



Examining the Relationship between Brand Value, Energy Production and Economic Growth

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ABSTRACT

The aim of this study is to determine the relationship between the energy production of the USA between 2010-2019 and the brand value of an energy company (oil and gas) selected from this country and the economic growth of the country. Multiple Linear Regression Model was used to measure whether there is a significant relationship between these variables or the effect of the relationship. Data for analysis were obtained annually from the World Bank, EIA and Brand Finance. During the study phase, Variance inflation factors for the independent variables (VIF) test, Breusch-Pagan/Cook Weisberg test, Breusch-Godfrey LM test and Shapiro-Wilk W test were applied. In the study, energy production and brand value of an energy company were used as independent variables, and economic growth was used as dependent variables. As a result of the latest regression analysis, it has been determined that there is a positive linear relationship between the dependent and independent variables of the country. In the study, it was concluded that the increase in energy production in the USA and the increase in the brand value of the relevant energy company positively affected the economic growth of this country.

Keywords: Brand value, Energy production, Economic growth, GDP, USA

JEL Classifications: E23, M39, Q43, O40

1. INTRODUCTION

Economic growth is an important factor in the stability of macroeconomic factors such as increasing the level of output, tourism revenue, controlling the unemployment level or increasing the welfare of the country in terms of the country it represents (Huseynli, 2022). The realization of economic growth is among the main goals that almost every country wants to achieve. For this reason, economic growth is affected by a number of factors, either positively or negatively.

Production factors, which are one of the foundations of economic growth, have an important place in the development of countries. However, the emergence of new factors with the development of society and science has also differentiated the developments between countries. One of these factors is energy. It has an important place in the efficient and effective use of energy production factors and

therefore in economic growth. Therefore, the development potential of countries that produce more energy is also high. Energy has become a fundamental factor in the functioning of systems and allows the organization of society and the creation of a certain standard of living (Smil, 2008). Energy not only raises the living standard of the society and allows the advancement of technology, but also has an important share in the economic growth of the country. Although we can produce much more, more diverse and in a shorter time, this acceleration has created social pressures (Steffen et al., 2021), has led to increased complexity of society (Hall and Klitgaard, 2011), and in final to the modeling of the world system (Castells, 2010; George, 2013) which is increasingly dependent on energy. There are also differences in the economic growth of countries with low energy dependency and countries with high energy dependence.

In addition to these, issues such as marketing activities, consumer behavior and branding, whose origins date back centuries, are

also one of the main factors that should be taken into account today. Namely, there is increasing attention in the world to the brand-oriented approach rather than the product-oriented approach. Because what keeps brands alive is the value they create in consumers. This value is related to the behaviors that consumers buy, repurchase, recommend to others, even dream of buying when they don't have the money now, defend them without any influence, and even fall in love with them. This shows the strength of the brands and the countries where the brands originate. Because brand value is not measured by the financial value of the institutions, but by the market value. Brands are one of the most important intangible assets of companies (Chica et al., 2016; Keller and Lehmann, 2006; Backhaus and Tikoo, 2004). The term brand value refers to the value of a brand for the focus firm (Gupta et al., 2018; Keller, 2016). Different brand building strategies and tactics create different results or "added value" for an industrial brand (Kirk et al., 2013). This "added value" can also affect the economic growth of the country.

A number of studies that have been done or are still being conducted in the literature also have the quality of determining the relationship and direction of different factors with economic growth. Revenues from international tourism, foreign exchange reserve structure, inflation rates, the country's position at the international level, energy production and consumption, international brands owned by the country can be given as examples of factors. In our study, it is aimed to determine whether there is a relationship between the economic growth of the sample country, energy production and the values of the selected brands owned by the country.

Considering all these, the problem of whether energy production or owning a valuable brand will increase GDP has emerged. This study was conducted to prove this problem. The aim of the study is to investigate the relationship between the economic growth of a country that produces energy and a country that has a valuable brand.

2. LITERATURE REVIEW

2.1. Brand and Brand Value

The brand is considered one of the most important assets of any company. For this reason, the determination of brand value is of great importance (Janoskova and Kliestikova, 2018; Gurses and Uslu, 2014). According to Caputa (2015), building strong brands should be the main goal of entrepreneurs, because it provides a number of advantages. Product and manufacturer brand are the main determinants of customer capital and company value. Along with all this, Aaker (1996) states that strong brands help the company establish an identity in the market, reduce vulnerability to competitive actions by leading to larger margins and more intermediary cooperation.

