v}$$

where $\acute{x}$ is the row vector of GDP, *B* is the output matrix, and $\acute{v}$ is the line vector of the production factors. Assuming that the output coefficients are constant, the above relation can be turned into Equation(17).

(19) $$\acute{x} = \acute{v}(1 - B)^{-1}$$

The parameter $G = (1 - B)^{-1}$ is called the inverse Gosh matrix. Similarly, DFL and DIFL, which represent the direct backward linkage

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and the direct and indirect backward linkages, are obtained from the sum of the rows in matrices $B = [b_{ij}]$ and $G = [g_{ij}]$. The normalized forms of the backward and forward linkage indices, which are used to identify the key sectors and activities in the economies of countries, are introduced in Equations(18) and (19).

(20) $$DIBL_j^n = \frac{\frac{1}{n}\sum_{i=1}^{n} l_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} l_{ij}}$$

normalized direct and indirect forward linkage

(21) $$DIFL_i^n = \frac{\frac{1}{n}\sum_{j=1}^{n} l_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} l_{ij}}$$

normalized direct and indirect backward linkage

The existence of normalized backward and forward linkages greater than one for a sector means that the average performance of that sector is greater than the average performance of the economy as a whole. In other words, sectors with $DIBL^n$ and $DIFL^n$ greater than one are considered as key sectors. Therefore, in this study, the three sectors of "manufacture of rubber and plastic products", "manufacture of fabricated metal products except machinery and equipment" and "transportation" were found to be the key sectors of Isfahan Province.

5-3- Job Creation

In order to provide a more realistic picture of job creation, in addition to direct employment, indirect employment was also calculated through the internal input-output table of the province. To this end, Equation (22(was used as follows:

(22) $$L_j = \sum_{i=1}^{n} e_i l_{ij}$$

where e_i and L_i represent direct employment and the total of each sector, respectively. The data about the employment in the industrial sectors were based on the census on industrial workshops and the adjustment of national to provincial data. The data related to the other sectors were also obtained from the census of the labor force taken by the Statistics Center of Iran. As the calculations indicated, among the

activities in Isfahan Province, agriculture, construction, transportation and other services were found to have the highest total employment.

5-4- Pollution

Ever since the industrial revolution, the intense need for energy has led to the excessive use of fossil fuels. The exploitation and easy access to fossil fuels compared to other energies has caused these fuels to be considered relatively cheap and economical, but considering the external consequences of fossil fuels, these types of energies can no longer be considered as the best option (Faraji Dizaji & et.al, 2023). since the increase in energy consumption in the world leads to the increasing emission of greenhouse gases, especially CO_2 due to the counsumtion of fossil fules. Considering the destructive effects of carbon dioxide (CO_2) as the most abundant greenhouse gas (Bazazan and Pourbagher, 2013) on the environment and climate change, the criterion for the pollution of economic sectors in this study is the amount of carbon dioxide emission. Thus, after the consumption of energy carriers was calculated with the emission coefficients recommended by the International Committee on Climate Change (IPCC), the amount of CO_2 emission was estimated in all the sectors. The results showed that the sectors of "manufacture of coke, refined oil products, nuclear fuels, and chemical materials and products", "manufacture of non-metallic mineral products" and "manufacture of basic metals" were the most polluting ones.

5-5- Value Added

The comparative advantage index of the value added was calculated with the ratio of the value added of each sector to the total value added of the province compared to the corresponding ratio in the country. This was done through the following equation as also used by Jafari Samimi (2012):

(23) $$VARCA_i = \frac{\frac{RVA_i}{TRVA}}{\frac{NVA_i}{TNVA}}$$

where $VARCA_i$ is the obvious comparative advantage of the value added in industry *i*, RVA_i is the value added of sector *i* in the province, *TRVA* is the total value added (GDP) of the province, NVA_i is the value added of sector *i* in the country, and *TNVA* is the total value added of the country. According to this criterion, the sectors with a comparative advantage were of a higher priority for investment. The results showed that Isfahan Province has a significant comparative advantage in the activities of "making basic metals" and " manufacture of textiles."

6- Findings

In the present study, first, the national input-output table of 2016 issued by the Central Bank of Iran, the regional accounts of Isfahan Province, and the generalized spatial quota method of SFLQ were used to provide the input-output table of the province. Then, using the TOPSIS method, the economic activities of Isfahan Province were prioritized. After the calculation and normalization of all the quantitative criteria in different parts of the province, they were weighted, and the final results were evaluated. For this purpose, first, a national table was prepared with twenty sections compiled together in accordance with the production structure of Isfahan Province and its water consumption data. Then, the normalized values of the studied criteria were examined (**Tabel 3**). These values were, in fact, the relative weights of the options based on each criterion. Based on the results of **Tabel 3**, in the case of considering the water intensity criterion, the highest weight is related to this criterion, and if the water intensity criterion is ignored, the pollution criterion is given priority.

Tabel 3. Shannon entropy output results
Source: Research findings

Job creation	Linkage	Value added	Pollution	Energy intensity	Water intensity	Intensity type
0/001	0/059	0/189	0.210	0.110	0.428	Weights considering the water intensity criterion
6	5	3	2	4	1	Ranking

0/003	0/104	0/331	0/368	0/192	-	Weights without considering the water intensity criterion
5	4	2	1	3	-	Rank

To show the importance of the simultaneous consideration of different criteria, the results of the study were prioritized once with the water intensity criterion and once without it. This was done with regard to the significance of water resources.

According to the results of the TOPSIS method, taking into account the criteria of water intensity, respectively, "construction", "Other Services" and "Water, Electricity and Gas" sectors have the least distance from the best option, and in the same way, the "construction" sectors, " Other services" and "Clothing manufacturing, processing and dyeing of fur, tanning and polishing of leather and other leather products" are the farthest away from the worst option. Based on the final weight index, the "Construction" and "Other Services" and "Water, Electricity and Gas" sectors are in first to third priority respectively. In examining the results of the calculations without taking into account the waterintensity criterion, which shows more different results, respectively, the "construction", "agriculture" and "other services" sectors have the least distance from the best option, and in the same way, the "agriculture" sectors, "Construction" and "other services" are farthest from the worst option. According to the final weight index, the sectors "construction", "agriculture" and other services" are in the first to third priority respectively.

The results are compared in **Tabel 4** As it can be seen, the values obtained based on the water intensity criterion are different from those obtained without this criterion. Indeed, this method yielded a different set of priorities for most of the sectors. This change of priority was very noticeable in some sectors.

For example, in the prioritization of the sectors according to the water intensity criterion, the agriculture sector was in the twentieth place, while this rank was the second in the prioritization without considering that criterion. Also, in the sector of "manufacture of leather apparel", this criterion was downgraded from the ninth to the thirteenth

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rank considering the water intensity criterion. Similarly, the sectors of "manufacture of textiles" and "manufacture of rubber and plastic products" were ranked 7th and 9th, respectively, while the ranks of these sectors without considering the water intensity criterion were fifteen and twelve. In the meantime, the priorities for the sectors of "wood and products of wood", "manufacture of machinery and equipment not classified elsewhere" and "construction" remained constant.

As it can be seen in **Tabel 4,** with the elimination of the water intensity criterion, the priority of the sectors with higher water intensity, such as "agriculture" or "manufacture of leather apparel", was shifted to lower categories. This means that ignoring the water supply criterion in prioritizing the economic activities of the province, can put pressure on the limited water resources in the long run and jeopardize the future development of the province although it may provide economic benefits in the short run.

Tabel 4. Comparison of the research results gained with and without the water intensity criterion
Source: Research findings

Sector[2]	Prioritization by considering the water intensity criterion				Prioritization without considering the water intensity criterion			
	Distance from the positive ideal	Distance from the negative ideal	Final weight	Rank	Distance from the positive ideal	Distance from the negative ideal	Final weight	Rank
1	0/428	0/237	0/356	20	0/058	0/414	0/876	2
2	0/104	0/470	0/817	5	0/183	0/355	0/660	6
3	0/110	0/460	0/806	15	0/191	0/345	0/643	14
4	0/108	0/469	0/812	7	0/189	0/339	0/642	15
5	0/111	0/476	0/810	13	0/195	0/367	0/653	9
6	0/110	0/473	0/810	11	0/193	0/359	0/649	11
7	0/113	0/458	0/801	16	0/198	0/327	0/623	17
8	0/127	0/452	0/780	18	0/222	0/269	0/547	19
9	0/109	0/472	0/811	9	0/192	0/355	0/649	12
10	0/223	0/429	0/657	19	0/390	0/098	0/200	20
11	0/119	0/457	0/792	17	0/209	0/285	0/576	18
12	0/111	0/471	0/808	14	0/195	0/348	0/640	16
13	0/109	0/470	0/811	8	0/190	0/359	0/653	8

[2] Each number refers to the corresponding sector in **Tabel 1**

14	0/107	0/474	0/814	6	0/188	0/359	0/655	7
15	0/110	0/474	0/810	12	0/194	0/361	0/650	10
16	0/110	0/472	0/810	10	0/192	0/355	0/648	13
17	0/089	0/471	0/840	3	0/156	0/362	0/698	4
18	0/032	0/483	0/936	1	0/057	0/404	0/876	1
19	0/096	0/472	0/830	4	0/168	0/369	0/686	5
20	0/059	0/476	0/889	2	0/103	0/379	0/785	3

7- Discussion

Based on the results of the present research, in the case of considering the water intensity criterion, the most weight is related to this criterion, and if the water intensity criterion is ignored, the pollution criterion is given priority. According to the results of the TOPSIS method, taking into account the criteria of water intensity, respectively, "Building", "Other Services" and "Water, Electricity and Gas" sectors have the least distance from the best option, and in the same way, the "Building" sectors, " Other services" and "Clothing manufacturing, processing and dyeing of fur, tanning and polishing of leather and other leather products" are the farthest away from the worst option. Based on the final weight index, the "Construction" and "Other Services" and "Water, Electricity and Gas" sectors are in first to third priority respectively. In examining the results of the calculations without taking into account the water intensity criterion, which shows more different results, respectively, the "construction", "agriculture" and "other services" sectors have the least distance from the best option, and in the same way, the "agriculture" sectors, "Building" and "other services" are farthest from the worst option. According to the final weight index, the "construction", "agriculture" and other services" sectors are in the first to third priority respectively. Finally, the results of prioritizing economic sectors show that in the prioritization of the sectors according to the water intensity criterion, the agriculture sector was in the twentieth place, while this rank was the second in the prioritization without considering that criterion. Also, in the sector of "manufacture of leather apparel", this criterion was downgraded from the ninth to the thirteenth rank considering the water intensity criterion. Similarly, the sectors of "manufacture of textiles" and "manufacture of rubber and plastic products" were ranked 7th and 9th, respectively, while the ranks

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of these sectors without considering the water intensity criterion were fifteen and twelve. In the meantime, the priorities for the sectors of "wood and products of wood", "manufacture of machinery and equipment not classified elsewhere" and "construction" remained constant.

8- Conclusion

Due to the climate change and global warming, water resources are declining. Water resources have become so important that they affect that the strategic policies and international relations of many countries. So far, a considerable bulk of research has been done in this field to manage and control water resources and ensure their optimal use. Therefore, in the process of sustainable development, it seems necessary to choose a systematic method based on an optimal combination of different criteria. In line with it, this study was conducted to determine the priority of economic sectors in Isfahan Province.

For this purpose, input-output data models and the TOPSIS method were combined, and the corresponding criteria were set to be water intensity, energy intensity, pollution, job creation, intensity of inter-sectoral relationships and value added. Among them, water intensity seems to be an important criterion considering the role of water resources in sustainable development and the severe shortage of these resources in Isfahan Province. In this study, the TOPSIS method served to prioritize the key economic sectors of the province.

The results of this prioritization showed the importance of ranking the sectors in terms of water intensify as a criterion. As it occurred, through the TOPSIS method, the priority of most sectors emerged to be different from the results of prioritization with no water intensity considered. The difference was very significant in some sectors. For example, in the prioritization of sectors according to the water supply criterion, the agriculture sector was in the twentieth place, while it shifted to the second rank when prioritized without that criterion considered. Similarly, for the sector of manufacture of leather

apparel, the involvement of the water intensity criterion downgraded the sector from the ninth to the thirteenth rank.

Conversely, the sectors of "making textiles" and "making rubber and plastic products" were prioritized with the criterion of water intensity, and they ranked seventh and ninth, respectively. Without this criterion, however, these sectors were prioritized and gained the fifteenth and twelfth ranks. Thus, the change in the rank of a sector depends on the water level of that sector. As it was found, the agriculture sector was in the second place in the prioritization without considering the water supply criterion, while the rank of this sector moved to twenty with the inclusion of the water supply criterion. This role of water intensity suggests the importance of paying attention to the water level. Therefore, it is necessary to prioritize the economic sectors in a region in accordance with the climatic conditions there. It is also advisable not to establish water-demanding activities such as steel industries and cultivation of highly water-consuming products in low-water areas.

Finally, considering that development plans should be in line with the ecosystem and environmental conditions, the following recommendations are in order:

a. Based on the studies of water consumption, the agriculture sector is the largest consumer of water. Therefore, considering the arid and semi-arid climatic conditions in Isfahan Province and the shortage of water there, it is very important to preserve the water resources in the region. The improper management of water resources and the problem of water shortage in the region may lead to food insecurity. Therefore, it is necessary to increase the productivity and improve the production methods in the agriculture sector.

b. Apart from modifying the production methods, employing modern technology directly leads to the reduction of water wastage in the agriculture sector and indirectly to the reduction of water consumption in agriculture-related industries.

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c. To prioritize economic sectors at the national and regional levels, economic factors and cross-sectoral links as well as social and environmental aspects should also be taken into consideration.

d. To make development plans and upstream documents, the limitation of water resources should be taken into account, and the allocation of these resources to economic sectors should be done in line with the goals of sustainable development.

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Greenwash and Explaining The Mechanism of Its Effect on Green Purchasing Intention

Mohammad Ayati Mehr *, Edris Mahmoodi, ** Bahar Sepyani***

** Phd in Management, Department of Management., faculty of Economics and social sciences , Shahid Chamran University of Ahvaz , Ahvaz, Iran. (Corresponding Author)*

*** Phd in Management, Department of Management., faculty of Economics and social sciences , Shahid Chamran University of Ahvaz , Ahvaz, Iran.*

**** Graduated from Master of Business Administration, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran.*

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CORRESPONDING AUTHOR'S:
Email: **M.ayati@scu.ac.ir**
0000-0002-1833-6253

Postal address:
Khuzestan- Ahvaz- Golestan Boulevard- Shahid Chamran University of Ahvaz- Faculty of Economics and Social Sciences.

Further Information:
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ABSTRACT

Businesses are utilizing greenwashing to beat their rivals along with the growth of green markets. The goal of the current study was to investigate the practice of "greenwashing" and explain how it affects consumers' intentions to purchase environmentally friendly products. The statistical population of this study includes people who bought environmentally friendly food goods in Iran. Due to the statistical population's infinity, Cochran's relationship was used to obtain a sample size of 384, and ultimately 276 valid questionnaires were retrieved by accessible sampling. Then, the data were analyzed using the structural equation modeling method with the help of SmartPLS. The results demonstrated that greenwashing has a detrimental and considerable impact on Iranian consumers' green purchase intention for environmentally friendly food products. Additionally, the association between greenwashing and intention to make a green purchase was validated, with green word-of-mouth and green skepticism serving as mediators. Because greenwashing behavior has not been taken into account in domestic studies in Iran, the findings of this study provide the first theoretical and practical consequences for managers in the food business.

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1- Introduction

Green issues have gained attention as pollution levels in industrialized nations have increased (Guo, Tao, Li, & Wang, 2017; Roulet & Touboul, 2015; Zhang, Li, Cao, & Huang, 2018). The challenges and issues related to the environment and air pollution have grown highly apparent in populous nations like India and China (Guo et al., 2017). Environmental problems in these nations include decreased food safety, air pollution, and waste disposal (Fernando, Sivakumaran, & Suganthi, 2014). India, which has a population of almost 1.2 billion people and a large number of pollutants that it has released into the atmosphere, has been identified as one of the nations that produce pollutants (Atlas, 2018). After the United States and China, India has registered third place in the air and industrial waste. Many businesses consider environmental difficulties and production challenges as a result of people and shareholders' growing awareness of green issues (Y. S. Chen & Chang, 2012). The last ten years have seen a significant increase in pressure from a variety of stakeholders, including consumers, investors, customers, and governments, on businesses to publish information about their performance and environmentally friendly products Environmental have entered (Guo et al., 2017; Kim & Lyon, 2015; Marquis, Toffel, & Zhou, 2016). According to Vollero et al. (2016), the stakeholders and shareholders of energy distribution companies have increased their pressure on producers to create clean energy and sustainable products. As a result, it can be said that people and consumers are more aware of the environment and eager to use green products and services (Y.-S. Chen & Chang, 2013; Y.-S. Chen, Lin, & Chang, 2014). Customers may be willing to pay more for a company's products than competitors if they see that businesses and market players fulfill their social responsibilities concerning the environment (Grimmer & Bingham, 2013; Guo et al., 2017).

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According to Nielsen media research, approximately 66% of global consumers are willing to pay more for environmentally friendly products (Nielsen media, 2018). To respond to such situations, market leaders place a high value on corporate social responsibility (Kramer & Porter, 2006). Social responsibility is the voluntary incorporation of environmental and social concerns into business interactions with stakeholders (European Commission, 2009). Businesses must perform sustainably to address environmental issues, and in addition to accomplishing their economic objectives, they must take into account their social, environmental, and global health impacts (Elkington, 1994). Development that satisfies current demands without jeopardizing the ability of future generations to meet their own needs is known as sustainable development (World Commission on Environment and Development, 1987). A rise in demand drives companies to develop and design green marketing strategies to enhance their reputation among clients and consumers (Zhang et al., 2018). Green markets are growing (Delmas & Burbano, 2011) and as these markets grow and develop, a practice known as “greenwashing” has been implemented and observed by businesses (Majláth, 2017). This concept was first expressed by an environmentalist named Jay Westervelt (Guo et al., 2017; Wolniak & Habek, 2015). This phenomenon is defined as the confluence of two business behaviors: subpar environmental performance and effective environmental performance communication (Delmas & Burbano, 2011). Naturally, there are several perspectives on this occurrence (de Freitas Netto, Sobral, Ribeiro, & Soares, 2020). To separate organizations from engaging in ecologically unfriendly activities, Webster's Dictionary defines "greenwashing" as measures to present environmentally good projects (Merriam-Webster, 2018). This phrase was defined in the Oxford Dictionary in 1999. The Oxford English Dictionary's definition

of "greenwashing" (Oxford English Dictionary, 2018) is as follows: False information produced by an institution intended to project a public image of social or environmental obligations, but judged to be unwarranted or purposefully misleading. According to several experts, including Lyon and Montgomery (2015), the phenomenon known as "greenwashing" has many facets and cannot be adequately defined. The issue of trust emerges because, in this decade compared to prior decades, greenwashing acts and activities have expanded, according to David Ogilvy's advertising agency (Hsu, 2014).

Consumers are skeptical and uncertain about how to discern green items from non-organic products due to the practice of "greenwashing" (Yang, Nguyen, Nguyen, Nguyen, & Cao, 2020). Additionally, the result of consumers' refusal to disclose products' environmental information is due to greenwashing behavior (Nguyen, Yang, Nguyen, Johnson, & Cao, 2019). Research has revealed that greenwashing activity decreases the purchasing of environmentally friendly goods and harms consumers' intentions to make such purchases (Ansu-Mensah & Bein, 2019; Guerreiro & Pacheco, 2021; Nguyen et al., 2019). Businesses focus on sustainable development and employ green marketing techniques to sell their goods to address this issue. This study focuses on consumers of food industry products in small and medium sized Enterprise in Khuzestan province aimed at examining green Wash behavior and explaining the mechanism of its effect on green Purchase intention. For academics and industry experts in the subject of marketing, the current study offers a significant theoretical and practical contribution. First, a theoretical model linking perceptions of greenwashing behavior to green skepticism, green word-of-mouth, green confusion, and green purchase intention is proposed and examined in this study. Second, it explores the mediating impacts

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of green word-of-mouth and green skepticism based on the literature and research background. Third, it offers fresh perspectives on developing markets and perhaps crucial data for comprehending greenwashing practices in the green market. The primary benefit of this research for customers who care about the environment and safety is that it offers information on how to discern genuine green products from non-organic ones. 2- Literature Review and Research Hypotheses

1-1- Green Marketing

The importance of green marketing has increased in today's market (Reddy & Reddy, 2017). All packaging, product modification, and production-related actions that are taken to suit client needs while also protecting the environment are referred to as "green marketing" (Dangelico & Vocalelli, 2017). Green marketing, according to Pagliacci et al. (2019), is the process of meeting client wants with environmentally friendly products. In short, green marketing is concerned with situations in which products are marketed in environmentally friendly ways. It is widely acknowledged that environmental concerns and product usefulness are the primary determinants of consumers' green purchasing intentions(Pagliacci, Manolică, Roman, & Boldureanu, 2019). Even if consumers express concern about the environment, this does not always translate into a desire to buy green (Nguyen et al., 2019; Park & Lin, 2020). Consumers may be unwilling to participate in sustainable consumption practices (Phuah, Ow, Sandhu, & Kassim, 2018), so it is not surprising that Dangelico and Vocalelli (2017) rank environmental sustainability third after customer satisfaction and company profitability. Because it is a relatively new idea, there is a lack of public consensus on what constitutes a green product (Dangelico & Vocalelli, 2017). As a result, there is a need to define criteria to distinguish between organic and

inorganic products (Mishra & Sharma, 2014). Green marketing has several advantages, including ensuring profit-driven growth that is constant and cost savings (Ritter, Borchardt, Vaccaro, Pereira, & Almeida, 2015). Due to the significance of this topic, some businesses argue that their performance is good despite having bad environmental performance (Nekmahmud & Fekete-Farkas, 2020). The practice of "greenwashing," which is briefly covered below, is one of the subjects on which scholars in this area have concentrated their attention.

