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A Case Study on Evaluating Regional Development-Oriented Universities' Contribution to Society Activities in Turkey

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Abstract

This study aims to evaluate the efficiency and performance of contribution to society activities of Turkish public universities titled as regional development-oriented universities in the content of Mission Differentiation and Specialization on the Basis of Regional Development Project. Data Envelopment Analysis was applied to assess the relative contribution to society efficiency of these universities for 2018 and 2019. The results indicate that relatively efficient universities were only three and two out of fifteen universities according to their use of human and financial inputs in 2018 and 2019, respectively. Also, the overall mean score of universities is less than 0.5; hence, in total, universities were inefficient regarding their contribution to society activities in both years. Besides, the number of universities that had a 100% or higher fulfillment rate of the objectives pertaining the social contribution activities in the university's strategic plan varied between four and seven. Although the main aim of regional development-oriented universities is to contribute to their regions' socio-economic development, the findings show that selected universities have a poor performance in contributing to society activities, in other words, partly in third mission activities.

Keyword: contribution to society; data envelopment analysis; efficiency; regional development-oriented university; university third mission

1. INTRODUCTION

Traditionally, teaching and research were the two primary missions of universities until the 1980s. The rise of the knowledge economy, globalization, and competition have led to a transformation in the mission of universities. Hence, their traditional missions have expanded, shifting from primarily teaching to research and eventually adding a third mission, labeled "contribution to society" (Compagnucci&Spigarelli, 2020; Rubens et al., 2017; Urdari et al., 2017). Batterbury&Hill (2004) states that higher education has an economic significance to future prosperity and has, with government encouragement, caused universities to embrace third mission activities alongside the more traditional ones. Hence, the third mission of universities states that, besides teaching and research, universities should contribute to the regional socio-economic development (Frondizi et al., 2019). In this sense, the main characteristic of the third mission is to promote the relationship between universities and society with the non-university stakeholders in their region (Mora et al., 2015).

Increasing with the knowledge transfer role of higher education, the third mission of universities has become more crucial than before since universities have begun

to seem like knowledge infrastructures (Kitagawa, 2004). Therefore, the third mission activities have primarily started to focus on contributing to the social, economic, and cultural development of the regions in which they operate by transferring knowledge and technologies to industry and society as a whole (De Jong et al., 2014; Secundo et al., 2017; Agasisti et al., 2019; Compagnucci& Spigarelli, 2020). Hence, the third mission activities of universities include all activities that generate, use, apply, or transfer knowledge outside the university (Molas-Gallart&Castro-Martinez, 2007; Urdari et al., 2017). As a result, contribution to the well-being of society has become a new mission of universities.

Nevertheless, contribution to society is a fuzzy and ambiguous concept in contrast to teaching and research since it has several dimensions. While the processes and structures associated with teaching and research are relatively well defined and analyzed, the case with the third mission is a complex task due to the difficulty of its implementation in practice, and measurements are not clear-cut (Papadimitriou, 2020). Schoen et al. (2006) has proposed to gather third mission activities around eight dimensions: human resources (transfer of embodied knowledge in PhD students and graduates), intellectual property (patents, copyright, etc.), spin-offs (knowledge transfer through entrepreneurship), contracts with industry, contracts with public bodies, participation in policy-making, involvement in social and cultural life (museums, sports facilities, law shops, etc.), and public understanding of science (open days, participation in sci-

entific fairs, involvement into activities directed towards children and secondary schools, etc.). Hence, the third mission activities in higher education include an extensive array of activities performed by universities. However, in sum, they can be grouped under two main dimensions: research dimension (technology and knowledge transfer, innovation, etc.) and social dimension (lifelong learning, university engagement in social and cultural life, regional development, etc.) (Mora et al., 2015; Compagnucci& Spigarelli, 2020; Frondizi et al., 2019).

In recent years, social dimension of universities' third mission has been seen in the Turkish universities' strategic plan report. In this context, the some objectives and performance criteria have been defined for improving and increasing the universities' contribution to society activities in these reports. Furthermore, the Council of Higher Education (CoHE) in Turkey has published "University Monitoring and Evaluation Reports" since 2018, composed of 42 indicators under five main categories, and one of them is labeled as "contribution to society and responsibility" category (CoHE, 2021). Similarly, the Turkish Higher Education Quality Council (THEQC) publishes "Institutional Indicator Reports" under five main headings, and one of them is "service to society" (THEQC, 2021). Therefore, it is evident that in Turkey, as in many other countries, contribution to society activities of universities have begun to be considered as performance criteria in higher education. But it is vital to note that contribution to society indicators in these two reports are only related to the social dimension of the third mission of universities such as number of social projects carried out by the university, number of people receiving training through Continuous Education Centre (CEC), number of certificates receiving through CEC, number of activities related to the social inclusion of disadvantaged groups, etc. Moreover, the CoHE has given high achievement awards in the contribution to society category since 2017 to promote the activities and projects about this issue in Turkish universities[1].