The role of brand appraisal in assisting consumers in their first and repeat purchase choices has a long history (Veloutsou, 2014). The concept of creating value depending on the brand concept is possible both for the company and for the consumer. According to Kim et al. (2008), value creation as a construct has a longstanding relationship with both consumer needs and firm value strategies.

The antecedents of marketing value strategies include determining what business the firm should be in (strategic objectives), determining competitive methods or action plans on how these general aspects should be implemented (strategic tools), and allocating resources to functional areas that support defined competitive methods (Aksoy et al., 2015).

According to O'Reilly (2005), brand value can be considered from two economic or psychological perspectives;

1. Finance that sees the brand as an asset on the balance sheet
2. The behavior in which brand power resides in the mind of the customer.

From this point of view, the value created by a company in the mind of the consumer has been touted as the main purpose of an organization and the pioneer of consumer satisfaction and loyalty, which ensures firm performance, economic growth and long-term viability (Landroguéz et al., 2013). Therefore, a firm's strategic goals, strategic tools, and resource allocations must be aligned with value-creating attributes to achieve organizational success (Olsen et al., 2008).

Researchers show that value-as-behavior has great potential in improving customer loyalty and helping marketing managers implement informed policies by understanding consumer value components (Sweeney and Soutar, 2001; Tsai, 2005). The concept of value plays an important role for companies and customers have been explored since the 1990s. From a company perspective, value is a source of competitive advantage (Woodruff, 1997) and the key to the long-term success of the company. Because promoting customer satisfaction by providing superior benefits to customers (Carpenter, 2008) affects customer retention (Koller et al. 2011).

Considering all these, it is very important for brands to create strong brand value by creating value in consumers. From this point of view, it is possible that countries with strong brands can also use the power of these brands as a factor for their own economic growth.

2.2. Energy Production and Economic Power

Production in industry is an indicator of the activity cycle that shows the production activity, and its purpose is to measure the changes in the production volume at the level of each year. According to Stoeniu (2021), production provides a measure of the trend in the volume of value added over a given reference period. Production resources can be attributed in different ways depending on the thinking perspective. Organizational researchers often talk about assets or capabilities when pointing to production resources (Barney, 1991).

From an economic point of view, production, imports and exports are interrelated and are important points for economic growth. In this sense, energy demand depends on the economic growth rate and standard of living of each country, as well as on the development of the industry (Stoeniu, 2021). In the institutional setting, energy efficiency has become a competitive parameter due to the institutional focus on industrial sustainability (Fleiter

et al., 2012). To achieve industrial energy efficiency, all available energy-related information needs to be reviewed and evaluated.

Industry is driven by energy production, which provides the vital functions of the state and at the same time guarantees its security and independence. Energy production is a vital component of the world economy. There is an active process of increasing cost of energy resources (oil, gas, coal) in the world economy. This is primarily due to the sharp increase in the consumption of hydrocarbon energy in industrialized countries such as the USA, Japan, Germany, as well as the significant development of the economy of China, India and other countries of the world. All this determines the search for energy-saving technology and technology in the world economy as a whole (Dźwigoł et al., 2019).

Energy independence of the state as a component of energy security is a complex socioeconomic category, characterized by a complex of statistical indicators, the level of state independence in conducting an energy policy that is able to withstand external and internal challenges through intensive measures of economic development without harming society and national production as a whole (Tutar et al., 2022). The complex of statistical indicators of energy independence includes the efficiency of the use of FER, the volume of investments attracted, the state of logistics, dependence on imports from other countries, the volume of production and consumption of FER, etc. (Dźwigoł et al., 2019).

The main indicators of the energy independence assessment were determined as follows (Dźwigoł et al., 2019): GDP per capita; production of energy materials; FER import and export; fixed capital investments for the type of economic activity “Supply of electric power, gas, steam and conditioned air”; the volume of industrial products sold by types of economic activity “Supply of electric power, gas, steam and conditioned air”; total FER consumption in the country; energy intensity of production; Ratio of FER imports to GDP; The specific gravity of natural gas in the structure of FER consumption; The degree of wear of fixed capital assets by types of economic activity “Electric power, gas, steam and conditioned air supply”.