1-2- GreenWash

This phrase has been defined as a company's false and deceptive green claims (Parguel, Benoît-Moreau, & Larceneux, 2011). According to Aji & Sutikno (2015), "greenwashing" is a collection of practices used to deceive customers about a company's environmental practices or the advantages of a good or service for the environment (Aji & Sutikno, 2015). According to Lyon and Maxwell (2011), this activity is known as "greenwashing," which is the Oxford English Dictionary's term for distorting information to display an ecologically friendly business persona. Businesses that engage in "greenwashing" deceive consumers about the environmental benefits of their products and services (Lyon & Maxwell, 2011). Under the influence of greenwashing conduct, the entire cycle of green marketing efforts can be damaged, and ultimately, customers are unable to believe the green strategies of businesses (Y.-S. Chen et al., 2014). Due to their increasing concern for the globe, consumers are more aware of environmental issues (C.-F. Chen & Chang, 2008). Conscious consumers frequently purchase eco-friendly goods (Y.-S. Chen et al., 2014). Organizations engage in greenwashing behavior through green word-of-mouth advertising to enhance their green image in the eyes of customers (Parguel et al., 2011). Because of

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the increased demand for green products, greenwashing is becoming more common to take advantage of green incentives.

1-3- Green Purchase Intention

Purchasing intention of consumers is critical in determining green marketing strategies (Paul & Rana, 2012). 'Purchase' refers to anything that consumers consider and intend to buy. 'Purchasing intention' is defined as the potential behaviors that lead to a consumer's commitment or decision to purchase a specific product (Agyapong, Afi, & Kwateng, 2018).

Similarly, in another definition 'purchasing intention' is defined as "indications of how much people are willing to try or the amount of effort they plan to put in to perform that behavior" (Ajzen, 1991). Due to environmental objectives including the search for healthier options, environmental consciousness, and sustainability, consumers choose the sort of product to buy (Paul & Rana, 2012). Market movements frequently determine changes in consumers' behaviors (Surya & Hajamohideen, 2018). The result of individual marketing action is the consumer's capacity to evaluate quality, price, value, and availability as competitive goods (Ritter et al., 2015). The usage of green products must be made more widely known to encourage ecologically friendly lifestyles which results in a shift away from conventional products (Amegbe, Owino, & Nuwasiima, 2017). Research has shown that green products positively affect green purchase intention (Soon & Kong, 2012). Green purchase intention is defined as a person's likelihood and desire to prefer products with green characteristics over other conventional goods (Lasuin & Ng, 2014). According to Aman et al. (2012), the purpose of buying green is for the consumer to be able to appreciate green products, resulting in positive words and a willingness to pay more. According to Chan and Lau (2001), if a customer is

committed to a specific green product, this goal is more likely to be met as a result of the purchase (Chan & Lau, 2001). As a result, customer judgment may influence the purchase of environmentally friendly goods. As a result, for this study, customers' green purchase intention has been defined as the desire to purchase green products (Wong, Wong, & Wong, 2020).

1-4- Green Confusion

Confusion among consumers is a result of their failure to effectively and appropriately comprehend the various features of a product. Customers need knowledge about items since they are complex, ambiguous, and confused (Turnbull, Leek, & Ying, 2000). According to Chen and Chang (2013), green confusion for consumers is seen as one of their weaknesses. Additionally, according to some other academics, green confusion is the inability to accurately comprehend the environmental aspects of a good or service (Avcilar & Demirgünes, 2017).

Consumers are confused by the rise in "green" claims and the promotion of environmentally friendly product claims (Newell et al., 1998). The fast expansion of environmental claims for a variety of goods and services has led to consumer confusion (Kangun et al., 1991). Confusion can also arise from the use of environmental terms and expressions without a clear or consistent interpretation. Terms like "natural," "biodegradable," "recyclable," "renewable," "degradable," and "ozone friendly" are examples (Kangun et al., 1993). Customers are confused by incomplete environmental reviews of products in comparison claims and the complex science that is required to truly understand green claims (Stokes, 2009). According to Atwood (1993), increasing the diversity of environmental arguments can also lead to confusion among consumers, so companies should take the necessary

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measures to prevent customer confusion by providing them with timely, appropriate and correct information (Tarabieh, 2021).

1-5- Green Skepticism

A person's tendency toward the claim made by the other party is known as skepticism (Obermiller & Spangenberg, 1998). Studies have looked into the function of skepticism in a variety of fields, including philosophy, psychology, and sociology (Rosen, 2004; Taber and Lodge, 2006). It has been studied in the area of skepticism management in industries like marketing, green products, social responsibility, and advertising (Kim and Lee, 2009; Skarmeas et al., 2014; Vlachos et al., 2016). Skepticism is defined differently by different authors in the literature, and some researchers have looked into it as a personality trait. Researchers contend that, while skeptical consumers may differ in their distrust or disbelief of others, they can be persuaded to change their minds if presented with sufficient evidence (Fore & Greer, 2003). As a result, there may be skepticism about green products and corporate claims about environmental performance (Aji & Sutikno, 2015). If consumers are skeptical of green claims, their skepticism of the company grows, which can harm the company's reputation and market share.

1-6- Green Word-of-Mouth

Consumers will continue to share marketing information until it has an impact on their behavior and attitude toward a product. This practice is known as word-of-mouth advertising (Huete-Alcocer, 2017). Additionally, word-of-mouth is referred to as "green word-of-mouth" if it is accompanied by green claims about the environmental performance of a particular product (Guerreiro and Pacheco, 2021). Because the majority of customers and consumers use it, word of mouth is regarded as a crucial marketing tool (Al-Gasawneh & Matar

Al-Adamat, 2020). The influence of word-of-mouth has grown over time thanks to the growth of social media, and today it can be said that this factor has a global impact on marketing research. Customers and consumers quickly shared messages about products and services, and online reviews, comments, and recommendations were received. These resources provide information to current, former, and prospective customers about a product or service (Septiari, 2018). Word of mouth can influence consumer views, reviews, purchase decisions, and post-use reviews, and it can be used as a powerful marketing tool to investigate consumer feedback.

1-7- Greenwash and Green Purchase Intention

In emerging markets, there is a rising demand for quality products (Wang et al., 2019). Consumers find it challenging to distinguish between truthful and false claims. Even a green product is seen as having a high risk by them. On the one hand, the majority of businesses operating in the market produce pollutants, but they frequently tout their reputations for being environmentally friendly. However, consumers are likely to view retailers promoting green products with skepticism because they fail to explain how such products benefit the environment (Yiridoe et al., 2005). Consumer mistrust may result from this (Nuttavuthisit & Thgersen, 2017). Customers are skeptical of green claims and worried about the discrepancy between the company's image and reality (Self et al., 2010). Greenwashing, as demonstrated by Polonsky et al. (2012), causes false claims to be made about green products, which lowers the appeal of buying green goods. According to Nyilasy et al. (2014), corporate greenwashing behavior raises ethical concerns in addition to harming consumers' perceptions and their propensity to make environmentally friendly purchases.

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According to the above explanations, the following hypothesis is taken into account:

H1: Greenwashing has a negative and significant effect on the intention to buy green.

1-8- GreenWash and Green Word-of-Mouth

Some businesses engage in greenwashing activities to boost product sales and expand their market share, allowing them to easily satisfy customers' concerns about the sustainability of their products. Though previous studies have shown that greenwashing harms green word of mouth when customers and consumers learn that the company has engaged in these practices, it can have a negative impact (Chen et al., 2013). Additionally, bad experiences leave a lasting impression on customers and consumers and have strong effects (Skarmeas & Leonidou, 2013). When consumers find that a company's environmentally friendly actions and activities are not transparent and it is trying to mislead consumers through greenwashing activities, they reject the positive green word of mouth. Alternatively, it may take the form of disclosing negative information to warn others about the negative motives of companies engaged in greenwashing (Chen et al., 2013). ; Zhang et al., 2018). Chen et al. (2013) showed that greenwashing decreased and negatively impacted green word of mouth. When consumers turn to negative green word-of-mouth against a business, it can be viewed as a threat to the business, especially in this day and age where many social media outlets can disclose negative information. (Zhang et al., 2018).). Companies should therefore reduce and stop greenwashing activities to prevent this negative impact (Guerreiro & Pacheco, 2021). According to the abovementioned, the following hypothesis should be taken into account:

H2: Greenwashing has a negative and significant effect on green word-of-mouth.

1-9- GreenWash and Green Confusion

Under the heading of greenwashing, companies typically claim false information about the environmental attributes of their products, and consumers ultimately lose trust in company advertising (Polonsky et al., 2010). For example, corporate greenwashing activities are being viewed with increasing skepticism by customers due to opportunism. Greenwashing also leads to customer confusion over company statements about environmental practices (Lyon & Montgomery, 2015). Similarly, Avcilar and Demirgünes (2017) found that false green claims can confuse consumers with green purchase intentions, so the following hypothesis is presented:

H 3: Greenwashing has a positive and significant effect on green confusion.

1-10- Greenwash and Green Skepticism

Environmental skepticism is one of the key issues for consumers, businesses, and shareholders (Nguyen et al., 2019). In general, green skepticism or skepticism refers to a tendency to doubt, question, or distrust green activities or claims. In addition, skepticism has been associated with concepts such as suspicion, distrust, lack of trust, or mistrust. In recent years, with the rapid spread of environmentally friendly products, the number of cases of greenwashing has increased (Delmas & Burbano, 2011). Knowing consumers and their awareness of such cases (greenwashing) leads to their skepticism toward green activities and claims (Hariuchi et al., 2009; Chen and Chang, 2013). Therefore, the following hypotheses have been presented:

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H 4: Greenwashing has a positive and significant effect on green skepticism.

1-11- Green confusion and Green Purchase Intention

Typically, consumers prefer companies that operate based on public interest, and they respond to companies' manipulation of information (Foreh & Grier, 2003). According to research by Michel et al. (2005), because the company lacks information about its products, consumers are very confused and do not know which products are suitable for them and how to use them. Greenwashing is another reason for consumer confusion, as it is possible to confuse companies making false claims with companies making accurate claims. It is difficult for customers to understand the distinction between a product that meets the criteria for environmental sustainability and a product that does not meet false and hidden data. (Paixão, 2016). Negative states of mind, positive associations, and beliefs that are contrary to the interpretation of the green-wash phenomenon with green consumers, despite the difficulties in distinguishing whether it is true or false, in some cases create skepticism towards green products (Junior et al, 2019). Consumers will consider purchasing environmentally friendly products if they are comparable to conventional products and are accepted by the market in key aspects such as practicality, compatibility, usability, and price. (Rahman et al., 2015).). According to the abovementioned the following hypothesis is presented:

H 5: Green confusion has a negative and significant effect on green purchase intention.

1-12- Green Skepticism and Green Purchase Intention

The consumer's mistrust of the quality of organic goods is one of the most significant obstacles to purchasing decisions (Vindigni et al.,

2002). When consumers can distinguish between green and conventional items in terms of qualities including taste, freshness, performance, appearance, price, quality, and convenience (easy of use), they are more likely to purchase green products. Most businesses in our nation and some other nations present an environmentally favorable image, yet this is untrue (Bhattacharya, 2012; Schlegelmilch et al., 2013; Wang et al., 1996). Customers and consumers become concerned when the advertising picture and reality diverge. Consumers lose faith in green goods and services when they take these discrepancies into account (Nailasi et al., 2014). Customers may then quit purchasing green items as a result of their negative comments regarding the company's reasons for projecting such a false image (Obermiller et al., 2005). Therefore, the following hypothesis is presented:

H 6: Green skepticism has a negative and significant effect on green purchase intention.

1-13- Green Word-of-Mouth and Green Purchase Intention

To lower perceived risk, customers pre-screen products. They typically use the Internet to get this information since it enables real-time interaction between customers. Consumers are more likely to trust green products, which influences their purchasing decisions and green purchasing intents. Customers are more likely to purchase products with a positive green reputation when they are unsure about buying green products (Chen et al., 2013). In reality, positive word-of-mouth may influence consumers' long-term, short-term, and risk-taking product decisions. (Siano et al., 2017). According to Zhang et al. (2018), it is expected that green word of mouth will have a positive effect on green purchase intention, so the following hypothesis is presented:

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H 7: Green word of mouth has a positive and significant effect on green purchase intention.

1-14- The Mediating Role of Green Skepticism

Studies show that greenwashing leads to environmental skepticism (Chen & Chang, 2013; Self et al., 2010). When consumers believe that companies abuse opportunistic environmental benefits and are pessimistic towards them, attitudes are negative toward green brands, and buy green products from companies that claim to be green. Such is created in them and they try not to buy these products (Skarmeas & Léonidou, 2015; Pomering & Johnson, 2009); In addition, researchers have shown a mediating effect of green skepticism on the relationship between green plant washing and green purchase intention (Nguyin et al., 2019). Therefore, the following hypothesis is presented:

H 8: Green cynicism plays a mediating role in the relationship between greenwashing and green purchase intention.

1-15- The Mediating Role of Green Word-of-Mouth

Rapid economic growth, mass consumption, and unsustainable consumption make developing countries major contributors to climate change and pollution (Barbarossa & Pelsmacker, 2016). In these countries, businesses are characterized by low competitive pressure and minimal greenwashing regulations (Yang et al., 2020), greenwashing is widely used by businesses to attract green consumers. (Laufer, 2003; Parguel et al., 2011). This phenomenon is amplified by green word of mouth, which negatively impacts green purchase intention and customers can trust (Chen et al., 2018; Yang et al., 2020). According to the abovementioned the following hypothesis is presented:

H9: Green word-of-mouth has a mediating role in the relationship between greenwashing and green purchase behavior.

Finally, the following conceptual model has been developed by the authors as a proposed model to determine the relationship between research variables:

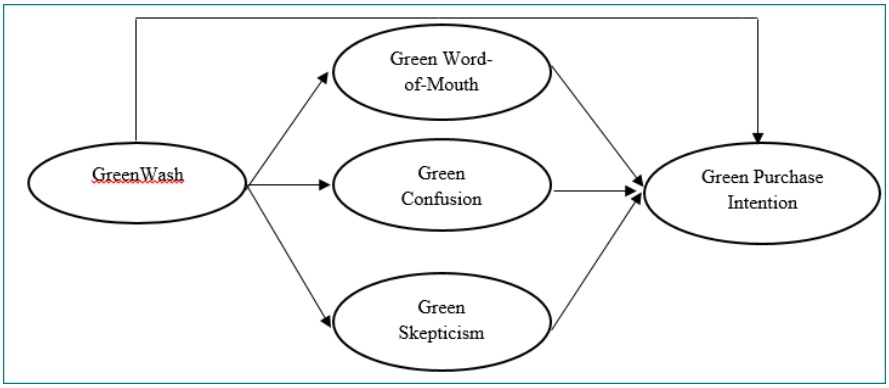

Figure 1. Conceptual Model (Source: authors)

2- Methodology

2-1- Research Measures

The current study is descriptive-survey research. To measure the conceptual model of the research, 26 measurement items on a 5-point Likert scale were used from the previous studies. In this scale, spectrum 1 indicated 'completely disagree', and spectrum 5 indicated the final limit of the Likert scale, i.e. 'completely agree'. Spectrum 3 also showed the intermediate between these two. To collect data, a standard questionnaire was used (Zhang et al., 2018, Horiuchi et al., 2009; Chen and Chang, 2013; Aji & Sutikno, 2015; Molinari et al., 2008; Mohr et

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al., 1998; Ansu-Mensah, 2021; Chen and Chang, 2008; and Nguyen et al., 2019).

2-2- Data Collection

The statistical population of this study includes consumers of green food industry products in small and medium -sized Enterprise in Khuzestan province. Data were collected through an online survey. Samples were accessed using available sampling methods. Respondents were asked via email and social media to click on a link to his website with the questionnaire and complete an online survey. Due to the infinity of the statistical population, the sample size was obtained by 384 Cochran correlations, yielding a total of 276 healthy responses, resulting in a participant response rate of approximately 72%. It was found that 46% of the respondents were male and 54% were female. Besides, 2.2% of the respondents were in the age group less than 20 years, 26.1% between 20 and 30, 50% between 30 and 40, and 21.7% were in the age group older than 40. It was also found that 7.6% of the respondents had a high school degree, 9.8% college degree, 42.4% bachelor's degree, 33.7% master's degree, and 6.5% Ph.D. degree.

2-3- Data Analysis

Data analysis was done by using SPSS 26.0 and structural equation modeling (SEM) using SmartPLS 3.0. Anderson and Gerbing (1988) proposed a two-phase process of SEM, namely the measurement model and the structural model. Consequently, using Smart PLS-SEM in this study looks at the aforementioned two levels of analysis. The measurement model links the observed variables to their identifiable latent variables, whereas the structural model links the latent variables to other latent variables. Also, in the current study, special indirect

effects were used to analyze the mediating roles in PLS software (Hair et al, 2022).

3- Results

3-1- K-S Test

The type of statistical data distribution is adjusted to select the appropriate test for data analysis. To determine the type of data distribution, the K-S test (Frank and Massey, 1951) which can be implemented in SPSS was used. SPSS has performed this test by default at the 5% error level. If the significance level of this test exceeds 5%, the data will be normally distributed. In addition, if the value of the significance level is less than 5%, the distribution of the research variables will be abnormal (Ayati Mehr & Beigi, 2017). **Tabel 1** shows the results of this test. Considering that the significance level for all the research variables was less than 5%, it can be concluded that the distribution of the research variables is not normal.

In addition, since the PLS software is not sensitive to the statistical data distribution pattern, it was used in this study to test the research hypotheses.

Tabel 1. K-S Test Results

Constructs	Significance Level	Statistical Distribution
GW	0/000	Non-Normal
GC	0/000	Non-Normal
GWM	0/000	Non-Normal
GS	0/000	Non-Normal
GPI	0/000	Non-Normal

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3-2- Reliability and Validity

To examine the reliability of measurement models factor loadings, composite reliability, and Cronbach's alpha were used. According to **Tabel 3**, the values obtained for composite reliability (Jöreskog, 1971) and Cronbach's alpha (Diamantopoulos et al., 2012) were higher than 0.7 which is a favorable level. Also, if the values of the factor loadings are higher than 0.4, the reliability and internal consistency of the items are confirmed (Hair et al, 2022). According to **Tabel 2**, the factor loading of all the items was higher than 0.4, so in this sense, the reliability of the measurement models was confirmed. Convergent and divergent validity were used to measure validity in this study. AVE index was used to measure convergent validity and its corresponding values for each variable were shown in **Tabel 3**. To confirm the convergent validity of the measurement models the values of the AVE index should exceed 0.5 (Sarstedt et al., 2021). According to **Tabel 3**, the AVE index values are at a favorable level and the convergent validity of the measurement models is confirmed. To measure the validity of the questionnaires, we consulted experts in the field and after making some modifications, we revised the questionnaire from their perspective and redistributed it.

Tabel 2. Factor Loading (FA)

Constructs									
Green purchase intention		Green skepticism		Green confusion		Green word of mouth		Greenwashing	
Items	FA[1]	Items	FA	Items	FA	Items	FA	Items	FA
1	0/744	7	0.790	10	0/833	15	0/757	19	0.773
2	0/743	8	0.842	11	0/801	16	0/754	20	0.838
3	0/786	9	0.870	12	0/797	17	0/775	21	0.837
3	0/783			13	0/777	18	0/808	22	0.806

5	0/847			14	0/771			23	0.818
6	0/806							24	0.835
								25	0.789

Tabel 3. Measuring Validity and Reliabity

Constructs	Items	AVE	CR	Cronbach's alpha	References
GW	7	0.0.663	0.932	0.915	Zhang et al. (2018), Harichoi et al. (2009)
GC	5	0.0.634	0.896	0.856	Chen and Chang (2013), Ajayi and Sutikno (2015)
GWM	4	0.598	0.876	0.776	Zhang et al. (2018) and Molinari et al. (2008)
GS	3	0.696	0.873	0.782	Mohr et al. (1998)
GPI	6	0.617	0.906	0.875	Ansu Mensah (2021), Chen and Chang (2008) and Nguyen et al. (2019)

In the following, the HTMT index was used to measure divergent validity. Henseler et al (2015) proposed a threshold value of 0.90 for structural models with constructs that are conceptually very similar, such as cognitive satisfaction, affective satisfaction, and loyalty. In such a setting, an HTMT value above 0.90 would suggest that discriminant validity is not present. But when constructs are conceptually more distinct, a lower, more conservative, the threshold value is suggested, such as 0.85.

Tabel 4 shows the results of measuring this index in the software:

Tabel 4. Discriminant validity

Constructs	GS	GW	GC	GWM	GPI
GS	-	-	-	-	-
GW	0.304	-	-	-	-
GC	0.360	0.827	-	-	-
GWM	0.618	0.328	0.592	-	-
GPI	0.674	0.364	0.170	0.362	-

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3-3- Structural Model Fit

In this study, the coefficient of determination and effect size index were used to assess the quality of structural models. The coefficient of determination indicates what percentage of the target structure's variance is explained by other structures, and values above 0.26 are acceptable for the coefficient of determination (Cohen, 1988). The results regarding the coefficient of determination are shown in **Tabel 5**.

Tabel 5. Coefficient of Determination

Constructs	r^2
GWM	0.671
GC	0.684
GS	0.595
GPI	0.808

Tabel 6. Effect Size Index

Exogenous structures	Effect size index	Effect size
Greenwashing	1.469	Strong
Green skepticism	2.164	Strong
Green confusion	2.040	Strong
Green word of mouth	1.029	Strong

Another important index to evaluate the structural model is the effect size index. Cohen (1988) introduced three values of 0.02, 0.15, and 0.35 for small, medium, and strong effect sizes, respectively. **Tabel 6** shows the values of this index for the effect of exogenous variables on the construct of green purchase intention.

3-4- Model Fit

In the present study, NFI, SRMR, and RMS_{theta} indices were also used to evaluate the overall fit of the model. Values lower than 0.08 and 0.12

were considered for the RMS_{theta} index as optimal values (Henseler et al., 2014; Lohmöller, 1989). Also, values higher than 0.9 are desirable for the NFI index. Table 7 shows the results of examining the model fit.

Tabel 7. Model Fit

Model fit indices	optimal value	software output
SRMR	<0.08	0.064
RMS_{theta}	<0.12	0.112
NFI	>0.9	0.921

3-5- Hypotheses Testing

To test research hypotheses, it is necessary to examine the role of variables in the conceptual framework of research. The first criterion for testing research hypotheses is the t-statistic. The hypothesis is confirmed if the absolute value of the t-statistic is greater than 1.96 at the 5% error level. Another measure is the path coefficient between study components, which indicates influence and causality. Path coefficients describe the existence of a linear causal relationship between two latent variables, the strength of the relationship, and the direction of the relationship (Kock & Hadaya, 2018). A summary of the results obtained concerning the path coefficients and the value of the T statistic in this research is given in **Tabel 8**.