On the other hand, the CoHE started a new Project in 2016, as part of a reformative action plan in the Turkish higher education system, titled "Mission Differentiation and Specialization on the Basis of Regional Development" in partnership with the Ministry of Development. The project is dedicated to the young public universities established in Turkey in or after 2006. It aims to promote the universities' contribution to their region and encourage specialization in certain fields. Currently, this project has been conducted in 15 public universities, and they work on this project to contribute to the socio-economic development of their regions. These 15 universities were selected according to various parameters on current situation of the region and university, and measuring university-region relations. Hence, some additional budgets might be allocated to these public universities according

to their projects (CoHE, 2020). Hence, it is expected that these selected universities will more emphasize activities related to contribution to society.

Consequently, the main objective of this study is to evaluate the efficiency and performance of contribution to society activities of regional development-oriented universities in Turkey. Therefore, this paper will shed light on the efficiency and performance of contribution to society activities of these selected universities. Here we used Data Envelopment Analysis (DEA) to estimate the efficiency of contribution to society activities in 15 Turkish public universities. Therefore, when the lack of studies within the literature measuring the efficiency and performance of contribution to society activities in higher education is considered, this study might fill a gap in this area. From a policy standpoint, the findings of this study will provide managerial information and serve as a guide for regional development-oriented university administrations in Turkey in better utilizing their resources to improve and increase contribution to society activities in their region.

The remainder of this paper is organized as follows. The next section reviews the literature on efficiency and performance measurement for universities. Section three explains the methodology, and section four introduces the data. Then, empirical findings are presented in section five. Finally, the study is concluded in the last section.

2. LITERATURE

Efficiency is a critical issue for people in charge of public services, and differences in efficiency might provide information about best practices (Johnes, 2015). The relationship between one or more inputs (or factors of production) and one or more outputs is defined as efficiency (OECD, 2019). Governments and public-sector organizations are under constant pressure to improve their efficiency. As a result of their reliance on public funds, efficiency has become a significant concern in Turkish public universities.

Since universities are non-profit organizations and motivated by different goals, the efficiency measurement of universities is difficult due to its characteristic features. Firstly, universities have various inputs and outputs, so it becomes complicated to measure the impact of each input on each output separately. Secondly, universities' output cannot be measured quantitatively, such as skill development, socialization, etc. (Worthington, 2001; Engert, 1996; Günay&Yüksel-Haliloğlu, 2018; Günay&Dulupçu, 2019).

The international literature about the efficiency and performance evaluation of universities in the world and in Turkey are mostly focused on teaching (Agasisti&Bonomi, 2014; Abbott&Doucouliagos, 2003; Barra&Zotti, 2016;

[1] https://odul.yok.gov.tr/ (03.08.2021).

Mikušová, 2017; Baysal et al., 2005; Yeşilyurt, 2009) and research (Johnes&Yu, 2008; Johnes&Johnes, 1995; Munoz, 2016; Ng&Li, 2000; Günay&Yüksel-Haliloğlu, 2018; Karacabey, 2001). These studies were commonly used the non-parametric DEA method to measure the universities' teaching or research efficiency. Although Charnes, Cooper,&Rhodes (CCR) (1978) developed the CCR DEA method to measure the efficiency of non-profit public institutions, Tomkins&Green (1988) firstly used this method to measure the universities' efficiency.

However, in the present literature, less attention has been devoted to identifying, analyzing, and measuring universities' contribution to society activities (Giuri, 2019). Two reasons might explain this reluctance: rankings and difficulties in measuring contribution to society activities (Glaser, O'Shea,&Chastenet de Gery, 2014). Frondizi et al. (2019) showed that the weight of activities related to contribution to society mission of universities in the leading international rankings is marginal or non-existent. This situation refers to indicators related to contribution to society mission are not much used to evaluate or compare universities.