The most important conditions for the stable and proportional development of the state are the solution of the problems of energy intensity in production and energy supply of the economy, which pose a threat to economic and national security. In this respect, energy production and energy independence are one of the most important factors for economic growth. The success of an energy efficiency policy depends on scientifically based economic and statistical analysis, forecasting and optimization of the state's energy balance. The fuel and energy complex significantly affects its situation, development opportunities and prospects, the effectiveness of state energy policy, the economic situation in the country and the conditions for sustainable development.

2.3. Relationship between Energy Production, Brand Value and GDP

In many studies in the literature, the existence of a long-term relationship between energy production and economic growth has been tried to be investigated. As a matter of fact, necessary

energy resources are important for economic growth and growth. In most of the studies, it is concluded that there is indeed a positive relationship between economic growth and energy production.

Energy is the lifeblood of technological and economic development. The energy choices made by the United States and the rest of the world have ramifications for economic growth; the local, national, and global environment; and even the shape of international political alliances and national defense commitments. Countries with different levels of wealth also face different energy problems.

On the other hand, there is almost nothing left that is not branded anymore. In this respect, branding in the energy sector started years ago. The brand value offered by a manufacturer provides emotional value to consumers, rational value to commercial customers, and reflects its operational efficiency as an important element of the value it provides to both consumers and business customers (Parment, 2008). A brand that can provide these three different types of value to its customers can generate demand for its products in a competitive market (Keller and Lehmann, 2006). Fulfilling the demand generated through brand value requires brand managers to shift their focus back to their firm's activities (Srivastava et al., 1999).

Considering all these, it is seen that the elements of energy production and brand value have an important role in the economic growth of a country. Namely, Lyulev et al. (2018) proved the important relationships between macroeconomic stability and country brand in their study. Therefore, the authors analyze the national brand as an important indicator of macroeconomic stability. They also proved that the country brand is a decisive indicator of macroeconomic stability (Lyulyov et al., 2018).

The reviewed studies (Fan, 2006; Brown et al., 2006; Cotîrlea, 2015) allocate the “national brand”, “country's image”, “country's identity” and “country's reputation”. In the official report “Government policy on country's brand”, the experts have compared terms “brand” and “image”. In the literature (Janoskova and Kliestikova, 2018; Lo et al., 2018; Bilan et al., 2019) it is emphasized that the brand is a more comprehensive definition, while at the same time, the image is a variable part of the brand that affects its value.

On the other hand, brand value indicates the ability of managers to conduct business activities in a way that allows a company to achieve its business goals (Srivastava et al., 1998). Instead, brand competitiveness is reflected in the brand's ability to lead a market better than its competitors (Muniz and Guinn, 2001; Winzar et al., 2018; Tong and Wang, 2011). Competing in a market through business customers requires brand managers to use the brand efficiently to differentiate the value they offer business customers from their competitors (Leone et al., 2006; Webster, 2000).

Bilan et al. (2019) checked two hypotheses such as the multiple connections between the social value determinants that make up the country's brand and the link between the social value determinants of the brand and the country's macroeconomic

stability. The purpose of the analysis concerns Lithuania, Latvia, Croatia, Bulgaria, Poland, Romania (the last countries to join the EU) and Ukraine.

3. RESEARCH METHODOLOGY

3.1. Purpose

Within the scope of the study, the development of the countries with energy production power and the economic growth of the countries to which the companies with high brand value belong were examined. From this point of view, the aim of this study is to investigate the relationship between the economic growth of a country that produces energy and a country that has a valuable brand. Analysis was conducted to measure whether there is a significant relationship between dependent and independent variables and how the variables affect economic growth. Total energy production and brand value of the energy company were taken as the independent variable, and economic growth was taken as the dependent variable. In order to obtain a meaningful result, the logarithm of our dependent variable was taken and included in the analysis.