Tabel 8. Hypotheses Testing Result

Hypothesis	Path	T Statistics	Path coefficient	Result
H_1	GW→ GPI	6.045	-0.316	Supported
H_2	GW→ GWM	40.944	-0.819	Supported
H_3	GW→ GC	40.476	0.827	Supported
H_4	GW→ GS	29.208	0.771	Supported
H_5	GC→ GPI	5.833	-0.269	Supported
H_6	GS→ GPI	3.053	-0.135	Supported
H_7	GWM→ GPI	5.218	0.254	Supported
H_8	GW→ $GC \rightarrow GPI$	2.985	-0.104	Supported
H_9	GW→ $GWM \rightarrow GPI$	5.596	-0.208	Supported

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4- Discussion and Conclusions

This study makes a significant scientific contribution to green research. It is the first attempt to investigate the relationship between greenwashing and the intention to purchase green foods in the Iranian food industry. The present study encourages and supports food industry marketers to create credible green claims to not only improve their business conditions but also strengthen their environmental programs. It was revealed that some food industries are at high risk because consumers are skeptical about the environmental friendliness of their activities and services. In this regard, the factors influencing greenwashing attitudes are very important (Aukilar and Demirgones, 2017). The results of this study show how this mechanism (negative effect of greenwashing on green purchase intention) is triggered by green skepticism. As their awareness and experience of green products have increased compared to the past, consumers are increasingly critical in evaluating the sustainable environmental practices of food companies (Parguel et al., 2015). Consumers are increasingly aware of the environmental benefits, health, and safety issues associated with purchasing green products, and as a result, they may become more skeptical of the company's motives leading to negative product criticism and green purchase intentions. As a result, business managers must establish enough credibility to keep consumers from being skeptical. Our results suggest that managers need to focus on some environmentally friendly methods to reduce consumer skepticism. Managers need to be more transparent about their environmental performance and non-governmental organizations can audit companies' environmental reports and fine companies that engage in greenwashing while these measures may reduce customers’ confusion.

Attempts to make the green word of mouth and green advertising may lead to the opposite result due to the perception of greenwashing behavior and negative word of mouth (Allsop et al., 2007). In particular, if a company's performance is misleading and its environmental claims are confusing and misleading so that its authenticity cannot be determined, the intention to purchase environmentally friendly products is reduced. In this regard, companies must incorporate environmental concerns and responsibilities into their core values, and continuously and consistently integrate their environmental commitments and attributes into their overall strategies and actions. In this regard, business leaders should adopt policies that create consumer confidence in companies' green efforts and dynamics. A better way to do this is to transparently and honestly conduct green efforts that incorporate this environmental concern and responsibility into core values and corporate identity (Hai et al., 2017).

The mediating role of green word of mouth and its positive impact on green purchase intention indicates the need for managers to monitor social platforms (Zhang et al., 2018). So they can hear what is being said about their brands and products, and even gather suggestions on how to improve green advertising. Considering the statements about environmental performance, managers can develop and better tailor strategies to satisfy consumers and meet environmental expectations. Customer confusion due to greenwashing behavior negatively impacts green purchasing intentions in the food industry. As a result, companies must not only claim to be "green" but also have to demonstrate proof of their green products. They must have clear and transparent statements and commitments about environmental performance. These policies reduce confusion and risk for customers. The results of this study are consistent with the results of studies conducted by Saxena & Sharma (2021), Ansu Mensah (2021), Guerrero and Pacheco (2021), Nguyen et al. (2021), Hameed et al.), Akturan (2018), Goh and Balaajib (2016), Chen et al. (2014). Finally, the findings of this study may be useful and significant for managers, professionals, students,

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and other researchers and they may initiate the necessary direction for future orientations in green marketing research.

5- Suggestions

It is recommended that the food industry establish strong green performance strategies. It should be highlighted that green efforts should be assessed and approved by environmental organizations. Furthermore, delivering green messaging broadly to consumers may be a better method for food sectors to be more credible to consumers. In this regard, food manufacturers should educate merchants on their production methods and green claims, as these retailers serve as effective information channels between producers and their consumers. The importance of informational and instructional programs should not be underestimated. Policymakers, marketers, and community organizations should work together to create and implement these programs to enhance consumer awareness of green practices and the benefits of green products. These programs boost customers' environmental understanding and ethical convictions, as well as their level of green skepticism, which increases their propensity to buy organic foods. Therefore, by conducting marketing/advertising efforts, policymakers, marketers, green producers, and governments can aid in disseminating information about the advantages of green products. These initiatives may increase customers' knowledge and understanding of green products, as well as their willingness to buy them. Consumers must be trained on the advantages of investing in green products. As a result, they are incentivized to spend more on green items, which may raise product prices for consumers. To address the pricing issue, consumers can be offered incentives to encourage them to purchase green items. Managers in the food business are encouraged to include environmental performance in industry

strategies and demonstrate their commitment to the environment. As a result, the food business must avoid misleading green ads. Another management tactic is the release of data on environmental performance which is a fundamental instrument to raise customer loyalty and trust and attract green consumers. The marketing research team should also work to increase consumer demand for eco-friendly goods. Last but not least, it is recommended that the government and relevant organizations create appropriate laws and regulations regarding greenwashing activity, with the corresponding punitive legislation and fines being set by the accountable institutions.

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Investigating the Effect of Sanctions on Casual Relationship between Corruption, Income Inequality and Poverty in Iran

Sayed Amin Mansouri*

** Associate Professor of Economics, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran. (Corresponding Author)*

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CORRESPONDING AUTHOR'S:
Email:
Email:sa.mansouri@scu.ac.ir
0000-0003-1251-4028

Postal address:
Golestan street, Golestan, Department of Economics, Faculty of Economics and Social Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Khuzestan, Postal code: 61357-93113, Iran

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ABSTRACT

The purpose of the present study is to investigate the effect of sanctions on causal relationship between corruption, income inequality and poverty in Iran during 1984 to 2020. For this purpose, a number of embezzlement concluded cases in the courts of general jurisdiction and Control of Corruption indicator (COC) as the representative of corruption indicator, Atkinson index and Gini index as the representative of income distribution and the indicators of per capita income and poverty line (calculated based on Linear Expenditure System (LES)) as the representative of poverty status were firstly gathered and calculated. According to the obtained results, income distribution is not an effective variable on poverty and vice versa, but it is a significant variable for the cause of corruption. However, poverty line under sanctions is a good representative of income distribution causality. Corruption and poverty cannot properly explain the distribution of income. However, the control of corruption has been the cause of income distribution. Also, corruption (poverty) is an effective variable for poverty causality (corruption) and the significance level of this relationship is higher under sanctions.

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1- Introduction

The issue of poverty and its relationship with governance variables is important in terms of different economic aspects. In most countries, incompetence of economic sectors, recession, severe unemployment, demographic changes and other socio-economic factors have exposed low-income households to poverty and deprived disadvantaged classes from government assistance and other community amenities. Therefore, a new attitude towards poverty and its economic and social factors have been adopted by economists in recent decades. In this regard, corruption is one of the most important variables affecting poverty and income inequality. As Huntington puts it, corruption refers to those public sector employees who ignore accepted norms, rules and custom for non-organizational interests. In other words, corruption is an illegitimate tool to satisfy illegal demands from administrative system (Huntington & Fukuyama, 1968). Scott believes that corruption is a behavior in which a person plays a governmental role to pursue his/ her private interests and achieve greater prosperity or a better position outside the formal framework of his/her duties (Scott, 1972). Hart et al have defined corruption as utilizing government property for gaining personal interest (Hart, Shleifer, & Vishny, 1997).

The number of revealed corruption-related crimes is one of the major challenges of Iran which has been significantly increased in recent years. According to official reports, although only two cases of embezzlement were reported in 1990s and 2000s with a total value up to $ 800 million, administrative corruption has significantly increased in 2010s with 13 large corruption cases and a total value up to $ 14 billion and a growth of over 1500% compared to 1990s and 2000s (The Iranian Students News Agency[1] (ISNA), 2017). The spread of such amount of corruption in administrative and bureaucratic system of the country can have irreparable economic and social consequences. The statistic investigations have shown that macroeconomic indicators including economic growth, employment, unemployment, poverty,

[1] Https://Bit.Ly/2o5vvni

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inflation and income distribution have become less favorable in 2010 compared to previous decades (Statistical Center of Iran, Iran Statistical Yearbook, 2017). In this regard, the following questions can be raised: is there a relationship between corruption and the indicators of income distribution and poverty in the country? Since the volume of international and unilateral sanctions on Iran has increased in the 2010s, does such a widespread growth in the volume and value of corruption cases in Iran have a relationship with sanctions? Therefore, the purpose of the present study is to investigate the effect of sanctions on causal relationship between corruption, income inequality and poverty in Iran during 1984 to 2020. For this purpose, the indices of per capita income, poverty line, administrative corruption and control of corruption, Atkinson and Gini have been utilized to investigate their interactions through Toda-Yamamoto Causality Test.

2- Literature Review

Numerous studies – (Grossman & Helpman, 1997; Mauro, 1995, 1998, 2002; Pellegrini & Gerlagh, 2004)-have been conducted to investigate the effect of corruption on economy in terms of the effect it has on economic growth. One of the early studies on economic field of crime was conducted by Fleisher (Fleisher, 1963). In that study, he investigated the relationship between crime and unemployment and concluded that there was a direct relationship between crime rates and unemployment. In terms of causes and motivations for committing a crime, Becker has proposed a theoretical model with purely economic analysis to evaluate the rational behavior of criminals. As Becker put it, criminals behave rationally and engage in criminal activity with lucrative motives (Becker, 1968). On the word of Ehrlich, education is a factor for increasing the expected legal income of individuals on one hand and decreasing crime rate on the other hand (Ehrlich, 1973). He then has concluded that occurrence of crimes have a positive relationship with income inequality, especially crimes against property. Johnston has stated that corruption is in the interest of "wealthy

people", especially when their share is high. Disproportionately, corruption is borne by low-income people. Individuals in low-income groups spend much of their income compared to individuals of high-income groups (Johnston, 1989). Tanzi has argued that corruption disrupts the role of government in income distribution. Since only individuals with favoritism links can take best and most beneficial government projects, it is less likely for the government to improve the distribution of income in society (Tanzi, 1998).

According to the cross-country panel data, Easterly and Levine have stated that increased corruption is an important channel of decreasing ethnic diversity of growth (economic) (Easterly & Levine, 1997). In their study, Rajeev and Nelson have shown that government size has a direct effect on corruption so that corruption is increased with an increase in government size (Goel & Nelson, 1998). Gupta et al. have conducted a study on investigating the relationship between corruption, income distribution and poverty and concluded that high and increasing corruption intensifies income inequality and poverty and decreases economic growth, efficiency of tax system, efficiency of government expenditure and human capital formation (Gupta, Davoodi, & Alonso-Terme, 2002)

Li, Xu & Zou and Chong & Calderon have found an inverse U-shaped relationship between corruption and income inequality by data obtained from a combined group of countries including low-income, middle-income and high-income countries. They found a positive relationship between corruption and income inequality in high-income countries and a negative relationship in low-income countries. They argued that increasing income inequality with increase in corruption does not necessarily mean increasing poverty with increase in corruption. They also found a linear and positive relationship between corruption and poverty (Chong & Calderón, 2000; Li, Xu, & Zou, 2000). Karstedt has also drawn on the direct relationship between income inequality and corruption. In the countries investigated, there was also a nonlinear relationship between income inequality and corruption. Additionally, administrative corruption decreases

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significantly after reaching to the specific point of income inequality (Karstedt, 2003). Chetwynd et al have used two economic and governmental models to explain how corruption affects poverty. In the economic model, corruption affects poverty by affecting economic growth factors. Corruption avoids encouraging domestic and foreign investment, distorts public funds for personal purposes and extends bribe activities that act bribery without taxpaying and as a result, declines the tax revenue. Ultimately, corruption drives talents from productive activities to non-productive activities. In other words, corruption impedes market competitiveness by decreasing economic investment and market distortion and leads to inefficiency of the economy. In the governmental model, corruption affects poverty by affecting governmental factors. As an example, corruption destroys the capital needed by the government to deliver high quality public services and diverts public capital from basic needs to capital projects where bribes are likely to occur. Corruption destroys government performance, diminishes government-provided services, declines public trust and social capital, and decreases funds needed to support economic growth plans. Therefore, corruption decreases the government's capability for helping citizens and poor people and affects poverty through posing serious challenges to government activities (Chetwynd, Chetwynd, & Spector, 2003).

You and Khagram investigated the direct relationship between inequality and corruption and argued that poor people cannot control and monitor wealthy people and the matter leads to increase in the probability of wealthy people's abuse from their position for gaining personal interests. As a result, inequality increases corruption (Jong-Sung & Khagram, 2005). Song & Khagram and Oriaku & Ogwu have confirmed the mutual relationship between inequality and corruption in their studies (Jong-Sung & Khagram, 2005; Nwala, Oriaku, & Ogwu, 2005). Dincer and Gunalp showed that corruption has increased poverty and inequality in the United States during a specific period (Dincer & Gunalp, 2008). Wu & Zhu showed that corruption has a

significant negative effect on the economic growth and income inequality (Wu & Zhu, 2011). Dobson & Dobson concluded that increasing corruption has led to an increase in income inequality (Dobson & Ramlogan-Dobson, 2012). Justice has identified the positive and significant effect of corruption on poverty in Kenya and Botswana (Justice, 2014). Godinez and Ling investigated the relationship between administrative corruption and foreign direct investment and concluded that increasing corruption has led to a significant decrease in foreign investment attraction in these countries (Godinez & Liu, 2015).

Moradi et al. (2023) showed that the indicators of the rule of law and corruption control in both groups of selected countries and in all frameworks have significant negative and positive effects on income inequality, respectively. The political stability index also shows that in the first two quarters in both groups of countries, it has a negative and significant effect on income inequality (Gini coefficient), which can mean that with political instability, the incentive for poor investment and consumerism in these societies can be strengthened, resulting in reduced production and income inequality. While in the third quarter in both groups of countries studied, the political stability index has a positive and significant impact on income inequality, meaning that as political stability increases, the income distribution becomes more equal (Moradi, Jafari, & Fatahi, 2023).

Mansouri et al. (2022), show that the Human Development Index of Khuzestan province reached a high level from 1375 with a value of 64/0 from the average level in 1385 to 1395, which is an acceptable growth in this index. The Human Development Index without oil in Khuzestan province is also lower than the similar national index and shows the worse situation in Khuzestan province than in the country in this regard (Sayed Amin Mansouri, Afghah, Aghaei Jannat-Makan, & sharifzadeh ahvazi, 2022).

Ershadi et al. (2022), show that the two provinces of Alborz and Tehran have the highest two-dimensional Development Index in the country, and the provinces of Sistan and Balochistan with the lowest

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index suffer from the highest development inequality in the country. based on the correlation matrix between the two dimensions of education and economics there is a 75% correlation. So it can be concluded that in general, provinces with better educational indicators also rank higher in the economy (Ershadi Zadh, Afghah, & Mansouri, 2022).

Mansouri and Afghah (2018) show taht the household dimension is the most important factor in increasing the minimum livelihood of all commodity groups. In other income groups, the poverty line has also increased. The study of the poverty line to income ratio shows that the poverty line rate is higher than the income to the sixth income group, and in the seventh, eighth income groups, on average, and only in the ninth and tenth income groups, the income rate is higher than the poverty line (Satyed Amin Mansouri & Afghah, 2018).

Afghah and Mansouri (2015) showed that increased security in society was the most important factor in the decline of the underground economy and hidden moral crimes. Bureaucratic corruption is the most influential variable of the increase in hidden moral crimes and illiteracy is the most influential variable of the increase in the underground economy. In addition, the increase in hidden moral crimes increases murder, theft and harassment, and the increase in the underground economy increases drinking, liquidity and energy consumption (Afghah & Mansouri, 2015).

3- Introducing data and variables

The statistics used in the present study have been obtained from the websites of Statistical Center of Iran, Central Bank of Iran and the World Bank. In the study, data related to Worldwide Government Index (WGI) have been obtained from the World Bank, data related to crime and corruption obtained from Statistics Department of Judiciary and other statistical data have been obtained from the websites of Statistical Center of Iran and Central Bank of Iran during 1984 to 2020.

In general, the data include the following cases:

1. Average annual income of urban households during 1984 to 2020 according to the type of income in each of the annual income groups;
2. Gini index during 1984 to 2020;
3. Percentage of literacy rate during 1984 to 2020;
4. The number of concluded cases of embezzlement, bribery and counterfeiting in court of general jurisdiction as the index for data related to administrative corruption (embezzlement, bribery, counterfeiting) during 1984 to 2020;
5. The data related to control of corruption (COC) index during 1984 to 2020;
6. Gross domestic product at fixed prices of 2004 in billion Rials during 1984 to 2020;
7. The index of poverty line in the study of (Mansouri & Afghah, 2015) in Rials during 1984 to 2020.

Accordingly, the variables used in the present study are as follows:

3-1- Poverty indices

1. **Per capita Income (IP):** Gross domestic product (GDP) at fixed price of 2004 in billion Rials divided by population (Statistical Center of Iran).
2. **Poverty Line (PL):** in the present study, Stone–Geary utility function (1954) and Linear Expenditure System (LES) have been used to measure the poverty line. The demand function or consumption expenditure equations (E) of Stone–Geary are defined as follows:

(1) $$E_{it} = p_{it} q_{it} = p_{it} \gamma_{it} + \beta_i (I - \sum_{i=1}^{n} \gamma_{it} p_{it})$$

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Where, (q_{it}) is the amount of production, (p_{it}) is price and (γ_{it}) is the minimum livelihood and $\sum_{i=1}^{n}\beta_i = 1$. If ($\sum_{i=1}^{n}\beta_i = 1$), then obtained consumption expenditure equations are linear with respect to price (P) and income (I) variables and are nonlinear with respect to parameters. According to this method, the demand equations have been derived from the linear expenditure system and the minimum livelihood (γ_{it}) is constant for the whole period. Therefore, according to the definition, the relative poverty line equals the expenditures on minimum livelihood consumption of each commodity group during 1984 to 2020 which would be as follow:

(2) $$Z_t = \sum_{i=\backslash}^{n} \gamma_{it} p_{it}$$

Urban households' expenditures statistics obtained from commodity items, urban households' income, price index of consumer goods and services for eight commodity groups at the base price of 2004 have been used to calculate the poverty line. The Iranian household product portfolio includes two groups. One group is related to food and tobacco and the other is related to non-food items including clothing and footwear, housing, furniture and accessories, household supplies and services, healthcare, transportation and communications, leisure, entertainment and cultural services and goods and miscellaneous household services.

3-2- Indices of income distribution

1. **GINI index:** GINI index is one of the most important indicators of income inequality, which is expressed as a ratio and has a value between zero and one. The closer the value to one, the greater is the inequality in the countries and when its value is close to zero, the distribution of income is more balanced.

2. **Atkinson index (ATK):** It is a criterion for inequality that is called average paid income according to Atkinson's (1970) defined concept:

(3)

$$I_{\varepsilon} = \left\{1 - \left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\mu}\right)^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}}\right\} \quad if \quad \varepsilon \neq 1$$

$$I_{\varepsilon} = \left\{1 - \left[\prod_{i=1}^{n}\left(\frac{y_i}{\mu}\right)\right]^{\frac{1}{n}}\right\} \quad if \quad \varepsilon = 1$$

Where, y_i is income for individual, μ represents the average of income and E measures the degree of inequality. The range of E is from zero to infinity. Whatever the degree of E rises, Atkinson indices have a greater effect on the variables of low and high incomes. ATK index equals to zero when incomes are equal and inequality is increased by approaching the index to 1.

3-3- Corruption indices

1. **Administrative corruption (AC):** This index is equal to the number of concluded cases of embezzlement, bribery and counterfeiting in court of general jurisdiction.
2. **Corruption Control (CC):** This indicator measures the extent of corruption (the use of public power to gain private interests). The range of changes in this index is between -2.5 and + 2.5, which higher values indicate better control of corruption and lower values indicate poorer control of corruption in countries.
3. **Sanction Virtual Variable (D2):** The criterion for this virtual variable is Zivot & Andrews stationary test, which considers the structural break in unit root test. For this purpose, structural failure has been identified since 2010 using the poverty line variable (LP). Therefore, the timing of sanctions' effect has been adjusted as 0 and 1 before and after the year of 2010, respectively.

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4- Toda-Yamamoto Causality Test (TY)

Toda and Yamamoto proposed a simple method in the form of estimating a modified VAR model to investigate the Granger causality relationship. They argue that the method is valid even in the presence of a co-integration relationship between variables. In this method, the number of optimal intervals (k) of the VAR model should first be determined. Then, the degree of maximum convergence (dmax) is determined and a VAR model with the number of (k+dmax) intervals is formed. The process of selecting time intervals is valid when K≥dmax. If the following two-variable model is considered, the Toda-Yamamoto causality test can be stated as follows:

$$Y_t = \alpha_0 + \beta_{1i}\sum_{i=1}^{k} Y_{t-i} + \beta_{2j}\sum_{j=k+1}^{d\max} Y_{t-j} + \gamma_{1i}\sum_{i=1}^{k} x_{t-i} + \gamma 2j\sum_{j=k+1}^{d\max} x_{t-j} + \varepsilon_{1t}$$
$$x_t = \alpha_1 + \lambda_{1i}\sum_{i=1}^{k} x_{t-i} + \lambda_{2j}\sum_{j=k+1}^{d\max} x_{t-j} + \sigma_{1i}\sum_{i=1}^{k} Y_{t-i} + \sigma_{2j}\sum_{j=k+1}^{d\max} Y_{t-j} + \varepsilon_{2t} \quad (4)$$

The used T-statistic of the present study would be the parent statistic that has an asymptote distribution of x^2 with freedom degree equaling to the number of zero constraints (Toda & Yamamoto, 1995). According to Zapata and Rambaldi, the advantage of this method is that there is no need to know co-integration features of system by utilizing from this method and only VAR model rank and the degree of maximum convergence of variables are sufficient to perform this test (Zapata & Rambaldi, 1997).