For instance, Urdari et al. (2017) investigated the types of measurements used by international university rankings and their connection to universities' contribution to society mission activities. Besides, Rubens et al. (2017) examined how universities fulfill their third mission as entrepreneurial universities. Moreover, Krcmarova (2011) summarized the process of conceptualizing the third mission of universities, and practical possibilities of data collection within the generated conceptual framework in the Czech higher education system were estimated. Jaeger&Kopper (2014) implied that if universities engage in third mission activities, the traditional missions are focused more on the surrounding regional environment, and the university region. Knudsen, Frederiksen,&Goduscheit (2019) captured existing knowledge of universities' third mission activities and identified five different models of how universities seek to fulfill the third mission. Nevertheless, it is important to note that they are not a direct performance measurement studies for the contribution to society activities in higher education.

3. METHODOLOGY

DEA is a linear programming based technique aimed at measuring the relative performances of decision-making units (DMUs) when it is challenging to compare inputs and outputs having different measurement units or measured by multi-scale (Karacaer, 1998). This method is used to compare the production performance of enterprises by handling multiple inputs and outputs simultaneously, something that cannot be measured using classical regression analysis (Baysal et al., 2005). DMUs are the organizations that are being evaluated in terms of efficiency, and DEA measures relative efficiency rath-

er than absolute efficiency at any particular time (Atan, 2003). DMUs must be homogenous organizations that use the same inputs to produce the same outputs, have the same goals, and operate in the same field (Oruç et al., 2014).

DEA model in this study is formulated concerning the constant returns to scale assumption. Therefore, in the CCR DEA model, it is assumed that when inputs are increased proportionately without changing the composition ratio of DMUs' inputs, outputs will also increase by the same ratio (Oruç et al., 2014). There are n DMUs to evaluate and each DMU has m inputs and s outputs. An output-oriented model was set to reach the optimum level of contribution to society output while not changing universities' inputs related to contribution to society mission since an output-oriented model focuses on maximizing outputs while maintaining the same level of input (Matthews&Mahadzir, 2006; Oruç et al., 2014). The mathematical expression of the CCR DEA model for output is as follows (Charnes, Cooper, Lewin,&Seiford, 1994):

$$Min\, h_k = \sum_{k=1}^{m} v_{ik} X_{ik}$$

Constraints:

$$\sum_{r=1}^{s} u_{rk} Y_{rk} - \sum_{i=1}^{m} v_{ik} X_{ij} \leq 0; k = 1,.....,n$$

$$\sum_{i=1}^{m} u_{rk} Y_{rk} = 1$$

$$u_{rk} \geq \varepsilon > 0; r = 1,.....,s$$

$$v_{ik} \geq \varepsilon > 0; i = 1,.....,m$$

where the k_{th} DMU uses x_{ik} units of input i to produce y_{rk} units of output r and their weights are shown by v_{ik} and u_{rk}, respectively.

4. DATA

Fifteen young public universities were established in or after 2006, labeled as regional development-oriented universities by the CoHE in Mission Differentiation and Specialization on the Basis of Regional Development in Turkey Project. These universities were selected as DMUs for this research since the objective of these universities is to promote the universities' contribution to society activities in their region and encourage specialization in certain fields. In other words, the aims of these universities are consistent with the theory of the contribution to society mission of universities. The data set for the 2018 and 2019 years was used to evaluate the relative efficiency of contribution to society activities of these universities. The inputs and outputs taken into account in this study are listed in Table 1.

The academic personnel and student data were taken from Higher Education Statistics published by the CoHE (CoHE, 2021a). While the total number of academic

Table 1. Inputs and Outputs

Inputs	Outputs
- Number of academic personnel (total) - Number of students (total) - University budget (total)	- Number of social responsibility projects - Number of certificates issued by the CEC and LC

Table 2. Contribution to Society Efficiency Scores of Universities

University	Selection Year for the Project	Foundation Year	Efficiency Score (2018)	Efficiency Score (2019)
Aksaray University	2018	2006	0.578	0.186
Artvin Coruh University	2020	2007	0.108	0.173
Bartin University	2020	2008	0.361	0.400
Bingol University	2016	2007	0.181	0.067
Burdur Mehmet Akif Ersoy University	2016	2006	1.000	1.000
Duzce University	2016	2006	1.000	1.000
Hitit University	2020	2006	0.272	0.122
Kastamonu University	2018	2006	0.287	0.192
Kirklareli University	2020	2007	0.309	0.127
Kirşehir Ahi Evran University	2016	2006	0.207	0.528
Muş Alparslan University	2018	2007	1.000	0.510
Recep Tayyip Erdogan University	2018	2006	0.641	0.106
Siirt University	2018	2007	0.120	0.139
Usak University	2016	2006	0.374	0.126
Yozgat Bozok University	2020	2006	0.718	0.122
Mean			0.477	0.320
E = 1			3	2
E < 1			12	13