3.2. Data Set

Three variables were used in the study: amount of energy production, brand value and GDP. The data on the amount of energy production was taken from the EIA. The U.S. Energy Information Administration (EIA) is a principal agency of the U.S. Federal Statistical System responsible for collecting, analyzing, and disseminating energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment (www.eia.gov) (Figure 1).

Data on brand value has been obtained from Brand Finance. Brand Finance is the world’s leading brand valuation consultancy. Brand Finance’s aim is “bridging the gap between marketing and finance”. Brand Finance puts 500 of the world’s biggest brands to the test every year. Ranking brands across all sectors and countries, Brand Finance publishes nearly 100 reports annually. One of these reports is “The world’s top 500 most valuable brands” every year (www.brandfinance.com). Based on the reports of Brand Finance, Chevron was the most valuable energy brand in the USA between 2010-2019 (Figure 2).

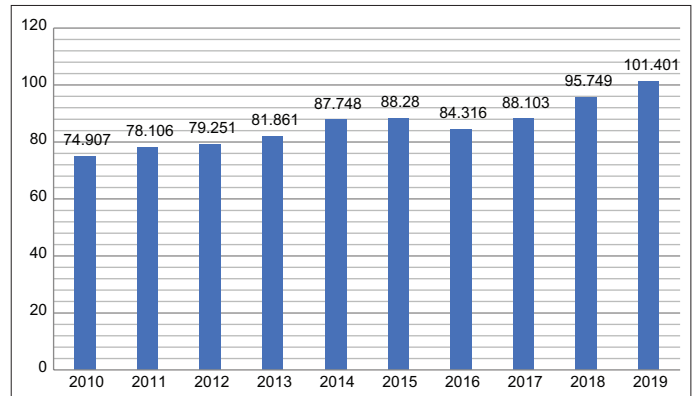
Data on GDP was obtained from the world bank. The World Bank Group is one of the world’s largest sources of funding and knowledge for developing countries. By its own institutions share a commitment to reducing poverty, increasing shared prosperity, and promoting sustainable development (www.worldbank.org).

The data set includes the years 2010-2019 (Figure 3). All data are included in the analysis on an annual basis. A series of tests were carried out to eliminate problems such as varying variance and normal distribution. In order to obtain a meaningful result, analyzes were made by taking the logarithm of the dependent variable.

3.3. Procedure

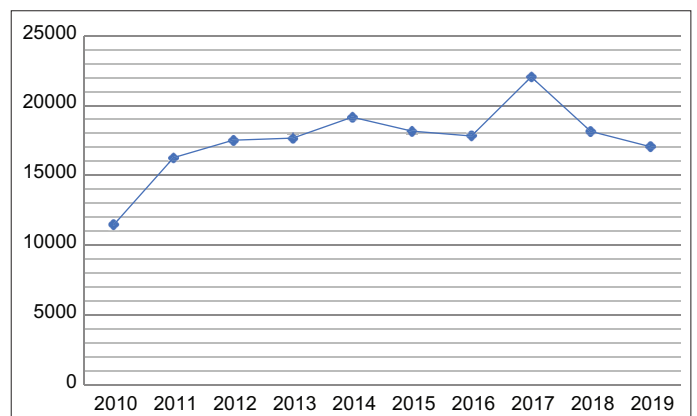
As stated, it is argued in the world that brand value is greater than the financial value of companies. Brand value is one of the most

Figure 1: Total Energy Production of the USA, quadrillion Btu (2010-2019)



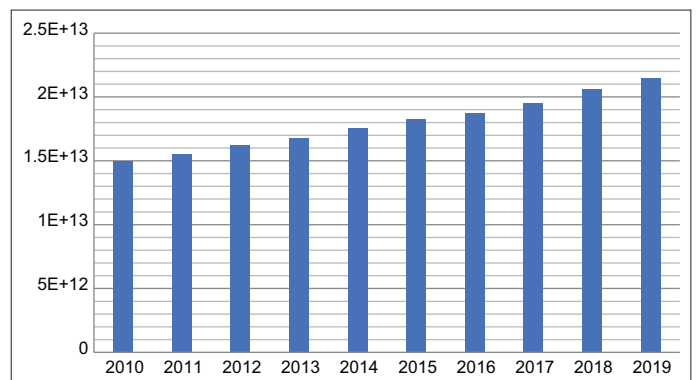
Source: Energy Information Administration