5- Model estimation and data analysis

5-1- The results of stationary test

Since most macroeconomic time series variables are non- stationary, it is necessary to make sure that variables are stationary according to co-integration theory in econometrics in order to avoid false regression in regression analysis. For this purpose, the variables of the present study were evaluated through Phillips-Peron (PP) test. The results of Phillips-

Peron stationary test have been represented in Table (1). As it can be seen from Table (1), all variables have become stationary with one time of differentiation, except the poverty line variable. As indicated in Table (2), Zivot & Andrews stationary test showed that the structural break in 2010 is reason of poverty line variable's non- stationary state and the variable is at stationary level.

Table 1. the results of Phillips-Perron (PP) test
Source: Research Results.

Variable	Prob	Result	Variable (first order differential)	Prob	Result
AC	0.78	Non-Stationary	**d(AC)**	0.00	Stationary
CC	0.61	Non-Stationary	**d(CC)**	0.08	Stationary
ATK	0.26	Non-Stationary	**d(ATK)**	0.00	Stationary
PL	1.0	Non-Stationary	**d(PL)**	0.3	Non-Stationary
IP	0.23	Non-Stationary	**d(IP)**	0.00	Stationary
GINI	0.08	Non-Stationary	**d(GINI)**	0.00	Stationary

Table 2. the results of Zivot & Andrews stationary test for differentiation of variables
Source: Research Results.

Variable	Trend and intercept Model	Result
d(PL)	0.00	Stationary

6- The results obtained from investigating the causality of poverty, income distribution and corruption indices

6-1- The first step: Estimation of VAR model

The results of investigation and estimation of short-run VAR model between poverty, income distribution and corruption indices in two stages, determining the optimal interval based on Schwarz and Akaike statistics and VAR model estimation are presented:

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- **VAR relationship between per capita income (IP) and administrative corruption (AC)**

As it can be seen from the estimated results of Table (3), D2 variable of sanctions had a significant positive effect on corruption and had no significant effect on per capita income. In other words, sanctions have affected the causality of per capita income on administrative corruption.

Table 3. estimation of VAR model for capita income (IP) and administrative corruption (AC)
Source: Research Results.

Lag	0	1	2	3	4
AIC	42.7	40.2	39.7	39.8	39.6
VAR	$\underset{t-stat}{AC} = \underset{8.03}{1.4}AC(-1) - \underset{-2.4}{0.7}AC(-2) - \underset{-2.05}{0.6}AC(-3) + \underset{3.8}{0.85}AC(-4) - \underset{-2.9}{55.5}IP(-1)$ $+\underset{1.6}{53}IP(-2) - \underset{-1.1}{34}IP(-3) - \underset{-0.23}{4.4}IP(-4) + \underset{4.3}{93656} + \underset{3.9}{176316}D2$ $R^2 = 0.89 \quad F = 17.5$ $\underset{t-stat}{IP} = -0.0018AC(-1) - \underset{-0.5}{0.0018}AC(-2) + \underset{1.1}{0.004}AC(-3) + \underset{0.26}{0.0008}AC(-4)$ $+\underset{6.4}{1.6}IP(-1) - \underset{-2.6}{1.1}IP(-2) + \underset{1.2}{0.5}IP(-3) - \underset{-1.1}{0.26}IP(-4) + \underset{1.8}{506} + \underset{1.4}{850}D2$ $R^2 = 0.98 \quad F = 15$				

- **VAR relationship between per capita income (IP) and corruption control (CC)**

As it can be seen from the estimated results of Table (4), D2 variable of sanctions had a significant positive effect on per capita income, but had no significant effect on corruption control. In other words, sanctions have affected the causality of corruption control on per capita income.

Table 4. estimation of VAR model for per capita income (IP) and corruption control (CC)
Source: Research Results.

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**16.5**	**14.74**	**13.95**	**14.3**	**14.62**
VAR	$IP = 1.4\,IP(-1) - 0.8\,IP(-2) - 2735\,CC(-1) + 1064\,CC(-2) + 441 + 1138\,D2$ (t-stat: 6.5, −3.6, −2.5, 0.8, 1, 2.1) $R^2 = 0.97 \quad F = 84$ $CC = -8.9e\text{-}06\,IP(-1) - 3.7e\text{-}05\,IP(-2) + 1.2\,CC(-1) - 0.6\,CC(-2) - 0.07 + 0.13\,D2$ (t-stat: −0.19, −0.8, 5, −1.9, −0.7, 1.1) $R^2 = 0.85 \quad F = 15$				

- **VAR relationship between per capita income (IP) and GINI index**

As it can be seen from the estimated results of Table (5), D2 variable of sanctions had a significant positive effect on per capita income, but had no significant effect on GINI index. In other words, sanctions have affected the causality of income distribution on per capita income.

Table 5. estimation of VAR model for per capita income (IP) and GINI index
Source: Research Results.

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**10.6**	**9.3**	**8.8**	**9.2**	**9**

VAR	$\underset{t-stat}{IP} = 1.4\underset{11.3}{IP}(-1) - 0.56\underset{-3.7}{IP}(-2) - 2227\underset{-0.2}{GINI}(-1) + 26236\underset{2..4}{GINI}(-2)$ $-9161 + 849\underset{1.8}{D2}$ $\underset{-1.6}{}$ $R^2 = 0.96 \quad F = 135$ $\underset{t-stat}{GINI} = -3.4e-06\underset{-1.4}{IP}(-1) + 2.8e-06\underset{0.97}{IP}(-2) + 0.3\underset{1.5}{GINI}(-1) - 0.05\underset{-0.3}{GINI}(-2)$ $+0.3 - 0.005\underset{-0.6}{D2}$ $\underset{2.9}{}$ $R^2 = 0.33 \quad F = 2.5$

- **VAR relationship between per capita income (IP) and Atkinson index (ATK)**

As it can be seen from the estimated results of Table (6), D2 variable of sanctions had no effect on causality of per capita income, on Atkinson Index and vice versa.

Table 6. estimation of VAR model for per capita income (IP) and Atkinson index (ATK)
Source: Research Results.

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**17**	**14.6**	**14.5**	**14.6**	**14.9**
VAR	$\underset{t-stat}{ATK} = 0.3\underset{1.6}{ATK}(-1) + 0.3\underset{1.5}{ATK}(-2) - 4.7e-05\underset{-1.4}{IP}(-1) + 3.3e-05\underset{1}{IP}(-2) + 0.2\underset{1.6}{}$ $R^2 = 0.53 \quad F = 7.2$ $\underset{t-stat}{IP} = -469\underset{-0.6}{ATK}(-1) - 303\underset{-0.37}{ATK}(-2) + 1.3\underset{9.5}{IP}(-1) - 0.4\underset{-3.2}{IP}(-2) + 716\underset{1.3}{}$ $R^2 = 0.96 \quad F = 138.4$				

- **VAR relationship between poverty line (PL) and administrative corruption (AC)**

As it can be seen from the estimated results of Table (7), D2 variable of sanctions had no effect on causality of per between poverty line, on administrative corruption and vice versa.

Table 7. estimation of VAR model for poverty line (PL) and administrative corruption (AC)
Source: Research Results.

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**44.4**	**40**	**40.1**	**40.4**	**40.1**
VAR	$\underset{t-stat}{PL} = \underset{4.03}{0.9}\,PL(-1) + \underset{0.97}{0.3}\,PL(-2) - \underset{-0.84}{0.2}\,PL(-3) + \underset{0.18}{0.07}\,PL(-4) + \underset{2.44}{0.01}\,AC(-1)$ $\underset{-2.4}{-0.01}\,AC(-2) + \underset{0.7}{0.003}\,AC(-3) + \underset{0.5}{0.002}\,AC(-4) + \underset{0.18}{34.1} + \underset{3.1}{1839.7}\,D2$ $R^2 = 1, F = 493$ $\underset{t-stat}{AC} = \underset{-3.6}{-49.4}\,PL(-1) + \underset{3.5}{73.2}\,PL(-2) + \underset{1.6}{29.8}\,PL(-3) - \underset{-3.4}{79.3}\,PL(-4) + \underset{7.9}{1.4}\,AC(-1)$ $\underset{-1}{-0.3}\,AC(-2) - \underset{-2.9}{0.9}\,AC(-3) + \underset{4}{0.9}\,AC(-4) + \underset{1.5}{16847} + \underset{3.6}{134696.1}\,D2$ $R^2 = 0.9, F = 16.6$				

- **VAR relationship between poverty line (PL) and corruption control (CC)**

As it can be seen from the estimated results of Table (8), D2 variable of sanctions had an effect on causality of per between poverty line, on corruption control and vice versa.

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Table 8. estimation of VAR model for poverty line (PL) and corruption control (CC)
Source: Research Results.

Lag	0	1	2	3	4
AIC	19.3	14.8	15.3	15.9	16.1
VAR	$\underset{t-stat}{PL} = \underset{22.6}{1.05}\,PL(-1) \underset{-0.22}{-196.1}\,CC(-1) + \underset{0.3}{143} + \underset{2.3}{1420.6}\,D2, R^2 = 1, F = 685.3$ $\underset{t-stat}{CC} = \underset{-3}{-1.9}\,PL(-1) + \underset{8.3}{1.05}\,CC(-1) + \underset{0.6}{0.04} + \underset{3}{0.25}\,D2, R^2 = 0.9, F = 33.4$				

- **VAR relationship between poverty line (PL) and GINI index**

As it can be seen from the estimated results of Table (9), D2 variable of sanctions had a significant positive effect on poverty line, but had no significant effect on GINI index. In other words, sanctions have affected the causality of income distribution on poverty line.

Table 9. estimation of VAR model for poverty line (PL) and GINI index
Source: Research Results.

Lag	0	1	2	3	4
AIC	12.3	9	9.4	9.7	10
VAR	$\underset{t-stat}{PL} = \underset{32.9}{1.1}\,PL(-1) \underset{-1.1}{-11531.3}\,GINI(-1) + \underset{1.08}{4739.5} + \underset{2.6}{1190.1}\,D2, R^2 = 1, F = 1754.7$ $\underset{t-stat}{GINI} = \underset{2.3}{1.3}\,PL(-1) + \underset{1.1}{0.2}\,GINI(-1) + \underset{4.4}{0.32} \underset{-2.7}{-0.02}\,D2, R^2 = 0.4, F = 5.5$				

- **VAR relationship between poverty line (PL) and Atkinson index (ATK)**

As it can be seen from the estimated results of Table (10), D2 variable of sanctions had no effect on causality of poverty line, on Atkinson Index and vice versa.

Table 10. estimation of VAR model for poverty line (PL) and Atkinson index (ATK)
Source: Research Results**.**

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**19.5**	**14.8**	**15.1**	**15.4**	**15.7**
VAR	$\underset{t-stat}{PL} = 1.15\,PL(-1) \underset{52.8}{-706.8}\,ATK(-1) + \underset{1.1}{384}, R^2 = 1, F = 1835.5$ $\underset{t-stat}{ATK} = \underset{-0.7}{-3.1}\,PL(-1) + 0.6\,ATK(-1) + \underset{2.3}{0.2}, R^2 = 0.4, F = 10.2$				

- **VAR relationship between GINI index and administrative corruption (AC)**

As it can be seen from the estimated results of Table (11), D2 variable of sanctions had no effect on causality of GINI index, on administrative corruption and vice versa.

Table 11. estimation of VAR model for per capita income (IP) and administrative corruption (AC)
Source: Research Results**.**

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**18.8**	**17.8**	**18**	**18.4**	**18.7**
VAR	$\underset{t-stat}{GINI} = 0.4\,GINI(-1) + \underset{2.1}{2.9}\,AC(-1) + \underset{3.5}{0.5}, R^2 = 0.3, F = 5.3$ $\underset{t-stat}{AC} = \underset{0.05}{45879.02}\,GINI(-1) + 0.8\,AC(-1) \underset{-0.01}{-5184}, R^2 = 0.75, F = 42.2$				

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- **VAR relationship between GINI index and corruption control (CC)**

As it can be seen from the estimated results of Table (12), D2 variable of sanctions had no effect on causality of GINI index, on corruption control and vice versa.

Table 12. estimation of VAR model for per capita income (IP) and corruption control (CC)
Source: Research Results.

Lag	0	1	2	3	4
AIC	-6.5	-9.0	-8.5	-7.9	-7.4
VAR	$\underset{t-stat}{GINI} = 0.1\,GINI(-1) + \underset{0.4}{0.04}\,CC(-1) + \underset{5.7}{0.4}, R^2 = 0.7, F = 21.4$ $\underset{t-stat}{CC} = -5.4\,GINI(-1) + \underset{8.02}{1.08}\,CC(-1) + \underset{2}{2.2}, R^2 = 0.82, F = 39.5$				

- **VAR relationship between Atkinson index (ATK) and administrative corruption (AC)**

As it can be seen from the estimated results of Table (13), D2 variable of sanctions had a significant positive effect on administrative corruption, but had no significant effect on Atkinson index. In other words, sanctions have affected the causality of income distribution on administrative corruption.

Table 13. estimation of VAR model for poverty line (PL) and administrative corruption (AC)
Source: Research Results.

Lag	**0**	**1**	**2**	**3**	**4**
SIC	**24.5**	**23.3**	**23.2**	**23.4**	**23.4**
VAR	$\underset{t-stat}{ATK} = 0.4\,ATK(-1)_{1.7} + 0.5\,ATK(-2)_{2.1} - 0.3\,ATK(-3)_{-1.2} - 0.2\,ATK(-4)_{-0.8} + 2.4\,AC(-1)_{0.3}$ $+ 3.7\,AC(-2)_{0.3} + 2.6\,AC(-3)_{0.2} - 7.9\,AC(-4)_{-1.1} + 0.3_{1.8} - 0.08\,D2_{-1}, R^2 = 0.6, F = 3$ $\underset{t-stat}{AC} = 55778.9\,ATK(-1)_{1.1} + 150091.1\,ATK(-2)_{2.8} + 101914.001\,ATK(-3)_{1.7} + 45467.2\,A$ $+ 0.8\,AC(-1)_{4.5} - 0.3\,AC(-2)_{-1.05} - 0.3\,AC(-3)_{-1.4} + 0.4\,AC(-4)_{2.3} - 117977_{3.6} + 59281.3\,D2_{3.2}, R^2 = 1, F$				

- **VAR relationship between Atkinson index (ATK) and corruption control (CC)**

As it can be seen from the estimated results of Table (14), D2 variable of sanctions had a significant positive effect on Atkinson index, but had no significant effect on corruption control. In other words, sanctions have affected the causality of corruption control on income distribution.

Table 14. estimation of VAR model for poverty line (PL) and corruption control (CC)
Source: Research Results.

Lag	**0**	**1**	**2**	**3**	**4**
AIC	**-1.7**	**-3.4**	**-3.3**	**-3.2**	**-3.0**

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VAR	$\underset{t-stat}{ATK} = \underset{1.8}{0.5}\,ATK(-1) + \underset{1.8}{0.5}\,ATK(-2) - \underset{-0.5}{0.12}\,ATK(-3) - \underset{-0.2}{0.1}\,CC(-1)$ $- \underset{-0.2}{0.1}\,CC(-2) + \underset{1.5}{0.54}\,CC(-3) + \underset{0.9}{0.2} + \underset{1.8}{0.23}\,D2, R^2 = 0.8, F = 6$ $\underset{t-stat}{CC} = \underset{0.4}{0.12}\,ATK(-1) + \underset{1.3}{0.4}\,ATK(-2) + \underset{0.7}{0.2}\,ATK(-3) + \underset{2.8}{0.9}\,CC(-1)$ $- \underset{-0.8}{0.32}\,CC(-2) + \underset{0.5}{0.2}\,CC(-3) - \underset{0.2}{0.5} + \underset{1.3}{0.2}\,D2, R^2 = 0.9, F = 11.8$

6-2- Investigating the results of Toda- Yamamoto causality test

- The Relationship between causality of corruption and the income distribution on Poverty

Table (15), represents the results of parent test (χ^2) for investigating the causality of poverty variable with corruption and income distribution variables based on estimated relations of VAR model at the confidence level of 95%.

Table 15. the results of causality test for poverty
Source: Research Results.

Independent Variable	Effective variable	(χ^2) for Sanction Model	Prob	Result
Per capita Income	Gini Coefficient	3.6	0.16	insignificant
		5.9	0.05	significant*
	Atkinson index	3.9	0.27	insignificant
	Corruption	0.7	0.9	insignificant
		20.6	0	significant*
	COC	6.2	0.04	significant*
		7	0.02	significant*
Poverty Line	Gini Coefficient	6.4	0.02	significant*
		1.1	0.3	insignificant

	Atkinson index	**0.9**	**0.3**	insignificant
	Corruption	**0.5**	**0.5**	insignificant
		7.7	**0.1**	significant**
	COC	**0.05**	**0.8**	insignificant

***Significant at the level of 5%, **Significant at the level of 10%**

According to the obtained results of the present study, GINI index is not the cause of per capita income under normal condition, but is its cause under sanctions condition. In contrast, Atkinson index is the cause of per capita income neither under normal condition, nor under sanctions condition. Also, GINI index is the cause of poverty under normal condition, but is not its cause under sanctions condition. In contrast, Atkinson index is the cause of per capita income neither under normal condition, nor under sanctions condition.

On the other hand, investigating the causality of corruption on poverty indices showed that administrative corruption is not the cause of per capita income and the poverty line under normal condition, but is their cause under sanctions condition. Also, corruption control is the cause of per capita income both under normal and sanctions conditions, but is not the cause of poverty under normal and sanctions conditions.

- **The Relationship between causality of poverty and corruption on income distribution**

Table (16) represents the results of parent test (χ^2) for investigating the causality of income distribution variable with corruption and poverty variables based on estimated relations of VAR model at the confidence level of 95%.

Table 16. the results of causality test for income distribution
Source: Research Results.

Independent Variable	**Effective variable**	**(χ^2) for Sanction Model**	**Prob**	**Result**

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Gini Coefficient	**Per capita Income**	**3.4**	**0.18**	insignificant
	Poverty Line	**0**	**0.99**	insignificant
		5.5	**0.02**	significant*
	Corruption	**1.8**	**0.18**	insignificant
	COC	**23.2**	**0**	significant*
Atkinson index	**Per capita Income**	**0.75**	**0.8**	insignificant
	Poverty Line	**0.4**	**0.5**	insignificant
	Corruption	**2.7**	**0.6**	insignificant
	COC	**3.9**	**0.3**	insignificant

***Significant at the level of 5%, **Significant at the level of 10%**

According to the obtained results of the present study, the causality of per capita income on GINI was non-significant under any conditions. In other words, per capita income is not a good index for investigating income distribution. Also, poverty line is not the cause of GINI index under normal condition, but is its cause under sanctions conditions. According to the results, administrative corruption can be the cause of GINI index neither under normal condition, nor under sanctions condition. In contrast, corruption control is the cause of GINI index under both conditions. Also, no significant relationship was found between poverty and corruption indices with Atkinson's income distribution index under both conditions.

- **The Relationship between causality of poverty and income distribution on corruption**

Table (17) represents the results of parent test (χ^2) for investigating the causality of corruption variable with poverty and income distribution variables based on estimated relations of VAR model at the confidence level of 95%.

Table 17. the results of causality test for corruption
Source: Research Results.

Independent Variable	**Effective variable**	(χ^2) **for Sanction Model**	**Prob**	**Result**
Corruption	**Gini Coefficient**	**0**	**0.9**	insignificant
	Atkinson index	**26.7**	**0**	significant*
	Per capita Income	**4.8**	**0.11**	insignificant
		8.7	**0.07**	significant**
	Poverty Line	**0.4**	**0.5**	insignificant
		18.9	**0**	significant*
COC	**Gini Coefficient**	**4.3**	**0.04**	significant*
	Atkinson index	**7.1**	**0.06**	significant**
	Per capita Income	**1.7**	**0.4**	insignificant
	Poverty Line	**0.76**	**0.4**	insignificant
		8.8	**0**	significant*

***Significant at the level of 5%, **Significant at the level of 10%**

According to the obtained results of the present study, GINI index is not the cause of administrative corruption but Atkinson index is the cause of administrative corruption. In other words, income distribution is the cause of administrative corruption in terms of Atkinson index. Investigating the poverty indices showed that per capita income and poverty line are not the cause of corruption under normal condition, but they are the cause of corruption under sanctions condition. Also, income distribution indices of GINI and Atkinson are the cause of corruption control under both conditions. Among poverty indices, per capita income and poverty line are not the cause of corruption control under normal conditions, but poverty line can be the cause of corruption control under sanctions condition.

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7- Finding

Result of research show that:

- sanctions have affected the causality of per capita income on administrative corruption.
- sanctions have affected the causality of corruption control on per capita income.
- sanctions have affected the causality of income distribution on per capita income.
- sanctions had no effect on causality of per capita income, on Atkinson Index and vice versa.
- sanctions had no effect on causality of per between poverty line, on administrative corruption and vice versa.
- sanctions had an effect on causality of per between poverty line, on corruption control and vice versa.
- sanctions had a significant positive effect on poverty line, but had no significant effect on GINI index. In other words, sanctions have affected the causality of income distribution on poverty line.
- sanctions had no effect on causality of poverty line, on Atkinson Index and vice versa.
- sanctions had no effect on causality of GINI index, on administrative corruption and vice versa.
- sanctions had no effect on causality of GINI index, on corruption control and vice versa.
- sanctions had a significant positive effect on administrative corruption, but had no significant effect on Atkinson index. In other words, sanctions have affected the causality of income distribution on administrative corruption.
- sanctions had a significant positive effect on Atkinson index, but had no significant effect on corruption control. In other

words, sanctions have affected the causality of corruption control on income distribution.

According to the obtained results of the present study, GINI index is not the cause of per capita income under normal condition, but is its cause under sanctions condition. In contrast, Atkinson index is the cause of per capita income neither under normal condition, nor under sanctions condition. Also, GINI index is the cause of poverty under normal condition, but is not its cause under sanctions condition. In contrast, Atkinson index is the cause of per capita income neither under normal condition, nor under sanctions condition. Also, the causality of per capita income on GINI was non-significant under any conditions. In other words, per capita income is not a good index for investigating income distribution. Also, poverty line is not the cause of GINI index under normal condition, but is its cause under sanctions conditions. According to the results, administrative corruption can be the cause of GINI index neither under normal condition, nor under sanctions condition. In contrast, corruption control is the cause of GINI index under both conditions. Also, no significant relationship was found between poverty and

Other result show that GINI index is not the cause of administrative corruption but Atkinson index is the cause of administrative corruption. In other words, income distribution is the cause of administrative corruption in terms of Atkinson index. Investigating the poverty indices showed that per capita income and poverty line are not the cause of corruption under normal condition, but they are the cause of corruption under sanctions condition. Also, income distribution indices of GINI and Atkinson are the cause of corruption control under both conditions. Among poverty indices, per capita income and poverty line are not the cause of corruption control under normal conditions, but poverty line can be the cause of corruption control under sanctions condition.

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8- Conclusion

The purpose of the present study was to investigate the effect of sanctions on causal relationship between corruption, income inequality and poverty in Iran during1984 to 2020. For this purpose, the indices of per capita income p, poverty line, Atkinson, GINI, administrative corruption and corruption control were investigated. In general, the following results were obtained from the present study:

1. Income distribution is not an effective variable for poverty in Iran.
2. Corruption is an effective variable for causality of poverty in Iran and its significance level is higher under sanctions condition.
3. Corruption and poverty cannot properly explain the income distribution in Iran. However, the corruption control can be the cause of income distribution and poverty line is a proper representative for the cause of income distribution under sanctions conditions.
4. Income distribution is a strong variable for causality of corruption in Iran.
5. Poverty can properly explain the causality of corruption in Iran under sanctions condition, but is not the cause of corruption under normal condition.

According to the obtained results, it seems that sanctions condition is an effective variable for the relationship between variables of income distribution, corruption and poverty. However, the effective factors of income distribution need further investigations in future.

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فصلنامه علمی

اقتصاد مقداری

(بررسی‌های اقتصادی سابق)

دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز

دوره بیست و یکم، شماره اول، بهار ۱۴۰۳

(شماره مسلسل ۸۰)

بر اساس تأییدیه شماره ۳/۲۶۰۲ مورخ ۱۳۸۷/۴/۵ کمیسیون بررسی نشریات علمی کشور، این نشریه دارای درجه‌ی **علمی ـ پژوهشی** است.

این نشریه هم اکنون در سایت‌های پایگاه استنادی علوم جهان اسلام (ISC) به آدرس (www.isc.gov.ir)، پایگاه نظام نمایه سازي مرکز منطقه‌اي اطلاع رساني علوم و فناوري (ایران ژورنال) به آدرس (www.ricest.ac.ir) پایگاه اطلاعات علمی جهاد دانشگاهی (SID) به آدرس (www.sid.ir)، بانک اطلاعات نشریات کشور به آدرس (www.magiran.com)، پایگاه تخصصی نور به آدرس (www.noormags.ir) و همچنین مقالات این نشریه در سایت علمی google scholar به آدرس (https://scholar.google.com/)، پایگاه مجلات با دسترسی آزاد (DOAJ) به آدرس https://doaj.org، وب سایت EBSCO به آدرس www.ebsco.com نمایه شده است. چاپ مقاله‌هاي اين نشريه به معني تأييد مواضع نويسندگان نيست.

نشریه اقتصاد مقداری جهت تعاملات دوسویه و استفاده از ظرفیت‌های موجود، با انجمن علمی اقتصاد توسعه منطقه‌ای ایران تفاهم نامه ی همکاری امضا کرده است.

فصلنامه علمی اقتصاد مقداری

عنوان اختصاری: JQE

محورهای مطالعاتی: اقتصاد نظری و اقتصاد کاربردی

دوره انتشار: فصلنامه

صاحب امتیاز: دانشگاه شهید چمران اهواز

پروانه انتشار: شماره۱۲٤/۷۲۰ مورخ ۱۳۸۳/۱/۲۹ به زبان فارسی- انگلیسی

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پست الکترونیکی: jqe@scu.ac.ir؛

آدرس سامانه: jqe.scu.ac.ir

آدرس: اهواز- گلستان- دانشگاه شهید چمران اهواز- دانشکده اقتصاد و علوم اجتماعی- دفتر مجله اقصاد مقداری (بررسی های اقتصادی سابق)

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فصلنامه علمی ـ پژوهشی

اقتصاد مقداری

(بررسی‌های اقتصادی سابق)

دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز

دوره بیست و یکم، شماره اول، بهار ۱۴۰۳

صاحب امتیاز: دانشگاه شهید چمران اهواز

مدیر مسئول: دکتر حسن فرازمند

سردبیر: دکتر سید عزیز آرمن

دبیر اجرائی: دکتر سید مرتضی افقه

مدیر داخلی: دکتر سید امین منصوری

ویراستار انگلیسی: دکتر امیر مشهدی

ویراستار فنی و صفحه آرا: آزاده بدوی

همکاران علمی:

دکتر مرتضی عزتی	پژوهشکده اقتصاد دانشگاه تربیت مدرس
دکتر لطفعلی عاقلی کهنه شهری	پژوهشکده اقتصاد دانشگاه تربیت مدرس
دکتر علی ارشدی	پژوهشکده پولی بانک مرکزی
دکتر علی حسن زاده	پژوهشکده پولی و بانکی بانک مرکزی
دکتر شهزاد برومند	پژوهشکده ی امور اقتصادی دانشگاه علامه طباطبایی
دکتر ابوالفضل شاه آبادی	دانشکده اقتصاد دانشگاه الزهرا
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دکتر علی اکبر قلی زاده	دانشکده اقتصاد دانشگاه بوعلی سینا همدان
دکتر محمد حسن فطرس	دانشکده اقتصاد دانشگاه بوعلی سینا همدان
دکتر نادر مهرگان	دانشکده اقتصاد دانشگاه بوعلی سینا همدان
دکتر اصغر شاهمرادی	دانشکده اقتصاد دانشگاه تهران
دکتر حسین عباسی نژاد	دانشکده اقتصاد دانشگاه تهران
دکتر قهرمان عبدلی	دانشکده اقتصاد دانشگاه تهران
دکتر محسن مهرآرا	دانشکده اقتصاد دانشگاه تهران
دکتر جعفر عبادی	دانشکده اقتصاد دانشگاه تهران
دکتر محمدنبی شهیکی تاش	دانشکده اقتصاد دانشگاه زاهدان
دکتر حسین مرزبان	دانشکده اقتصاد دانشگاه شیراز
دکتر رضا اکبریان	دانشکده اقتصاد دانشگاه شیراز
دکتر ابراهیم هادیان	دانشکده اقتصاد دانشگاه شیراز
دکتر اسفندیار جهانگرد	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر جمشید پژویان	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر حمید رضا ارباب	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر حمید رضا برادران شرکاء	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر سهیلا پروین	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر سید محمد رضا سید نورانی	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر علی اصغر بانویی	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر محمد قلی یوسفی	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر علی امامی میبدی	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر ناصر خیابانی	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر سعید مشیری	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر مهدی تقوی	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر فتح الله تاری	دانشکده اقتصاد دانشگاه علامه طباطبایی
دکتر محسن ابراهیمی	دانشکده اقتصاد دانشگاه خوارزمی تهران
دکتر حمید کرد بچه	دانشکده علوم اجتماعی و اقتصادی دانشگاه الزهرا

دکتر احمد صلاح‌منش	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر امیر حسین منتظر حجت	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر حسن فرازمند	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر سید امین منصوری	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر عبدالمجید آهنگری	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر مسعود خداپناه	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر ابراهیم انواری	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر سید عزیز آرمن	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر مرتضی افقه	دانشکده اقتصاد و علوم اجتماعی دانشگاه شهید چمران اهواز
دکتر مصیب پهلوانی	دانشکده اقتصاد و علوم اداری دانشگاه سیستان و بلوچستان
دکتر حسن حیدری	دانشکده اقتصاد و مدیریت دانشگاه ارومیه
دکتر کیومرث شهبازی	دانشکده اقتصاد و مدیریت دانشگاه ارومیه
دکتر فاطمه بزازان	دانشکده علوم اجتماعی و اقتصاد دانشگاه الزهراء
دکتر محمود حائریان	دانشکده علوم اجتماعی و اقتصاد دانشگاه الزهراء
دکتر مهدی پدرام	دانشکده علوم اجتماعی و اقتصاد دانشگاه الزهراء
دکتر شمس الله شیرین بخش	دانشکده علوم اجتماعی و اقتصاد دانشگاه الزهراء
دکتر خدیجه نصراللهی	دانشکده علوم اداری و اقتصاد دانشگاه اصفهان
دکتر محمد واعظ	دانشکده علوم اداری و اقتصاد دانشگاه اصفهان
دکتر مرتضی سامتی	دانشکده علوم اداری و اقتصاد دانشگاه اصفهان
دکتر سعید صمدی	دانشکده علوم اداری و اقتصاد دانشگاه اصفهان
دکتر سید کمیل طیبی	دانشکده علوم اداری و اقتصاد دانشگاه اصفهان
دکتر مصطفی عمادزاده	دانشکده علوم اداری و اقتصاد دانشگاه اصفهان
دکتر محمد طاهر احمدی	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر محمدحسین حسین‌زاده	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر مهدی خداپرست	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر سید مهدی مصطفوی	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر علی اکبر ناجی میدانی	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر محمد رضا لطفعلی پور	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر مصطفی سلیمی فر	دانشکده علوم اداری و اقتصاد دانشگاه فردوسی مشهد
دکتر اسمعیل ابونوری	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر زهرا کریمی	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر سعید راسخی	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر علیرضا پور فرج	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر محمد تقی گیلک حکیم‌آبادی	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر نورالدین شریفی	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر وحید تقی نژاد عمران	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر یوسف محنت فر	دانشکده علوم اقتصادی و اداری دانشگاه مازندران

دکتر احمد جعفری صمیمی	دانشکده علوم اقتصادی و اداری دانشگاه مازندران
دکتر کامبیز هژبر کیانی	دانشکده علوم اقتصادی و سیاسی دانشگاه شهید بهشتی
دکتر سعید عابدین درکوش	دانشکده علوم اقتصادی و سیاسی دانشگاه شهید بهشتی
دکتر محمد حسین پور کاظمی	دانشکده علوم اقتصادی و سیاسی دانشگاه شهید بهشتی
دکتر محمد نوفرستی	دانشکده علوم اقتصادی و سیاسی دانشگاه شهید بهشتی
دکتر حشمت الله عسگری	دانشکده علوم انسانی دانشگاه ایلام
دکتر سید ابراهیم حسینی نسب	دانشکده علوم انسانی دانشگاه تربیت مدرس
دکتر علی قنبری	دانشکده علوم انسانی دانشگاه تربیت مدرس
دکتر رضا نجارزاده	دانشکده علوم انسانی دانشگاه تربیت مدرس
دکتر عباس عصاری آرانی	دانشکده علوم انسانی دانشگاه تربیت مدرس
دکتر زهرا نصراللهی	دانشکده علوم انسانی دانشگاه یزد
دکتر سید نظام الدین مکیان	دانشکده علوم انسانی دانشگاه یزد
دکتر حبیب انصاری سامانی	دانشکده علوم انسانی دانشگاه یزد
دکتر بهزاد سلمانی	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر جعفر حقیقت	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر حسین اصغر پور	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر حسین پناهی	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر داوود بهبودی	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر محسن پور عبادالهان	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر محمد باقر بهشتی	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر رضا رنچپور	دانشکده علوم انسانی و اجتماعی دانشگاه تبریز
دکتر رحیم چینی پرداز	دانشکده علوم ریاضی و آمار دانشگاه شهید چمران اهواز
دکتر حسین اکبری فرد	دانشکده مدیریت و اقتصاد دانشگاه شهید باهنر کرمان
دکتر عادل پیغامی	دانشگاه امام صادق (ع)
دکتر محمد مهدی عسگری	دانشگاه امام صادق (ع)
دکتر عبداله شایان زینیوند	دانشگاه ایلام
دکتر روح الله زارع	دانشگاه آزاد اسلامی
دکتر فخرالدین فخرحسینی	دانشگاه آزاد اسلامی
دکتر هاشم زارع	دانشگاه آزاد اسلامی
دکتر فرشید پورشهابی	دانشگاه بجنورد
دکتر فرهاد خداداد کاشی	دانشگاه پیام نور
دکتر مجتبی بهمنی	دانشگاه شهید باهنر کرمان
دکتر سید احمدرضا جلالی نائینی	موسسه عالی آموزش و پژوهش مدیریت و برنامه ریزی

راهنمای تدوین و شرایط پذیرش و ارسال مقالات

شرایط ارسال مقاله در فصلنامه اقتصاد مقداری:

۱- موضوع مقاله در ارتباط با پژوهش‌های مقداری یا اقتصاد کاربردی باشد.

۲- مقاله حاصل مطالعات، تجربه ها و تحقیقات نویسنده (یا نویسندگان) و به لحاظ محتوا، مقاله علمی پژوهشی باشد. مسوولیت صحت و سقم مطالب مقاله به عهده ی نویسنده است.

۳- مقاله قبلا برای هیچ یک از نشریات (داخلی یا خارجی) ارسال یا در هیچ یک از نشریات (یا مجموعه مقالات همایش‌ها) چاپ نشده باشد.

٤- مقاله اصلی شامل عنوان، نویسندگان، چکیده، واژه های کلیدی، طبقه بندی JEL، مقدمه، بدنه ی اصلی، پیوست‌ها و فهرست منابع باشد.

تبصره: فایل اصلی مقاله "بدون نام نویسندگان" باشد.

تبصره۲: اعضای هئیت علمی می بایست از ایمیل سازمانی به منظور ارسال مقاله استفاده نمایند.

تبصره۳: به منظور رفاه نویسندگان، رعایت رسم الخط مجله اقتصاد مقداری در مرحله ی اول ارسال برای مجله اجباری نیست، با این وجود می بایست بخش های کلیدی یک مقاله ی پژوهشی را دارا باشد.

- نویسندگان محترم توجه کنند که همانگونه که فایل مشخصات نویسندگان را ارسال می کنند، در سامانه مجله نیز ترتیب نویسندگان مقاله، نویسنده ی مسئول و مشخصات آن ها همانند فرمت فایل ارسال شده باشد. تبعات عدم تطابق و رعایت این مسئله، به عهده ی نویسنده (گان) است.
- درجه ی علمی نویسنده و رشته، دانشکده .....، دانشگاه.....، شهر، کشور. به عنوان مثال:
- استادیار اقتصاد، دانشکده ی اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز، ایران
- در صورتی که نویسندگان مقاله بعد از ارسال آن، درخواست تغییر در مشخصات نویسندگان را مقاله داشته باشند، لازم است بصورت مکتوب که در آن تمامی نویسندگان به همراه افیلیشن آن ها طبق فرمت استاندارد مجله تنظیم شده و توسط تمام نویسندگان جدید و قدیم امضاء شده باشد، از طریق ایمیل به مجله ارسال نمایند.
- چارچوب مقاله به صورت استاندارد فصلنامه طبق فایل نمونه فایل راهنمای نویسندگان باشد.

۵- به غیر از چکیده ی فارسی کوتاه که در فرمت اصلی مقاله ارسال می شود، چکیده گسترده (Extended Abstract) به صورت فارسی و انگلیسی حداقل ٤۵۰ کلمه (مطابق با فرم شماره٤) ارسال شود.

٦- برای متون (چکیده یا مقاله) انگلیسی گواهی معتبر ترجمه (Native) به همراه مقاله ارسال شود (بخش فایل‌های تکمیلی/اضافی).

۷- **هزینه ارسال مقاله :**۱۰۰ هزار ریال است که بعد از تایید مقاله و قبل از ارسال به داوری اخذ می‌شود و **هزینه چاپ مقاله** ۲۵۰ هزار ریال که بعد از پذیرش مقاله برای چاپ اخذ می‌شود.

۸- با توجه به سیاست جدید مجله مبنی بر ارزیابی درجه ی مشابهت، در صورتی که مقالات ارسالی زیر ۱۵ درصد مشابهت داشته باشند، برای داوری ارسال خواهد شد و در صورتی که مقالات بالای ۳۰ درصد مشابهت داشته باشد، رد خواهد شد.

۹- مقاله دریافت شده ابتدا توسط هیات تحریریه مورد بررسی قرار می گیرد و در صورتی که مناسب تشخیص داده شود، توسط حداقل دو نفر از صاحب نظران به صورت محرمانه داوری خواهد شد.

۱۰- مقاله همراه با تعهد نامه نویسنده مسئول، در زمان ارسال فایل مقاله به عنوان فایل تکمیلی (فرم های شماره ۱، ۲، ۳ و ٤) ارسال گردد. پس از دریافت فایل الکترونیکی مقاله، کد رهگیری برای اطلاع از فرآیند بررسی، داوری و سایر پیگیری ها به نویسنده مسئول اختصاص و به آدرس الکترونیکی وی ارسال می شود.

۱۱- مقاله دریافت شده ابتدا توسط هیات تحریریه مورد بررسی قرار می گیرد و در صورتی که مناسب تشخیص داده شود، توسط حداقل دو نفر از صاحب نظران به صورت محرمانه داوری خواهد شد.

فهرست مقالات

فصلنامه‌ی اقتصاد مقداری (بررسی‌های اقتصادی سابق) بهار ۱۴۰۳ ۲۱(۱) ۲۸-۱

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ارائه روشی مبتنی بر نوفه زدایی موجک و الگوریتم پیچش زمانی پویا برای شناخت الگوی قیمت سهام در بورس اوراق بهادار تهران

رحیم قاسمیه*، حسنعلی سینایی**، الناز قلمبر دزفولی***

** دانشیار مدیریت، گروه مدیریت، دانشکده اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز، ایران (نویسنده مسئول).*

ایمیل: *r.ghasemiyeh@scu.ac.ir*

0000-0002-1042-3918

آدرس پستی: *استان خوزستان، اهواز، گلستان، گروه مدیریت، دانشکده اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، کد پستی ۶۱۳۵۷-۹۳۱۱۳*

*** استاد مدیریت، گروه مدیریت، دانشکده اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز، ایران.*
ایمیل: *eili1010@yahoo.com*

**** کارشناسی ارشد مدیریت مالی، دانشکده اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز، ایران.*
ایمیل:*e-ghalambor@stu.scu.ac.ir*

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اطلاعات تکمیلی:

مقاله حاضر برگرفته از رساله دکتری خانم الناز قلمبر دزفولی با راهنمای دکتر رحیم قاسمیه و حسنعلی سینایی در دانشگاه شهید چمران اهواز است.

قدردانی: از تمامی افراد و موسساتی که در انجام این تحقیق مولف را مساعدت نمودند، قدردانی می‌شود.
تضاد منافع: نویسندگان مقاله اعلام می‌کنند که در انتشار مقاله ارائه شده تضاد منافعی وجود ندارد.
منابع مالی: نویسنده‌ها هیچگونه حمایت مالی برای تحقیق، تألیف و انتشار این مقاله دریافت نکرده‌اند.

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چکیده گسترده

معرفی:

دلیل اصلی سرمایه‌گذاری مردم در بازار سهام، به دست آوردن سود است که لازمه آن، داشتن اطلاعات درست از بازار سهام، تغییرات قیمت و پیش‌بینی روند آتی آن است. بنابراین سرمایه‌گذاران نیازمند ابزارهای قدرتمند و قابل اعتماد برای پیش‌بینی قیمت سهام در آینده هستند. هدف اصلی تحقیق حاضر، ارائه مدلی مبتنی بر نوفه‌زدایی موجک و پیچش زمانی پویا جهت شناخت الگوی قیمت سهام در بورس اوراق بهادار تهران می‌باشد. در این راستا، ابتدا با استفاده از گام پیش‌پردازشی نوفه‌زدایی موجک، نویز از سری‌های زمانی قیمت سهام حذف شده و سپس داده‌های استخراجی، به عنوان ورودی مدل پیش‌بینی پیچش زمانی پویا مورد استفاده قرار می‌گیرندتحقیق در بازه زمانی ۱۳۹۵ تا ۱۳۹۸ انجام شده است. نتایج حاکی از آن است که پیش‌بینی‌های حاصل شده از روش پیچش زمانی پویا مجهز به گام پیش‌پردازشی نوفه‌زدایی موجک در مقایسه با پیش‌بینی‌های حاصل شده از روش پیچش زمانی پویا بدون گام پیش‌پردازشی نوفه‌زدایی موجک در هر سه سهم مورد بررسی، با خطای بسیار کمتری همراه بوده استاین تحقیق به جای تمرکز و خلاصه کردن روش‌های مختلف و متعدد برای پیش‌بینی قیمت سهام، بر روی شبکه‌های عصبی و نویز زدایی موجک و تاب

زمانی پویا برای شناسایی الگوهای قیمت سهام تمرکز می‌کند. این روش به عنوان یک تکنیک موثر جدید مورد تایید محققان قرار گرفته است.

متدولوژی:

اطلاعات مورد نیاز از سایت سازمان بورس اوراق بهادار تهران جمع آوری شده است. برای دسته بندی داده های تحقیق از نرم افزار *Excel* و برای تجزیه و تحلیل داده های تحقیق از نرم افزار *MATLAB* نسخه ۹٫۱۱ استفاده شده است. فلزات اساسی مانند فولاد و مس در ایران مهمترین بخش صادرات غیرنفتی کشور را تشکیل می دهند. این صنعت در بورس تهران نیز بیشترین همبستگی را با شاخص بورس دارد. حدود ۱۵ درصد از ارزش کل بورس اوراق بهادار تهران متعلق به گروه فلزات اساسی است و شرکت‌های فولاد مبارکه اصفهان، فولاد خوزستان و فولاد خراسان به ترتیب بیشترین سهم از ارزش کل بازار سرمایه را نسبت به سایر شرکت های گروه فلزات دارند. در نتیجه از بین سایر صنایع فعال در بورس اوراق بهادار تهران، صنعت فلزات اساسی و از بین سهام شرکت های فعال در صنعت فلزات، ۳ سهم مذکور به عنوان جامعه آماری تحقیق انتخاب شدند. داده های مورد نیاز، ۱۳۰۰ داده برای هر شرکت، در یک دوره چهار ساله جمع آوری شد. همچنین از روش *K-fold* برای تقسیم معاملات سهام هر شرکت به بخش های آموزشی و آزمایشی استفاده شده است.