Figure 2: Chevron’s brand value (2010-2019)



Source: Brand Finance

Figure 3: GDP of the USA (2010-2019)



Source: World Bank

important areas in terms of marketing and today there is nothing left without branding. It’s not just cars, food, cosmetics, clothing and electronics that are branded, it’s people, countries, cities, and even experiences. Brand value, which is created as a result of the experience and values promised and offered to consumers, is becoming the greatest assets of countries. Data between 2010 and 2019 were used to determine whether energy production and the brand value of an energy company specific to this country play a role in the economic growth of this country. Considering the relationship between the country with a strong brand will also

be strong and the growth of energy production in the country, the analysis of the role of a country's energy production and brand value in the economic growth of that country is based on the following procedure.

The reason for choosing the USA as the country is that this country ranks second in energy production in the world in recent years (see www.eia.gov). Afterwards, it filtered oil and natural gas among the world's 500 most valuable global brands, and among these brands, Chevron, an oil and natural gas brand of the USA, was selected. Between 2010-2019, the Chevron brand has been an oil and natural gas brand representing the USA, one of the world's 500 most valuable global brands (see www.brandfinance.com).

3.4. Analysis Method

In this part of the study, data collection and method for analysis are explained. A Multiple Linear Regression Model was defined and a number of assumptions of the model were listed. Analysis was performed using the STATA statistics/econometrics program. Regression analysis; It is a method used to examine the numerical relationship between dependent and independent variables. In this method, it is assumed that the dependent variable is affected by the independent variable. In other words, the independent variable affects the dependent variable. In the regression model, the independent variable y is denoted by the dependent variable x (Crouch et al., 1992).

In the Regression Analysis, if the number of dependent and independent variables is one, Simple Regression Analysis, if the dependent variable is one, Multiple Regression Analysis if there is more than one independent variable, and if there is more than one dependent variable, Multivariate Regression analysis methods are applied. If the relationship between the variables is linear, it is known as Linear Regression Analysis, if not, it is known as Linear Regression Analysis.

A Simple Regression Model;

$$y = \beta_0 + \beta_1 X + \varepsilon \tag{1}$$

form is installed. In the equation;

Y ; Dependent variable is X Independent variable.

β_0 ; It is a constant value and is the value of Y when $X=0$.

β_1 ; It is the regression coefficient. It expresses the change that will occur in the dependent variable in response to 1 unit change in the independent variable.

ε ; It is the random error term. It is assumed that the dependent variable contains a certain error. There is no error in the argument (Demir, 2011).

The random error ε has a normal distribution, the mean takes a zero value and has a constant spread (Anghelance and Anghel, 2014). If the number of independent variables is more than one, a multiple linear regression model is established. If a new term, X_{12} , is added to the simple regression model, the model gets the multiple linear regression model right.

$$y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{2i} + \varepsilon_i \tag{2}$$

Here it is multivariate linear with three parameters, namely β_0 , β_1 and β_2 . Multiple linear regression model if the number of independent variables is unknown:

$$y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{2i} + \dots + \beta_p X_{pi} + \varepsilon_i \tag{3}$$

is formulated. The dependent variable y_i in the equation; β_0 , its constant value; $X_{1i,pi}$, its arguments; ε_i represents the error term and $\beta_{1,p}$ regression coefficients (Dogan and Yilmaz, 2017).

4. ANALYSIS AND RESULTS

The Multiple Regression Model we established for the analysis;

$$\text{Economic growth (y)} = \beta_0 + \beta_1 \text{ brand value} + \beta_2 \text{ energy production (x)} + \varepsilon \tag{4}$$

Form is installed.

Our hypotheses for analysis;

H_0 : There is no relationship between economic growth and energy production and brand value,

H_1 : It was established that there is a relationship between economic growth and energy production and brand value.

The tests performed for some basic assumptions in order to apply the model and their results are shown below. The analysis was made and concluded in accordance with the following steps.

Multicollinearity test was performed to reach the VIF result. Variance inflation factors for the independent variables (VIF) test was conducted to measure whether the independent variables were related to each other. The results of the VIF test are listed in Table 1.