یافته‌ها:

یافته‌ها حاکی از آن است که روند پیش‌بینی قیمت سهام شرکت فولاد مبارکه اصفهان، روش پیشنهادی دقیقاً بر روی نمودار قیمت واقعی است. این نشان دهنده دقت بالای روش تحقیق پیشنهادی (تابش زمانی دینامیکی مجهز به مرحله نویز زدایی موجک) است. اما پیش‌بینی روند قیمت بر اساس روش مقایسه ، روش انحراف زمانی پویا بدون گام نویز زدایی موجک، توان پایینی دارد و روند پیش‌بینی‌شده مطابق با روند قیمت واقعی نیست.

نتیجه:

با توجه به مشکلات پیش‌بینی قیمت سهام با استفاده از روش کانولوشن زمانی دینامیکی ساده (بدون نویز زدایی موجک)، از رویکرد نویز زدایی موجک به عنوان مرحله پیش پردازش استفاده شد. برخلاف سایر مطالعات پیمایشی کنونی که بر خلاصه کردن بسیاری از روش‌های مورد استفاده برای پیش‌بینی بازار سهام متمرکز هستند، این تحقیق بر شبکه‌های

عصبی و نویز زدایی موجک و پیچش زمانی پویا برای شناسایی الگوهای قیمت سهام متمرکز است. تکنیک‌های هوشمند زیادی وجود دارد که هر کدام دارای مزایا و معایبی هستند، یکی از روش‌های هوشمند جدید که نتایج بهتری نسبت به سایر روش‌ها دارد، پیچش زمانی پویا (*DTW*) است.

چارچوب پیشنهادی با مرحله پیش پردازش نویز زدایی موجی به منظور کاهش مصادیق معاملات بیهوده و حذف نویز از سیگنال معاملاتی سهام سه شرکت فولاد مبارکه اصفهان، فولاد خراسان و فولاد خوزستان آغاز شد. سپس، پیش‌بینی سیگنال‌های معاملاتی با مشکل تاب زمانی پویا مدل‌سازی شد. در پایان نتایج به دست آمده از روش پیچش زمانی پویا با مرحله پیش پردازش نویز زدایی موجک و نتایج به دست آمده از روش تاب زدگی زمانی دینامیکی ساده بدون نویز زدایی موجک مقایسه شد. نتایج یافته‌ها نشان داد که الگوریتم پیشنهادی در این تحقیق در مقایسه با پیچش زمانی پویای ساده دارای دقت بیشتر و در عین حال خطای کمتری در پیش‌بینی روند قیمت سهام بوده و نتایج صحیح‌تری را ارائه می‌دهد بنابراین هر دو فرضیه مطرح شده در این تحقیق، تائید می شود.

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فصلنامه‌ی اقتصاد مقداری (بررسی‌های اقتصادی سابق) بهار ۱۴۰۳ ۲۱(۱) ۶۱-۲۹

فصلنامه‌ی اقتصاد مقداری

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شاپا چاپی: ۵۸۵۰-۲۰۰۸

بررسی تحلیلی جایگاه انسان توسعه یافته در سند تحول بنیادین آموزش و پرورش ایران

سید مرتضی افقه*، لیلی نورعلی زاده**، سید جلال هاشمی***، عبدالمجید آهنگری****

* دانشیار اقتصاد، گروه اقتصاد، دانشکده‌ی اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز ایران (نویسنده مسئول).

ایمیل: m.afghah@scu.ac.ir

0000-0002-0528-7974

آدرس پستی: استان خوزستان، اهواز، گلستان، گروه اقتصاد، دانشکده اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، کد پستی ۶۱۳۵۷-۹۳۱۱۳

** دانشجوی دکتری اقتصاد، گروه اقتصاد، دانشکده‌ی اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز ایران.

ایمیل: eili1010@yahoo.com

*** استادیار علوم ترتبی، گروه علوم تربیتی، دانشکده ی علوم تربیتی و روان شناسی، دانشگاه شهید چمران اهواز، اهواز ایران.

ایمیل: sayyed57@yahoo.com

**** دانشیار اقتصاد، گروه اقتصاد، دانشکده‌ی اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز ایران.

ایمیل: a_m_ahangari@yahoo.com

اطلاعات مقاله	طبقه‌بندی JEL	واژگان کلیدی
تاریخ دریافت: ۲۹ خرداد ۱۴۰۰	**I250**	**انسان توسعه یافته، سند تحول بنیادین آموزش و پرورش، تحلیل محتوا، آنتروپی شانون**
تاریخ بازنگری: ۱۶ مرداد ۱۴۰۰		
تاریخ پذیرش: ۸ شهریور ۱۴۰۰		

اطلاعات تکمیلی:
مقاله حاضر برگرفته از رساله دکتری خانم نورعلیزاده با راهنمای دکتر سید مرتضی افقه در دانشگاه شهید چمران اهواز است.
تشکر و قدردانی: نویسندگان از معاونت پژوهشی دانشگاه شهید چمران اهواز برای حمایت های مالی تشکر می کنند.
تضاد منافع: نویسنده مقاله اعلام می‌کند که در انتشار مقاله ارائه شده تضاد منافعی وجود ندارد.
منابع مالی: این مطالعه بخشی از رساله ی دکتری است که توسط دانشگاه شهید چمران اهواز، با شماره گرنت (*SCU.EE99.736*) حمایت مالی شده است.

ارجاع به مقاله:
افقه، سید مرتضی.، نورعلی زاده، لیلی.، هاشمی، سید جلال و آهنگری، عبدالمجید. (۱۴۰۳). بررسی تحلیلی جایگاه انسان توسعه یافته در سند تحول بنیادین آموزش و پرورش ایران. *فصلنامه‌ی اقتصاد مقداری (بررسی های اقتصادی سابق)*، *۲۱*(۱)، ۶۱-۲۹.
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چکیده گسترده

معرفی:

معرفی: هدف این پژوهش تحلیل مفهوم «انسان توسعه یافته» و تعیین میزان توجه به آن در سند تحول بنیادین آموزش و پرورش ایران مصوب آذر ماه سال ۱۳۹۰ است. این مفهوم بر اساس مبانی نظری اقتصاد کلاسیک در توصیف «انسان اقتصادی» و همچنین نظریهٔ انکلس در توصیف «انسان مدرن» تکوین یافته و با توجه به برخی از اندیشه ها و باورهای ملی و اسلامی متناسب سازی و بومی سازی شده است. منظور از «انسان توسعه یافته» در این پژوهش، فردی است که نگرش و طرز تلقی او رشد یافته و این توانمندی را دارد که منابع کشور را به ثروت و رفاه برای مردم جامعه تبدیل کند.

متدولوژی:

ابزار اندازه گیری، یک چک لیست تحلیل محتوای محقق ساخته است که شامل ۲۵ ویژگی انسان توسعه یافته می باشد و پایایی و روایی صوری آن از نظر متخصصان موضوعی احراز و رتبه بندی نیز شده است. جهت تعیین میزان اهمیت و رتبه بندی مؤلفه های انسان توسعه یافته از شاخص های آنتروپی شانون استفاده شده است. به منظور دستیابی به تبیینی معتبر و شفافیت نتایج در این پژوهش، چند مفهوم و مؤلفهٔ مهم و بنیادین که در مقالاتی ناظر به این سند تحلیل شده و فراوانی آنها تعیین گردیده بود انتخاب شدند و میزان فراوانی آنها با مجموع فراوانی مؤلفه های انسان توسعه یافته در متن سند تحول مقایسه شد.

یافته‌ها:

از کلمه شماری کل متن سند تحول بنیادین آموزش و پرورش نیز مشخص گردید که تنها حدود ۱٪ (۱۱۳ کلمه از ۱۰۹۱٤ کلمهٔ موجود) از این سند ٦٤ صفحه¬ای به مؤلفه های انسان توسعه یافته اختصاص یافته است.

نتیجه گیری:

در نتیجه می توان گفت که با توجه به وزن و اهمیت اقتصاد و مسائل ناظر بر آن در کشور (نظیر بیکاری، ضعف نگرشها و مهارت های ثروت آفرینی و عدم اهتمام به افزایش تولید و بهبود وضع معشیت عمومی و فقر زدایی) از دیدگاه رهبران و سیاست گذاران به ویژه در دهه های اخیر، تأکید و توجه اندکی به پرورش انسان توسعه یافته شده و به همین رو شایسته است در بازنگری متن سند تحول به این مؤلفه ها قویاً پرداخته شود.

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فصلنامه‌ی اقتصاد مقداری (بررسی‌های اقتصادی سابق) بهار ۱۴۰۳ ۲۱(۱) ۸۵-۶۳

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تاثیر نااطمینانی سیاست اقتصادی بر قیمت نفت (مطالعه موردی: کشور های عضو اوپک)

پروانه پردل*، مرضیه اسفندیاري**

*دانشجوی دکتری علوم اقتصادی، گروه اقتصاد، دانشگاه سیستان و بلوچستان، زاهدان، ایران

ایمیل: parvanehpordel_1994@yahoo.com

**دانشیار، گروه اقتصاد، دانشگاه سیستان و بلوچستان، زاهدان، ایران (نویسنده مسئول).

ایمیل: m.esfandiari@eco.usb.ac.ir

0000-0001-9259-5424

آدرس پستی: زاهدان، بلوار دانشگاه، دانشگاه سیستان و بلوچستان، کد پستی:۹۸۱۶۷-۴۵۸۴۵

اطلاعات مقاله	طبقه‌بندی JEL	واژگان کلیدی
تاریخ دریافت: ۰۷ آذر ۱۴۰۰ تاریخ بازنگری: ۳۱ اردیبهشت ۱۴۰۱ تاریخ پذیرش: ۲۳ خرداد ۱۴۰۱	E30, E60, C14, F02	قیمت نفت، عدم قطعیت سیاست اقتصادی، داده های پانل ناپارامتریک

اطلاعات تکمیلی:

این مقاله برگرفته از پایان نامه‌ی ارشد خانم پروانه پردل در رشته علوم اقتصادی به راهنمایی خانم دکتر مرضیه اسفندیاري در دانشگاه *سیستان و بلوچستان* است.

قدردانی: از تمامی افراد و موسساتی که در انجام این تحقیق مولف را مساعدت نمودند، قدردانی می‌شود.

تضاد منافع: نویسنده مقاله اعلام می‌کند که در انتشار مقاله ارائه شده تضاد منافعی وجود ندارد.

منابع مالی: نویسنده‌ها هیچگونه حمایت مالی برای تحقیق، تألیف و انتشار این مقاله دریافت نکرده‌اند.

ارجاع به مقاله:
پردل، پروانه و اسفندیاري، مرضیه (۱۴۰۳). تاثیر نااطمینانی سیاست اقتصادی بر قیمت نفت (مطالعه موردی: کشور های عضو اوپک). *فصلنامه‌ی اقتصاد مقداری (بررسی های اقتصادی سابق)*، ۲۱ (۱)، ۸۵-۶۳.
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چکیده گسترده

مقدمه:

در بازار نفت، قیمت نفت به عرضه و تقاضای بین المللی نفت بستگی دارد. به طور کلی عوامل موثر بر قیمت نفت را می توان به دو گروه اصلی عوامل بنیادی و عوامل غیربنیادی تقسیم کرد. نفت هم جنبه فیزیکی و هم کالایی دارد و هم دارایی. تغییرات عوامل اساسی و غیربنیادی منجر به تغییر قیمت نفت می شود. عرضه و تقاضا از جمله عوامل اساسی و ریسک ها و عدم قطعیت ها، عوامل روانی، سیاسی و ژئوپلیتیکی، فعالیت های بورسی و سفته بازی در بازارهای مالی نفت و ... که باعث تغییرات ناگهانی قیمت نفت می شود از جمله عوامل غیربنیادی هستند. یکی از نشانه های وجود عدم قطعیت در یک نظام اقتصادی، نوسان زیاد متغیرهای اقتصادی است. تعامل بین عملکرد نفت و اقتصاد کلان مدتهاست که توجه را در ادبیات اقتصادی به خود جلب کرده است. توجه به این موضوع به دهه ۱۹۷۰ برمی گردد. دهه ۱۹۷۰ و اوایل دهه ۱۹۸۰ با جهش شدید قیمت نفت مشخص شد. شوک های نامطلوب عرضه نفت اغلب منبع اصلی نوسانات کلان اقتصادی و رکود تورمی در آن دوره در نظر گرفته می شود [بلیندر و راد، ۲۰۰۸].

پژوهش حاضر از دو جهت با سایر مطالعات متفاوت است. در مطالعات داخلی، عدم قطعیت مربوط به متغیرها عمدتاً از طریق الگوی واریانس ناهمگن مشروط اندازه‌گیری می‌شود. در حالی که داده ها شاخص عدم قطعیت در این تحقیق بر اساس روش بیکر و همکاران است. [۲۰۱۶] و بر اساس رسانه ها. هنگام تجزیه و تحلیل پدیده های اقتصادی در چارچوب رگرسیون، نظریه اقتصادی به ندرت اطلاعات متمایزی در مورد شکل عملکردی رابطه بین متغیر وابسته و متغیرهای مستقل آن ارائه می دهد. ویژگی‌های ساده توابع

رگرسیون - مانند مدل‌هایی که در پارامترها خطی هستند - به طور گسترده در کاربردهای تجربی مورد استفاده قرار می‌گیرند، زیرا هم تخمین اقتصادسنجی و هم تفسیر اقتصادی پارامترهای رگرسیون برآورد شده را تسهیل می‌کنند. با این حال، فرض در مورد شکل عملکردی تابع رگرسیون منجر به خطای مشخصات پارامتر نادرست می‌شود که می‌تواند منجر به نتایج و توصیه‌های اقتصادی نادرست شود. در سال‌های اخیر، ادبیات رو به رشد سریع در مورد روش‌های اقتصادسنجی ناپارامتریک راه‌حلی برای مشکلات خطای مشخصات پارامتریک در مدل رگرسیون اقتصادسنجی روش های رگرسیون ناپارامتریک نیازی به فرض و تعیین فرم عملکردی برای رابطه بین متغیرهای توضیحی و متغیرهای وابسته از سوی محقق ندارد. بنابراین، شکل عملکردی به جای اینکه محقق تصمیمات دلخواه بگیرد، توسط داده ها تعیین می شود. از این جهت، پژوهش حاضر با سایر مطالعات متفاوت است، لذا در پژوهش حاضر با توجه به نقش و اهمیت اوپک در عرضه و تقاضای نفت و قیمت نفت و تأثیر آن بر رشد و تولید ثروت در جهان، عوامل مؤثر بر تعیین قیمت نفت اوپک با تأکید بر عدم قطعیت سیاست اقتصادی به عنوان نماینده عوامل غیربنیادی مؤثر بر قیمت نفت، برای منتخبی از کشورهای عضو اوپک از سال ۲۰۰۳ تا ۲۰۱۷ با استفاده از رگرسیون ناپارامتریک بررسی شده است.

روش تحقیق:

جامعه آماری در این پژوهش کشورهای عضو اوپک بوده و داده ها شامل ۶ مقطع بین سال های ۲۰۰۳-۲۰۱۷ می باشد. داده ها از گزارش های بانک جهانی، پایگاه داده اوپک، پایگاه داده عدم قطعیت سیاست های اقتصادی و پایگاه داده بانک جهانی و وب سایت *OECD* استخراج شده است. متغیرهای مدل قیمت واقعی نفت اوپک متغیرهای وابسته و متغیرهای مستقل شامل عدم قطعیت سیاست اقتصادی، شاخص ارزش افزوده صنعت، شاخص نرخ بهره واقعی، رانت نفت، انرژی های تجدیدپذیر و انتظارات قیمت نفت است.

یافته‌ها:

با استفاده از رگرسیون هسته: برآوردگر خطی محلی، میزان و جهت اثر عدم قطعیت سیاست اقتصاد جهانی بر قیمت نفت برآورد شده است. جدول معانی متغیرهای مورد مطالعه در پیوست یک آورده شده است. نتایج نشان می‌دهد که شاخص انرژی جایگزین و شاخص نرخ بهره با یک وقفه پایدار ثابت هستند. همچنین با توجه به نمودار نشان داده شده در پیوست

۲، در اکثر کشورهای مورد مطالعه، شاخص ارزش افزوده بخش صنعت با وقفه بر قیمت واقعی نفت تأثیر می‌گذارد. در این بخش با استفاده از یافته‌های رگرسیون هسته: برآوردگر خطی محلی در نرم افزار*Stata* ، فرضیه‌های تحقیق به شرح زیر بررسی می‌شود:

عدم قطعیت در سیاست‌های اقتصادی جهانی تأثیر مثبت و معناداری بر قیمت نفت دارد. در میان عوامل مؤثر بر قیمت نفت، عدم قطعیت سیاست‌های اقتصادی بیشترین تأثیر را دارد.

جدول ۱. رگرسیون هسته ای: برآوردگر خطی محلی برای ۶ کشور اوپک
مأخذ. نتایج تحقیق

Local-linear regression Kernel: epanechnikov Bandwidth: cross validation	Number of obs = 327 R-squared = 0.9678
Log op	Estimate
Mean Log op	4.210966
Effect Log un	0.3522596
Ope	0.420129
L rr	-0.0003032
Or	0.0209778
L ind	0.0169741
L re	-1.228478

جدول ۱، نتایج نشان می دهد که بین قیمت نفت و عدم اطمینان سیاست اقتصادی رابطه مثبت و معناداری وجود دارد. از نظر تأثیر بر قیمت نفت، انرژی جایگزین با ۱٫۲-، انتظارات

قیمت نفت با ۰/۴۲ و سپس عدم قطعیت سیاست اقتصادی با ۰/۳۵ به ترتیب بیشترین تأثیر را دارند.

با توجه به یافته‌ها می‌توان نتیجه گرفت که برای یک درصد تغییر در شاخص عدم قطعیت سیاست اقتصادی، متغیر قیمت نفت ۰/۳۵ درصد تغییر می کند. به ازای یک واحد تغییر در شاخص انتظارات قیمت نفت، قیمت نفت ۴۲ درصد افزایش می یابد. نرخ بهره واقعی با دوره ۰/۰۳ درصد، قیمت واقعی نفت اوپک را کاهش می دهد. برای یک واحد تغییر در شاخص رانت نفت، قیمت نفت اوپک ۲ درصد افزایش می یابد، ارزش افزوده بخش صنعت با تاخیر به نرخ ۱/۶ درصد قیمت نفت افزایش می یابد. شاخص انرژی‌های جایگزین و نو با تاخیر منجر به کاهش ۱۲ درصدی قیمت نفت می‌شود.

نتیجه گیری:

پژوهش حاضر با هدف بررسی تأثیر عدم قطعیت سیاست اقتصادی بر قیمت نفت در کشورهای منتخب اوپک انجام شده است. در تعیین قیمت نفت، عوامل اساسی شامل عوامل مربوط به عرضه و تقاضای نفت و عوامل غیربنیادی از جمله شرایط بازار مالی، سفته بازی و ژئوپلیتیک موثر است. با توجه به اینکه کشورهای مورد مطالعه از بین اوپک انتخاب می شوند و سهمیه تولید و فروش توسط اوپک تعیین می شود، عواملی مانند ارزش افزوده بخش صنعت در هر کشور، منابع انرژی جایگزین، رانت نفت و انتظارات قیمت نفت از عوامل اساسی هستند. و نرخ بهره واقعی فدرال رزرو آمریکا و عدم اطمینان سیاست اقتصادی از جمله عوامل غیربنیادی هستند. برآورد مدل به روش ناپارامتریک نشان می‌دهد که انرژی‌های تجدیدپذیر بیشترین تأثیر را بر قیمت نفت دارد، به طوری که با افزایش سهمیه انرژی‌های تجدیدپذیر در عرضه انرژی، قیمت نفت اوپک به دلیل کاهش تقاضا کاهش می‌یابد. ارزش افزوده بخش صنعت تأثیر مثبت و معناداری بر قیمت نفت دارد. زیرا با افزایش فعالیت های صنعتی، تقاضا برای نفت افزایش یافته و این امر منجر به افزایش قیمت نفت می شود. رانت نفت به عنوان تفاوت بین درآمد حاصل از فروش نفت و هزینه های استخراج نفت تأثیر مثبت و معناداری بر قیمت نفت دارد. با توجه به اینکه درآمد حاصل از فروش نفت به دلیل تعیین سهمیه تولید و فروش نفت و همچنین قیمت نفت در کشورهای عضو اوپک، با کاهش هزینه‌های استخراج نفت، در واقع سودآوری صنعت نفت افزایش یافته و از طریق افزایش سفته‌بازی نفت، قیمت های آن افزایش می

یابد انتظارات قیمت نفت، مانند انتظارات بازار برای هر کالایی، بر قیمت ها تأثیر می گذارد. انتظارات افزایش قیمت نفت به دلیل افزایش تقاضای احتیاطی نفت منجر به افزایش قیمت نفت خواهد شد. بر اساس یافته های تحقیق، افزایش نرخ بهره واقعی فدرال رزرو منجر به کاهش قیمت نفت خواهد شد. افزایش نرخ بهره از یک سو هزینه نگهداری نفت در کشتی را افزایش می دهد و از سوی دیگر ارزش فعلی خالص سودهای آتی را کاهش می دهد و در نتیجه عرضه نفت را افزایش می دهد. افزایش نرخ بهره در فدرال رزرو باعث کاهش قیمت اوراق قرضه پس انداز، اسناد خزانه و سهام خواهد شد. بنابراین سودآوری فعالیت‌های سفته‌بازی در بازار اوراق پس‌انداز منجر به انتقال جریان نقدی از بورس‌های کالایی مانند نفت و مشتقات آن و محصولات کشاورزی به بازار اوراق پس‌انداز و خزانه می‌شود. در نتیجه قیمت نفت کاهش می یابد. ظهور و گسترش عدم قطعیت سیاست های اقتصادی منجر به افزایش قیمت نفت خواهد شد. از آنجایی که نفت علاوه بر جنبه فیزیکی و کالایی دارای دارایی هایی نیز می باشد، با افزایش عدم قطعیت سیاست های اقتصادی، امکان محدود شدن عرضه نفت در آینده و همچنین افزایش تقاضای احتیاطی و سفته بازی نفت، قیمت نفت را افزایش می دهد. بنابراین، وضعیت منحصر به فرد کشورهای عضو اوپک به این معنی است که نامشخص بودن سیاست های اقتصادی جهانی مهم ترین عامل تأثیرگذار بر قیمت نفت نیست و توسعه انرژی های جایگزین تأثیر بسیار بیشتری بر قیمت نفت دارد و این امر تغییر در سیاست و سیاست را ضروری می کند. برنامه ریزی دقیق در کشورهای نفت خیز برای استفاده از انرژی های جایگزین و تولید فرآورده های نفتی به جای خام فروشی. اگرچه بر سیاست های کلی نظام در حوزه انرژی، تنوع منابع انرژی و جایگزینی صادرات نفت و گاز و محصولات پتروشیمی با صادرات نفت خام و گاز طبیعی تاکید شده است، اما علیرغم تدوین استراتژی ملی انرژی سند در کشور، عملیاتی و نظارتی بر تحقق آن باید در یک افق زمانی مناسب تهیه شود.