The fact that the VIF value is greater than 5 or 10 in some sources indicates that there is a multicollinearity problem in the model. Since we get low values in our model, it means that there is no multicollinearity problem.

Fixed variance test was performed to reach the Breusch-Godfrey LM test result. Breusch-Godfrey LM test was applied to examine whether there is autocorrelation between the error terms. According to the autocorrelation test results, since the probability value is greater than 0.05, it is seen that there is no autocorrelation in our model. Then, the Breusch-Pagan/Cook Weisberg test was applied to find out whether the model satisfies the homoscedasticity assumption.

Our hypotheses for analysis;

H_0 : There is no varying variance between the Error Terms,

H_1 : It means that there is varying variance between the Error Terms.

Table 1: VIF Test Results of the USA

Variable	VIF	1/VIF
Brand value	1.27	0.788720
Energy production	1.27	
Mean VIF	1.27	0.788720

5. DISCUSSION AND CONCLUSION

According to the results obtained, our H_0 hypothesis is accepted since our probability values are greater than 0.05 (Table 2). In other words, there is no problem of varying variance in our model. Constant variance is valid. This also applies to our other test, the normality test assumption.

Normality test was performed to reach the Shapiro-Wilk W test result. Another assumption, the Shapiro-Wilk W test, was applied to measure the normal distribution of error terms in the model. First, the error term was created in our model and then the Shapiro-Wilk W test was performed (Table 3).

Our hypotheses;

H_0 : The error terms are normally distributed.

H_1 : The error terms are normally distributed.

As the probability values are greater than 0.05 according to the results of the test, the H_0 hypothesis is accepted in the country. Error terms in the model show a normal distribution feature.

As can be seen from the test analysis results, the basic assumptions were tested in order to apply the model and it was concluded that the model was applicable. Then, regression analysis was started. The results of the regression analysis obtained are shown in Table 4.

According to the analysis results; In the United States, the coefficient of determination is $R^2 = 0.9224$. In other words, the model has the power to explain the variability in economic growth at a rate of 0.9224. Since the p value is less than α in the model ($p = 0.000 < 0.05$), it can be said that the model is significant at the 95% confidence level. When we look at the explanatory variable, it is seen that there is a significant relationship between energy production and brand value and economic growth. In this case, our H_1 alternative hypothesis is accepted. In other words, the formation of both energy resources and brand power in this country shows its own effect on the economic growth of the country.

Table 2: Breusch-Pegan/cook-Weisberg test results of the USA

H0: Constant variance
Variables: Fitted values of GDP
Chi 2 (1) = 0.01
Prob = 0.9435

Table 3: Shapiro-Wilk W test results of the USA

Variable	Observations	W	V	z	Prob > z
Error term	10	0.95020	0.767	-0.442	0.67090

Table 4: Multiple Linear Regression Analysis Result of the USA

R squared	Adjtused R squared	Prob>F
0.9224	0.9003	0.0001
GDP	Standart error	Coeff.
Brand value	0.00174	0.126944
Energy production	5.36e-06	8.11e-06

The aim of this study is to determine the relationship between energy production and brand value of the energy firm and economic growth of the United States between 2010-2019. Multiple Linear Regression Model was used to measure whether there is a significant relationship between these variables or the effect of the relationship. Data for analysis were obtained annually from the World Bank, EIA and Brand Finance. During the study phase, Variance inflation factors for the independent variables (VIF) test, Breusch-Pegan/Cook Weisberg test, Breusch-Godfrey LM test and Shapiro-Wilk W test were applied. As a result of the latest regression analysis, it has been determined that there is a linear positive relationship between the dependent and independent variables of the country. In other words, the increase in energy production and the formation of brand value of the firm in this country positively affect economic growth.

In addition, considering that the number of studies on energy production, brand value and economic growth in the literature is very limited, it is hoped that our study will fill this gap in the literature, albeit a little. In this study, energy production and brand value are used as independent variables and economic growth is used as dependent variables. While the study theoretically includes examining between energy production, brand value and economic growth, it will also initiate academic discussions about the energy production of a country, the brand value of an energy company of this country and the economic growth of this country. In future studies, it is recommended that more countries be preferred and the number of variables increased to be more comprehensive.

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