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ارزیابی کارایی اقتصاد چرخشی کشورهای حوزه خلیج فارس از حیث مدیریت پسماند جامد شهری

عبدالکریم حسین‌پور*، احمد قربان پور**، حمید شاهبندرزاده***

*استادیار گروه اقتصاد، دانشکده کسب و کار و اقتصاد، دانشگاه خلیج فارس، بوشهر، ایران(نویسنده مسئول).

ایمیل: k.hosseinpoor@pgu.ac.ir

0000-0002-8810-2129

**استادیار گروه مدیریت صنعتی، دانشکده کسب و کار و اقتصاد، دانشگاه خلیج فارس، بوشهر، ایران.

ایمیل: Ghorbanpur@pgu.ac.ir

*** دانشیار گروه مدیریت صنعتی، دانشکده کسب و کار و اقتصاد، دانشگاه خلیج فارس، بوشهر، ایران.

ایمیل: Shahbandarzadeh@pgu.ac.ir

آدرس پستی: بوشهر، بهمنی، دانشگاه خلیج فارس، دانشکده کسب و کار و اقتصاد. کد پستی: ۷۵۱۶۹۱۳۸۱۷.

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چکیده گسترده

مقدمه

در دهه گذشته، نگرانی در مورد محیط زیست به طور فزاینده ای در سراسر جهان افزایش یافته است. یکی از چالش های جدی زیست محیطی پسماندهای جامد شهری است که مدیریت آن به عنوان یکی از دغدغه های اصلی جوامع بشری مطرح شده است. بر اساس گزارش بانک جهانی، تا سال ۲۰۲۵، بیش از ۱٫۴ میلیارد نفر در شهرهای سراسر جهان زندگی خواهند کرد و هر یک از آنها به طور متوسط روزانه ۱٫۴۲ کیلوگرم زباله شهری تولید خواهند کرد. برآوردها نشان می دهد که زباله های شهری در سراسر جهان هر سال سه برابر می شود. تولید سالانه زباله شهری در سراسر جهان از ۰٫۶۸ میلیارد تن به ۲٫۲ میلیارد تن افزایش یافته است. بر اساس داده های موجود از کشورها تا سال ۲۰۱۲، بانک جهانی گزارشی با تمرکز بر تولید زباله های جامد شهری منتشر کرده است. زباله مواد یا اشیایی است که دور انداخته یا دور ریخته می شود. زباله جامد زباله یا مواد دور ریخته شده و اشیاء به دست آمده از فعالیت های صنعتی، تجاری، معدنی، کشاورزی و به طور کلی روزانه است(اگو و همکاران، ۲۰۲۰). زباله های جامد یکی از مسائل جدی زیست محیطی در کشورهای توسعه یافته و در حال توسعه است. مدیریت پسماند جامد یک چالش بزرگ در مناطق شهری در سراسر جهان، به ویژه در کشورهای در حال توسعه است. دلیل اصلی این چالش رشد سریع جمعیت همراه با گسترش شهرها، کاهش منابع مالی و ضعف برنامه ریزی شهری است. فعالیت های انسانی و تغییر در سبک زندگی و الگوهای مصرف منجر به افزایش نرخ تولید زباله شده است(بووارد و ایلانو، ۲۰۱۹). کنترل آلودگی های زیست

محیطی از جمله پسماندها بخش مهمی از وظیفه انسان در حفظ سلامت انسان است که با توجه به استانداردهای بهداشت اقتصادی در علوم و فنون جدید جایگاه ویژه ای دارد. تولید زباله در زندگی روزمره انسان امری اجتناب ناپذیر است و افزایش جمعیت موجب افزایش آن خواهد شد. زباله های جامد شهری به عنوان زباله های تولید شده توسط فعالیت‌های انسانی، تجاری و ساختمانی که توسط شهرداری ها جمع آوری و تصفیه می شود، تعریف می شود. ترکیب اصلی این زباله ها در کشورهای مختلف جهان تقریباً یکسان است. اما میزان ضایعات تولید، تراکم و سهم هر قسمت از آن کشور به کشور و شهر به شهر متفاوت است. این تفاوت ناشی از توسعه اقتصادی، موقعیت جغرافیایی، شرایط آب و هوایی و ملاحظات فرهنگی و اجتماعی است (افشار کاظمی و همکاران، ۱۳۹۳). سالانه حدود ۲٫۰۱ میلیارد تن زباله جامد شهری در جهان تولید می شود که حداقل ۳۳ درصد آن از نظر زیست محیطی مدیریت نمی شود. در سراسر جهان، زباله تولید شده برای هر نفر در روز به طور متوسط ۰٫۷۴ کیلوگرم است اما به طور گسترده ای از ۰٫۱۱ تا ۴٫۵۴ کیلوگرم متغیر است. البته پیش بینی می شود تا سال ۲۰۵۰ میزان زباله تولیدی در جهان به ۳٫۴۰ میلیارد تن افزایش یابد که معادل ۲ برابر رشد جمعیت در آن سال است. منطقه شرق آسیا و اقیانوسیه با ۲۳ درصد بیشترین زباله را در جهان تولید می کند در حالی که این رقم برای کشورهای خاورمیانه حدود ۶ درصد است. البته پیش بینی می شود تا سال ۲۰۵۰ کل تولید زباله در این منطقه بیش از دو برابر شود. شایان ذکر است که در این مناطق بیش از نیمی از زباله ها بدون استفاده مجدد دور ریخته می شود. این رشد زباله پیامدهای نامطلوب زیست محیطی، بهداشتی و رفاهی بسیاری را به همراه خواهد داشت. بنابراین نیاز به اقدامات اساسی دارد. مطالعه دقیق ادبیات موجود نشان می دهد که دانش کمی از اقتصاد دایره‌ای و مدیریت پسماند جامد شهری به خصوص در بحث بهبود عملکرد دایره‌ای کشورها وجود دارد. بنابراین سنجش عملکرد کشورها در این زمینه می تواند بسیار حائز اهمیت باشد.

روش‌شناسی تحقیق

این پژوهش از نظر هدف کاربردی و از نظر گردآوری داده ها توصیفی پیمایشی است. جامعه آماری، کشورهای حوزه خلیج فارس است. در این تحقیق از سرانه تولید پسماند جامد شهری و سه بعد شاخص پیشرفت اجتماعی «نیازهای اساسی انسان»، «مبانی رفاه»

و «فرصت» به عنوان ورودی و بازیافت به عنوان خروجی در مدل استفاده شده است. داده‌های این تحقیق مربوط به سال ۲۰۲۱ می باشد. مدل DEA در LINGO Softer پیاده سازی شده است.

یافته

یافته‌ها نشان می دهد که کشورهای کویت (۱)، امارات متحده عربی (۰/۹۵۲)، عربستان سعودی (۰/۶۵۴) و ایران (۰/۴۵۳) به ترتیب بالاترین عملکرد اقتصاد دایره ای را در مقایسه با سایر کشورهای حوزه خلیج فارس دارند. هدف این مطالعه تحلیل کارایی DMUها از منظر بازده متغیر به مقیاس است.

نتیجه‌گیری

هدف اصلی این مطالعه ارزیابی کارایی اقتصاد چرخشی کشورهای حوزه خلیج فارس از حیث مدیریت پسماند جامد شهری است. نتایج نشان می‌دهد که کشورهای کویت و امارات متحده عربی به ترتیب بالاترین عملکرد اقتصاد دایره‌ای را در مقایسه با سایر کشورهای حوزه خلیج فارس دارند. تجزیه و تحلیل داده‌ها نشان می‌دهد که طبق آمار بانک جهانی، این سه کشور به ترتیب ۲۱ درصد و ۲۰ درصد زباله های تولیدی را بازیافت می کنند. البته در شاخص‌های ورودی نسبت به سایر کشورها عملکرد خوبی دارند. لازم به ذکر است که این نتایج می‌تواند تا حدودی تحت تأثیر شرایط همه گیر کووید-۱۹ باشد. به عنوان مثال، ایران با جمعیت بیشتر و رعایت پروتکل‌های بهداشتی زباله‌های جامد بیشتری تولید خواهد کرد. همین امر می‌توانست باعث سقوط آن به رتبه چهارم شود. تجزیه و تحلیل داده ها نشان می دهد، سرانه تولید زباله در ایران بسیار کمتر از سایر کشورها است. ایران از نظر شاخص های SPI عملکرد متوسطی دارد. اما از نظر عملکرد دایره ای رتبه چهارم را به خود اختصاص داده است. دلیل این امر میزان بازیافت بسیار پایین آن است. سیاستگذاران باید از تبلیغات، آموزش و ... برای افزایش میزان جمع آوری زباله های قابل بازیافت استفاده کنند. کشورها به منظور بهبود عملکرد خود نیاز به کاهش تولید زباله و در عین حال افزایش نرخ بازیافت دارند. آموزش و سرمایه گذاری عمومی می تواند در این زمینه کمک کند. همچنین، آنها باید عملکرد خود را از نظر شاخص های SPI بهبود بخشند. کشورها همچنین دسترسی به مراقبت های اولیه پزشکی، غذا، آب و مسکن را بهبود می بخشند. همچنین، آنها باید دسترسی

شهروندان را به آموزش ابتدایی و حتی آموزش پیشرفته برای کسانی که در کشور مایلند دانش و مهارت های خود را افزایش دهند، فراهم کنند. با توجه به نتایج، پیشنهاد می شود سایر کشورهای حوزه خلیج فارس عملکرد خود را در بازیافت بهبود بخشند. داده های این کشورها نشان می دهد که آنها چیزی کمتر از ۱۰ درصد زباله های تولیدی خود را بازیافت می کنند. پیشنهاد می‌شود برای تبیین بهتر عملکرد کشورهای حاشیه خلیج فارس با کشورهای اروپایی ارزیابی شود. همچنین پیشنهاد می شود در محاسبه عملکرد اقتصاد دایره‌ای از شاخص های دیگری مانند استفاده مجدد استفاده شود. از آنجایی که بحث مدیریت زیست محیطی و اقتصاد دایره‌ای در سطح کشورهای مورد مطالعه جدید است. بدین منظور داده های این کشورها به ویژه شاخص نرخ بازیافت و شاخص های SPI در سال‌های گذشته تفاوت چندانی با سال جاری نداشته و عملا به خروجی قابل مقایسه ای نخواهند رسید. برای این منظور پیشنهاد می شود پژوهشگران آینده بتوانند در سال‌های مختلف با فاصله زمانی ۵ سال در یک رشته مطالعه کرده و نتایج سال های مختلف را با هم مقایسه کنند. با این حال، در روایی و پایایی این تحقیق تردیدی وجود ندارد. اما در تعمیم نتایج به تفکر بیشتری نیاز است.

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زهرا نصراللهی*، الهام اپراجونقانی**

* استاد گروه اقتصاد، دانشکده اقتصاد، مدیریت و حسابداری دانشگاه یزد، یزد، ایران. (نویسنده مسئول)

ایمیل: nasr@yazd.ac.ir
0000-0002-9537-136X
آدرس پستی: صفاییه، بلوار دانشگاه، دانشکده اقتصاد، مدیریت و حسابداری، دانشگاه یزد، یزد، ایران، کدپستی: ۸۹۱۵۸۱۸۴۱۱

** دانشجوی دکتری رشته علوم اقتصادی، گروه اقتصاد، دانشکده علوم اداری و اقتصاد، دانشگاه اصفهان، اصفهان، ایران.
ایمیل: elhamoperaj@gmail.com

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چکیده گسترده

مقدمه:

کمیابی و عدالت همواره از دغدغه‌های ذهنی بشر بوده است. نظام سرمایه‌داری در تقابل بین این دو مفهوم اولویت را بهره‌برداری بهینه از منابع کمیاب قرار داد و تامین عدالت را به دستیابی دست‌آوردهای حاصل از رشد اقتصادی، موکول کرد. تجربه دهه‌های اخیر که به صورت تخریب محیط‌زیست، آلودگی‌های فزاینده، نابودی گونه‌های مختلف حیوانی و گیاهی، تغییرات آب و هوایی و گرم شدن زمین، نمود یافت تردیدهایی را نسبت به رویکرد رشد افسارگسیخته منتج از نظام سرمایه‌داری ایجاد کرده و مفهومی تحت عنوان توسعه پایدار را به عنوان راه حل مقابله با این مشکلات مطرح می‌کند. مفهوم توسعه‌پایدار که در سال ۱۹۸۰ میلادی مطرح شد در واقع پاسخی به تاثیرات مخرب محیط‌زیستی و اجتماعی و در کل به مفهوم رشد اقتصادی بوده است، به‌گونه‌ای که این عقیده از جریانات محیط‌زیستی نشأت گرفته است (ذاکریان و همکاران، ۱۳۹۲). بر مبنای ایده توسعه‌پایدار بهره‌برداری از فرصت‌های توسعه با تعامل و سازگاری بین اهداف سه‌گانه (اجتماعی، محیط‌زیستی و اقتصادی)، میسر است. این رویکرد پایداری توسعه را مد نظر قرار می‌دهد که نشانه اهمیت یافتن توزیع عادلانه منافع رشد اقتصادی (اهداف اجتماعی و محیط‌زیستی) در عین توجه به کمیابی (اهداف اقتصادی) است. بر این اساس توسعه پایدار توسعه‌ای است که بتواند در دوره زمانی طولانی بدون اینکه خسارتی به محیط‌زیست وارد کند تداوم یابد (شفیعی، ۱۳۹۶). از این مقدمه می‌توان نتیجه گرفت که در بهره‌برداری از منابع صرف توجه به منافع

اقتصادی جایز نبوده و تامین اهداف سه‌گانه اجتماعی، محیطزیستی و اقتصادی، باید مد نظر قرار گیرد.

از آنجایی‌که در سال‌های اخیر تداوم رشد اقتصادی به همراه توسعه شهرنشینی و افزایش جمعیت، تخریب بیشتر محیطزیست و کاهش منابع طبیعی کمیاب از جمله منابع آب را به همراه داشته است، این موضوع منجر به توجه بیشتر پژوهشگران به بعد محیطزیستی توسعه‌پایدار شده است. از بعد توسعه‌پایدار فعالیت‌هایی در اولویت قرار می‌گیرند که ضمن فراهم آوری بیشترین منافع اقتصادی، کمترین فشار را بر منابع آب و محیطزیست منطقه وارد کنند (نصراللهی و زارعی، ۱۳۹٦). با ورود ایران به جرگه کشورهای در حال توسعه مسائل محیطزیستی در کشور ما نیز ابعاد وسیع و نمایان‌تری به خود گرفت. اگرچه ایران برای غلبه بر چالش‌های محیطزیستی تدابیری اندیشیده است، اما فاصله با شاخص‌های جهانی زیاد است و به باور بسیاری از فعالان این عرصه، ایران در حال نزدیک شدن به یک بحران محیطزیستی چند جانبه است (رضایان قیه‌باشی و مرزبان، ۱۳۹۸). قرار گرفتن کشور ایران در منطقه خشک و نیمه‌خشک اقلیمی و توزیع ناهمگون بارش‌ها منجر به تشدید وضعیت کمبود آب در ایران شده است به‌گونه‌ای که افزایش تقاضا، کشور را با محدودیت عرضه منابع آبی روبرو کرده است.

از اینرو باید در اولویت‌بندی فعالیت‌های اقتصادی به مسئله کمبود آب و سایر ملاحظات محیطزیستی توجه لازم صورت گیرد. در این راستا مطالعه حاضر به شناسایی و اولویت‌بندی فعالیت‌های اقتصادی استان اصفهان با استفاده از تعریف معیارهایی برای توسعه پایدار و با تاکید بر اهمیت منابع آبی پرداخته است. بدین منظور با تلفیق مدل‌های داده- ستانده و روش تاپسیس تصویری مناسب از اولویت‌بندی فعالیت‌های اقتصادی فراهم شده است. ساختار پژوهش به این صورت است که پس از بیان مقدمه در بخش دوم به تشریح مبانی نظری و ادبیات موضوع پرداخته شده است. و بخش سوم شامل مطالعات پیشین انجام گرفته در این زمینه است. در بخش چهارم به توضیح در مورد روش پژوهش، داده‌های پژوهش و چگونگی برآورد آنها پرداخته شده است. در بخش پنجم یافته‌های پژوهش ارائه شده و در نهایت بخش نهایی به نتیجه‌گیری کلی و ارائه پیشنهادات اختصاص یافته است.

متدولوژی:

پژوهش حاضر با تلفیق مدل داده – ستانده و روش تاپسیس و همچنین با در نظر گرفتن معیارهای شش گانه مصرف آب، مصرف انرژی، آلودگی ، شدت روابط بین بخشی، اشتغال‌زایی و ارزش افزدوه به اولویت‌بندی فعالیت‌های اقتصادی استان اصفهان پرداخته شده است.برای این منظور ابتدا جدول داده – ستانده ملی سال ۱۳۹۵ بانک مرکزی ایران و روش سهم‌مکانی sflq جدول داده ستانده استان اصفهان در بیست بخش برآورد شد. سپس با استفاده از ضرایب فزاینده داخلی استان، پیوندهای پسین و پیشین، آب‌بری مستقیم و غیرمستقیم، انرژی‌بری مستقیم و غیرمستقیم و اشتغال‌زایی مستقیم و غیرمستقیم بخش‌های اقتصادی استان محاسبه شد. روش وزن‌دهی شانون برای وزن‌دهی به معیارها مورد استفاده قرار گرفت و در نهایت اولویت‌بندی بخش‌های استان اصفهان با استفاده از روش تاپسیس و معیارهای موردنظر مشخص شد. در ادامه به تشریح مراحل مختلف روش در پژوهش پرداخته شده است.

مدل آنتروپی شانون

برای تعیین وزن هر یک از معیارهای مورد نظر در پژوهش موردبررسی از روش آنتروپی شانون استفاده شده است. این روش جایگزین استفاده از نظرات خبرگان است و مزیت آن این است که نظرات و قضاوت‌های شخصی افراد در آن دخیل نبوده و بر مبنای ماتریس تصمیم، وزن هر یک از معیارها تعیین می‌شود (درستکار احمدی و دهقانی، ۱۳۹۹). مراحل تعیین وزن به وسیله آنتروپی شانون به طور خلاصه در ادامه تشریح شده است. ابتدا کلیه ماتریس‌های تصمیم با استفاده از رابطه (۱) نرمالایز و مقدار E (آنتروپی) با استفاده از رابطه (۲) برآورد می‌شود.

$$r_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}} \qquad \forall\, i,j \tag{۱}$$

$$E_j = -h \sum_{i=1}^{m} r_{ij} \times log\, r_{ij} \quad {\scriptstyle j=1,\,2,\ldots,\,n} \tag{۲}$$

$$h = \frac{1}{ln(m)}$$

در رابطه (۱) و (۲) x_{ij} مقادیر مورد بررسی در پژوهش و m و n به ترتیب تعداد بخش‌ها و شاخص‌های مورد بررسی در پژوهش را نشان می‌دهد. در ادامه به محاسبه بردار وزنی پرداخته می‌شود و با استفاده از رابطه (۳) وزن هر یک از معیارها تعیین می‌شود.

$$W_j = \frac{(1 - E_j)}{\sum_{j=1}^{n}(1 - E_j)} \quad (۳)$$

مدل تاپسیس

مدل تاپسیس به عنوان یک روش تصمیم‌گیری چند شاخصه، روشی ساده اما کارآمد در اولویت‌بندی محسوب می‌شود. این روش، یکی از بهترین روش‌های تصمیم‌گیری چند شاخصه است که در این روش m گزینه به وسیله n روش مورد ارزیابی قرار می‌گیرد این تکنیک که از جمله مدل‌های جبرانی در بین روش‌های MCDM به شمار می‌رود، از یک منطق ریاضی پیروی می‌کند. این منطق در ابتدا «راه‌حل ایده‌آل مثبت» و «راه‌حل ایده‌آل منفی» را معرفی می‌کند، راه حل ایده آل مثبت راه‌حلی است که معیار سود را افزایش و معیار هزینه را کاهش می‌دهد و به تبع آن راه‌حل ایده آل منفی، ارزش عکس راه‌حل ایده آل مثبت را داراست. سپس تمامی گزینه‌های مورد بررسی با بهترین و بدترین گزینه مقایسه می‌شوند و فاصله خطی هر گزینه از بهترین گزینه و بدترین گزینه اندازه‌گیری می‌شود. در نهایت گزینه‌ای که بیشترین فاصله را از بدترین گزینه و کمترین فاصله را از بهترین گزینه دارا باشد، به عنوان گزینه برتر یا گزینه بهینه انتخاب می‌شود (خاتمی فیروزآبادی و همکاران، ۱۳۹۲).

روش تاپسیس را می‌توان به صورت دنباله‌ای از گام‌ها به شکل زیر توصیف کرد:

۱) محاسبه ماتریس تصمیم نرمال‌شده: گام اول این روش، تشکیل ماتریس تصمیم است. این روش شامل تعدادی معیار و گزینه است. یک ماتریس که معیارها در ستون قرار می‌گیرند و گزینه‌ها درسطر.

$$N_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} {x_{ij}}^2}} \quad (۴)$$

۲) محاسبه ماتریس تصمیم نرمال شده وزن‌دار شده: مقدار نرمال‌شده وزن‌دار شده V_{ij} به صورت رابطه (۵) محاسبه می‌شود که در آن w_j وزن j امین معیار است و $\sum_{j=1}^{n} w_j = 1$.

$$V_{ij} = W_j N_{ij} \ldots\ldots\ldots i=1,\ldots\ldots,m, j=1,\ldots\ldots,n \quad (۵)$$

۳)تعیین جواب ایده‌آل مثبت وایده‌آل منفی:

$$A^{+} = \{(V_1{}^{+}, V_2{}^{+}, \ldots\ldots, V_n{}^{+})\} = \left\{\left(max_{V_{ij}}\middle| i \in O\right), \left(min_{V_{ij}}\middle| i \in I\right)\right\}$$
$$A^{-} = \{(V_1{}^{-}, V_2{}^{-}, \ldots\ldots, V_n{}^{-})\} = \left\{\left(min_{V_{ij}}\middle| i \in O\right), \left(max_{V_{ij}}\middle| i \in I\right)\right\} \quad (۶)$$

بد ین ترتیب بهترین پاسخ (A^{+}) به‌عنوان گزینه‌ای انتخاب می‌شود که شامل بالاترین مقادیر معیارها باشد و بدترین پاسخ (A^{-}) شامل کوچکترین مقادیر است. در رابطه (٦) O متناظر به معیارهای سودمندی و I متناظر به معیارهای هزینه‌بری است.

٤) محاسبه اندازه‌های جداکننده: با استفاده از نرم اقلیدسی فاصله هر نقطه از جواب ایده‌آل (مثبت و منفی) بصورت رابطه (۷) برآورد خواهد شد.

$$d_i^{+} = \left[\sum_{j=1}^{n}\left(V_{ij} - V_j^{+}\right)^2\right]^{1/2}, i = 1, ., m \quad (۷)$$

فاصله گزینه iام از ایده‌آل مثبت)

(فاصله گزینه iام از ایده‌آل منفی) $$d_i^{-} = \left[\sum_{j=1}^{n}\left(V_{ij} - V_j^{-}\right)^2\right]^{1/2}, i = 1, \ldots., m$$

۵) محاسبه نزدیکی نسبی به جواب ایده‌آل: نزدیکی نسبی گزینه A_i نسبت به A^{+} به صورت رابطه (۸) است. همچنین $R_i \in [0و1]$ برقرار است.

$$R_i = \frac{d_i^{-}}{d_i^{-} + d_i^{+}}, i = 1, \ldots., m \quad (8)$$

(6) رتبه‌بندی اولویت‌ها: برای رتبه‌بندی گزینه‌ها با استفاده از R_i می‌توان آنها را به صورت نزولی رتبه‌بندی کرد. به عبارتی هر گزینه‌ای که R_i آن بزرگتر باشد اولویت بیشتری دارد (معظمی گودرزی و همکاران، ۱۳۹۳).

یافته‌ها:

برای نشان دادن اهمیت در نظر گرفتن همزمان معیار های متفاوت ، نتایج پژوهش با تکیه بر اهمیت منابع آب ، یکبار با استفاده از معیار آب‌بری و یکبار بدون استفاده از معیار آب‌بری اولویت بندی شده است. به عنوان مثال، در اولویت‌بندی بخش‌ها با در نظر گرفتن معیار آب‌بری، بخش کشاورزی در رتبه بیستم قرار دارد در صورتی که این رتبه در اولویت‌بندی بدون در نظر گرفتن معیار آب‌بری به رتبه دوم تبدیل شده است. همچنین در بخش «ساخت پوشاک، دباغی و پرداخت چرم» این معیار با در نظر گرفتن معیار آب‌بری

از رتبه نهم به رتبه سیزدهم تنزل رتبه داشته است. یا بعبارت دیگر بخش‌های «ساخت منسوجات» و «ساخت محصولات از لاستیک و پلاستیک» در اولویت‌بندی با در نظر گرفتن معیار آب‌بری به ترتیب در رتبه هفتم و نهم قرار دارد در صورتی که رتبه این بخش‌ها در اولویت‌بندی بدون در نظر گرفتن معیار آب‌بری به رتبه پانزدهم و دوازدهم تبدیل شده است. در این میان اولویت بخش‌های «ساخت چوب و محصولات چوبی»، «ساخت ماشین‌آلات و تجهیزات طبقه‌بندی نشده در جای دیگر» و «ساختمان» ثابت باقی مانده است.

نتیجه:

نتایج حاصل که بررسی اولویت‌بندی بخش‌های اقتصادی با اهمیت بر مبنای معیار آب‌بری است نشان‌دهنده توجه در رتبه‌بندی بخش‌ها با تکیه بر این معیار است، به طوری که اولویت بیشتر بخش‌ها در این روش تغییر کرده است و این تغییرات در برخی بخش‌ها بسیار قابل ملاحظه است. به عنوان مثال، در اولویت‌بندی بخش‌ها با در نظر گرفتن معیار آب‌بری، بخش «کشاورزی» در رتبه بیستم قرار دارد در صورتی که این رتبه در اولویت‌بندی بدون در نظر گرفتن معیار آب‌بری به رتبه دوم منتقل شده است همچنین در بخش «ساخت پوشاک، دباغی و پرداخت چرم» این معیار با در نظر گرفتن معیار آب‌بری از رتبه نهم به رتبه سیزدهم تنزل رتبه داشته است. بنابراین تغییر در رتبه‌بندی بخش‌ها به میزان آب‌بری هر بخش وابسته است. همان‌طور که مشاهده شد در اولویت‌بندی بدون در نظر گرفتن معیار آب‌بری بخش کشاورزی در رتبه دوم قرار دارد در صورتی که اگه معیار آب‌بری در نظر گرفته شود رتبه این بخش به بیست منتقل شد. این امر ناشی از آب‌بری بالای این بخش است که این مسئله اهمیت توجه به معیار آب‌بری را نمایان می‌سازد. از اینرو لازم است اولویت‌بندی بخش‌های اقتصادی در هر منطقه متناسب با شرایط اقلیمی و آب و هوایی منطقه باشد و در این مناطق اقدام به ایجاد صنایع آب‌بر مانند صنایع فولاد و کشت محصولات با آب‌بری بالا که نیازمند استفاده بیشتر از منابع آبی هستند نشود.

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تبیین مکانسیم اثر رفتار سبزشویی بر قصد خرید سبز مصرف کنندگان بنگاه‌های اقتصادی کوچک و متوسط(SMEs)

محمد آیتی مهر*، ادریس محمودی،** بهار سپیانی ***

* استادیار گروه مدیریت، دانشگاه شهید چمران اهواز، اهواز، ایران. (نویسنده ی مسئول)
ایمیل: M.ayati@scu.ac.ir
0000-0002-1833-6253
آدرس پستی: اهواز، بلوار گلستان، دانشگاه شهید چمران اهواز، دانشکده اقتصاد و علوم اجتماعی، گروه اقتصاد، کد پستی: ۶۱۳۵۷-۹۳۱۱۳
** استادیار گروه مدیریت، دانشگاه شهید چمران اهواز، اهواز، ایران.
ایمیل: ed.Mahmoodi@scu.ac.ir

*** دانش آموخته کارشناسی ارشد مدیریت بازاریابی، دانشگاه شهید چمران اهواز، اهواز، ایران.
ایمیل: baharsepeyani8115@gmail.com

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اطلاعات تکمیلی:

این مقاله برگرفته از پایان نامه ی ارشد خانم بهار سپیانی در رشته مدیریت بازاریابی به راهنمایی محمد آیتی مهر و ادریس محمودی در دانشگاه شهید چمران اهواز است.

قدردانی: از تمامی افراد و موسساتی که در انجام این تحقیق مولف را مساعدت نمودند، قدردانی می‌شود.
تضاد منافع: نویسندگان مقاله اعلام می‌کنند که در انتشار مقاله ارائه شده تضاد منافعی وجود ندارد.
منابع مالی: نویسنده‌ها هیچگونه حمایت مالی برای تحقیق، تألیف و انتشار این مقاله دریافت نکرده‌اند.

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چکیده گسترده

معرفی:

با افزایش رشد جمعیت و مسائل کره زمین توجه محققان به پدیده و رفتار سبزشویی بیشتر شده است. رفتار سبزشویی به وضعیتی گفته می‌شود که باتوجه به آن شرکت‌ها و کسب و کارها محصولات و خدمات ناسالم را سبز و ارگانیک جلوه می دهند(Wang et al., 2019). این مطالعه بینش های جدیدی را برای بازارهای نوظهور ایجاد می کند و اطلاعات بالقوه مهمی را برای دانشگاهیان و متخصصان در مورد رفتار سبزشویی فراهم می کند. می توان نشان داد که تقریبا نیمی از درآمد افراد صرف خرید محصولات غذایی می شود(Mishra & Sharma, 2012)، بنابراین کیفیت، ایمنی و عملکرد چنین محصولاتی توجه مشتریان، مصرف کنندگان و سهامداران را به خود جلب کرده است (Bhattacharya, al., 2012).)، بعلاوه حفاظت از محیط زیست به دلیل محدودیت مقررات سبزشویی و پیاده سازی نامشخص و غیر دقیق آن‌ها در کشور با مشکلاتی روبه رو شده است. در زمینه محصولات غذایی نیز، مقررات ملی در مورد برچسب‌های ارگانیک و سبز تعیین نشده است و بنابراین

بسیاری از شرکت ها و صنایع مواد غذایی می‌توانند به خوبی از رفتار سبزشویی استفاده کرده و خود را دوستدار محیط زیست جلوه دهند (Chen & Chang, 2012). با این توضیحات ممکن است که مشتریان نسبت به ادعاهای سبز تردید داشته باشند و خرید محصولات سبز در جامعه کاهش پیدا کند، که این امر به نوبه خود آسیب‌هایی را برای افراد از نظر ایمنی و سلامتی خواهد داشت و پیامد آن برای محیط زیست شامل آلودگی و تخریب اکوسیستم‌ها خواهد بود (Hai et al., 2017). استان خوزستان به علت داشتن شرکت‌های صنعتی در شرایطی است که در معرض آلودگی‌های صنعتی و زیست محیطی قرار می‌گیرد (Guo et al., 2014). در سال‌های گذشته پیشنهاداتی برای به حداقل رساندن اثرات زیست محیطی ضایعات، دسترسی به زندگی سبز و به حداکثر رساندن ظرفیت استفاده از محصولات صنایع غذایی سبز که با استفاده از پدیده سبزشویی می‌توان آثار بالقوه آن‌ها را کاهش داد، از طرف محققان ارائه نشده است، در نتیجه برای مصرف کنندگان حیاتی است که شیوه‌های مصرف محصولات خود را مورد بازنگری قرار دهند و از محصولات غیر ارگانیک به سمت محصولات سبز حرکت کنند. با مشاهده این موارد در این پژوهش به دنبال بررسی پدیده سبزشویی و تبیین مکانیسم اثر آن بر قصد خرید سبز خواهیم بود.

متدولوژی:

تحقیق حاضر از منظر روش شناسی در حیطه تحقیقات توصیفی و پیمایشی قرار دارد. همچنین از منظر شیوه اجرا مطالعه حاضر دارای دو فاز کتابخانه ای و میدانی است. در فاز کتابخانه‌ای محققان با استفاده از مرور ادبیات و پیشینه تجربی موجود به ارائه مدل پژوهش پرداخته‌اند. ابزار نویسندگان برای اینکار استفاده از منابع کتابخانه‌ای بوده است. در فاز میدانی نیز نویسندگان به توزیع پرسشنامه به منظور آزمون برازش مدل و فرضیه‌های تحقیق پرداخته‌اند. در نهایت ۲۷٦ پرسشنامه سالم گردآوری و با استفاده از روش مدلسازی معادلات ساختاری مبتنی بر رویکرد حداقل مربعات جزئی مورد تجزیه و تحلیل قرار گرفته است.

یافته‌ها:

نویسندگان یافته‌های این مطالعه را در دو گام اساسی ارائه می‌کنند. گام اول یافته‌ها مربوط به برازش و اعتبار مدل پژوهش است که پس از بررسی شاخص‌های اعتبار سنجی مشخص شد که مدل ارائه شده توسط نویسندگان از برازش مناسبی برخوردار است. دسته دوم از یافته‌های این تحقیق شامل تایید تمام فرضیه های پژوهش است که خلاصه‌ای از آن‌ها در **جدول ۱** آمده است:

جدول ۱. نتایج آزمون فرضیه های پژوهش

فرضیه ها	مسیر	ضریب مسیر	آماره T	نتیجه
H_1	سبزشویی ← قصد خرید سبز	-۰٫۳۱۶	۶٫۰۴۵	تایید
H_2	سبزشویی ← شفاهی سازی سبز	-۰٫۸۱۹	۴۰٫۹۴۴	تایید
H_3	سبزشویی← سردرگمی سبز	۰٫۸۲۷	۴۰٫۴۷۶	تایید
H_4	سبزشویی ← بدبینی سبز	۰٫۷۷۱	۲۹٫۲۰۸	تایید
H_5	سردرگمی سبز← قصد خرید سبز	-۰٫۲۶۹	۵٫۸۳۳	تایید
H_6	بدبینی سبز← قصد خرید سبز	-۰٫۱۳۵	۳٫۰۵۳	تایید
H_7	شفاهی سازی← قصد خرید سبز	۰٫۲۵۴	۵٫۲۱۸	تایید
H_8	سبزشویی← سردرگمی سبز← قصدخرید سبز	-۰٫۱۰۴	۲٫۹۸۵	تایید
H_9	سبزشویی← شفاهی سازی سبز← قصد خرید سبز	-۰٫۲۰۸	۵٫۵۹۶	تایید

نتیجه:

تحقیق حاضر بازاریابان صنایع موادغذایی را تشویق و حمایت می‌کند تا ادعاهای سبز معتبری را ایجاد کنند که نه تنها وضعیت کسب و کار آنها را بهبود می‌بخشد، بلکه برنامه‌های زیست محیطی آنها را نیز ارتقا می‌دهد. نتایج نشان داد که برخی از صنایع مواد غذایی به دلیل بدبینی مصرف کنندگان نسبت به سبزبودن فعالیت‌ها و خدمات آن‌ها دارای ریسک بالایی هستند. مدیران باید بر روی چندین روش سازگار با محیط زیست تمرکز کنند تا بدبینی مصرف‌کنندگان را کاهش دهند. مدیران باید شفافیت عملکرد زیست محیطی را افزایش دهند و درکنار آن سازمان‌های غیردولتی می‌توانند گزارش‌های زیست محیطی شرکت‌ها را حسابرسی کنند و شرکت‌هایی را که درگیر رفتار سبزشویی هستند جریمه کنند.

با این اوصاف انتظار می‌رود که بتوان تا حدودی به کنترل رفتار سبزشویی و تردیدهای سبز کمک نمود.

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بررسی تأثیر تحریم‌ها بر رابطه علی بین فساد، نابرابری درآمدی و فقر در ایران

سید امین منصوری*

* دانشیار اقتصاد، گروه اقتصاد، دانشکده‌ی اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، اهواز ایران (نویسنده مسئول).

ایمیل: sa.mansouri@scu.ac.ir

0000-0002-0528-7974

آدرس پستی: استان خوزستان، اهواز، گلستان، گروه اقتصاد، دانشکده اقتصاد و علوم اجتماعی، دانشگاه شهید چمران اهواز، کد پستی ۶۱۳۵۷-۹۳۱۱۳

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قدردانی: از تمامی افراد و موسساتی که در انجام این تحقیق مولف را مساعدت نمودند، قدردانی می‌شود.

تضاد منافع: نویسنده مقاله اعلام می‌کند که در انتشار مقاله ارائه شده تضاد منافعی وجود ندارد.

منابع مالی: نویسنده هیچگونه حمایت مالی برای تحقیق، تألیف و انتشار این مقاله دریافت نکرده است.

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چکیده گسترده

معرفی:

یکی از چالش های بزرگ کشور که در سال های اخیر به صورت چشمگیری افزایش داشته است، تعداد جرایم آشکار شده‌ی ناشی از فساد است. براساس گزارشات رسمی، اگرچه در دهه های ۷۰ و ۸۰ شمسی، از لحاظ تعداد اختلاس های بزرگ تنها تعداد دو پرونده با مجموع رقمی بالغ بر ۸۰۰ میلیون دلار اعلام گردید، اما در دهه ی ۹۰ فساد اداری با تعداد ۱۳ پرونده ی بزرگ فساد و رقمی بالغ بر ١٤ میلیارد دلار و رشدی فراتر از ۱۵۰۰ درصد نسبت به دهه های ۷۰ و ۸۰ شمسی افزایش چشمگیری داشته است. (خبرگزاری ایسنا[1]، ١٣٩٦). گسترش این حجم از فساد در سیستم اداری و دیوان سالاری کشور می تواند تبعات اقتصادی و اجتماعی جبران ناپذیری داشته باشد. بررسی های آماری نشان می‌دهد که در دهه‌ی ۹۰ شمسی، شاخص‌های کلان اقتصادی شامل رشد اقتصادی، اشتغال، بیکاری، فقر، تورم و توزیع درآمد نسبت به دهه های قبل نامطلوب تر شده است (مرکز آمار ایران، سالنامه کشور، ۱۳۹۵). بر این اساس یکی از سئوالاتی که ممکن مطرح شود این است که آیا بین فساد و شاخص های توزیع درآمد و فقر در کشور رابطه وجود دارد؟ با توجه جدید بودن مطالعه ی موضوعات مربوط فساد در ایران، به نظر می رسد بررسی ارتباط بین فقر، توزیع

[1] Https://Bit. Ly/2o5vvni

درآمد و فساد می تواند زوایای جدیدی در این رابطه به روی محققین و دست اندرکاران ذیربط باز نماید.

متدولوژی:

بر این اساس هدف این تحقیق بررسی ارتباط بین فساد، نابرابری درآمد و فقر در ایران در دوره ۱۳۹۹- ۱۳۶۳ است. برای این منظور، با محاسبه شاخص های درآمد سرانه، خط فقر، شاخص اتکینسون[۲]، شاخص ضریب جینی،[۳] فساد اداری و کنترل فساد[۴]، روابط متقابل آن ها با استفاده از آزمون علیت تودا و یاماموتو[۵] و آزمون همجمعی VECM مورد بررسی قرار می گیرد. این مقاله از بخش های زیر تشکیل شده است. پس از مقدمه، مبانی نظری مرور شده است و سپس پیشینه‌ی مطالعات ذیربط ارائه شده است. در بخش روش تحقیق، داده‌ها و متغیرها ابتدا تعریف شده و سپس مدل مورد استفاده در این تحقیق معرفی شده است. در بخش آخر برآورد مدل انجام شده و آزمون های علیت بررسی می‌شود و در نهایت نتایج این تحقیق مورد تجزیه و تحلیل قرار گرفته اند.

یافته‌ها:

یافته های تحقیق نشان می دهد که:

- تحریم ها بر علیت درآمد سرانه بر فساد اداری تاثیر گذاشته است
- تحریم ها بر علیت کنترل فساد بر درآمد سرانه تاثیر گذاشته است
- تحریم ها بر علیت توزیع درآمد بر درآمد سرانه تاثیر گذاشته است
- تحریم ها هیچ تاثیری بر علیت درآمد سرانه، بر شاخص اتکینسون و برعکس نداشت.
- تحریم ها هیچ تاثیری بر علیت بین خط فقر، فساد اداری و برعکس نداشت.
- تحریم ها بر علیت بین خط فقر، کنترل فساد و برعکس تاثیر گذاشت.

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[2] Atkinson Index
[3] Gini Index
[4] Control of Corruption
[5] Toda-Yamamoto Causality Test

- تحریم ها تاثیر مثبت قابل توجهی بر خط فقر داشتند، اما هیچ تاثیر قابل توجهی بر شاخص جینی نداشتند.
- تحریم ها هیچ تاثیری بر علیت خط فقر، بر شاخص اتکینسون و برعکس نداشت.
- تحریم ها هیچ تاثیری بر علیت بودن شاخص جینی، فساد اداری و بالعکس نداشت.
- تحریم ها هیچ تاثیری بر علیت بودن شاخص جینی، کنترل فساد و برعکس نداشت.
- تحریم ها تاثیر مثبت قابل توجهی بر فساد اداری داشتند، اما هیچ تاثیر قابل توجهی بر شاخص اتکینسون نداشتند. به عبارت دیگر، تحریم ها بر علیت توزیع درآمد بر فساد اداری تأثیر گذاشته است.
- تحریم ها تاثیر مثبت قابل توجهی بر شاخص اتکینسون داشتند، اما هیچ تاثیر قابل توجهی بر کنترل فساد نداشتند. به عبارت دیگر، تحریم ها بر علیت کنترل فساد بر توزیع درآمد تأثیر گذاشته است.

نتیجه گیری:

نتایج مدل برآوردی نشان داد که با افزایش یک درصدی ضریب شاخص اتکینسون تعداد پرونده‌های مختومه به میزان ۳/۲ افزایش می‌یابد. به عبارت دیگر، نابرابری توزیع درآمد اثر مثبت و معناداری بر فساد دارد یعنی با افزایش نابرابری بر میزان فساد اداری افزوده خواهد شد. از طرفی افزایش فساد تأثیر منفی بر توزیع عادلانه درآمد داشته است. به عبارتی فساد منجر به افزایش توزیع ناعادلانه درآمد شده است. همچنین فقر رابطه مثبت و معناداری با فساد دارد. نتایج آزمون علیت تودا و یاماموتو حاکی از علی نبودن متغیرها است ولی با اعمال متغیر دامی، نتیجه‌ی علیت از سمت خط فقر (PL) به سمت کنترل فساد (CC) تائید می‌گردد. به عبارت دیگر، افزایش فقر تأثیر معناداری بر افزایش فساد دارد. از طرفی با اعمال متغیر دامی در مدل نتیجه‌ی علیت از AC به سمت PL در سطح اطمینان ۹۰ درصد نیز تائید می‌گردد. یعنی با افزایش فساد اداری فقر افزایش می یابد. ضریب ECM مدل کوتاه‌مدت نیز حاکی از این است که در هر دوره ۴۷٪ درصد از عدم تعادل در توزیع نابرابری درآمد تعدیل شده و به سمت روند بلندمدت خود نزدیک می‌شود. همچنین از دیگر نتایج

تحقیق علیت فساد اداری (AC)به سمت درآمد سرانه (IP) است که بیانگر این است درآمد سرانه از فساد تأثیر بسزایی می پذیرد.

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