personnel refers to all academic personnel work in the university, the total number of students is composed of all undergraduate and graduate students. Turkish public universities are funded through the annual central government budget. The total budget amount of universities was obtained from the National Education Statistics published by the Ministry of National Education (MoNE) (MoNE, 2018 and 2019). Contribution to society indicators are published in "University Monitoring and Evaluation Reports" by the CoHE. There are eight indicators in this report for "contribution to society and responsibility" category, but only two of them can be used due to the VAR model rule. The relationship between the number of universities and the number of inputs and outputs was determined by a rule as $[(m+s) \leq n/3]$, where m is the number of inputs, s the number of outputs, and n the number universities (Banker et al., 1984). Regarding this, the university's number of social projects and the number of certificates given through CEC and Language Center (LC) were used as output in this study (CoHE, 2021b). The one reason why these two outputs were chosen among others is the data availability. The other one is that in contribution to society activities of universities in Turkey are conducted mainly by the CEC. In addition, the DEA calculations were carried out using the Win4DEAP software package program developed by Coelli (1996).

5. EMPIRICAL FINDINGS

Efficiency analysis results about the contribution to society activities of regional development-oriented universities in Turkey are presented in Table 2. In terms of the contribution to society efficiency, universities' mean score in 2019 was 0.320, lower than the value of 0.477 in 2018. Also, the number of relatively efficient universities in terms of contribution to society activities was only three and two out of 15 universities in 2018 and 2019, respectively. As a result, the overall efficiency of regional development-oriented universities related to contribution to society activities declined between 2018 and 2019. Moreover, while nine universities efficiency score was below the mean value in 2018, this number was ten in 2019. Although Burdur Mehmet Akif Ersoy University and Duzce University were relatively efficient in both years, Mus Alparslan University was only efficient in 2018 in terms of the contribution to society activities. Thus, it is obvious that both human and financial resources have not been used efficiently for the activities related to contribute to society in the regional development-oriented universities in Turkey. However, the findings also show

no direct positive relationship between the universities' selection year for the project and the efficiency scores.

Table 3 displays the universities' percentage of fulfilling of the objectives pertaining to the social contribution activities in the university's strategic plan in both 2018 and 2019, which is named one of the quality assurance indicators in the THEQC "Key Indicators Report". Public Finance Management and Control Law numbered 5018 came into force with all its provisions in January 2006 in Turkey2. Hence, public universities in Turkey are assumed as special budget administrations, and it is obligatory to prepare performance-based budgeting based on the strategic plan in all public universities in Turkey (Günay&Dulupçu, 2019). The values in Table 3 show that all regional development-oriented universities have at least a 50% fulfillment rate for their contribution to society activities in their strategic plans except Duzce University (36.66%) in 2019. Although seven universities (Aksaray University, Bingöl University, Burdur Mehmet Akif Ersoy University, Kirklareli University, Kirsehir Ahi Evran University, Mus Alparslan University and Usak University) have 100% or higher fulfillment rate in 2018, this number fell to four (Aksaray University, Burdur Mehmet Akif Ersoy University, Kirsehir Ahi Evran University and Mus Alparslan University) in 2019. Hence, they might be named the best performing regional development-oriented universities for contributing to society activities in 2018 and 2019. Additionally, except four universities (Burdur Mehmet Akif Ersoy University, Kirsehir Ahi Evran University, Mus Alparslan University and Siirt University), the regional development-oriented universities' fulfillment rate for the contribution to society activities in their strategic plans declined between in

Table 3. Percentage of the fulfillment of the objectives pertaining to the social contribution activities in the university's strategic plan (%)

University	2018	2019
Aksaray University	780.66	674.33
Artvin Coruh University	na	59.33
Bartın University	63	61.7
Bingol University	100	69.79
Burdur Mehmet Akif Ersoy University	105.6	387.04
Duzce University	71.43	36.66
Hitit University	78	64
Kastamonu University	na	50
Kirklareli University	141.33	na
Kirşehir Ahi Evran University	100	100
Mus Alparslan University	100	100
Recep Tayyip Erdogan University	60	51.37
Siirt University	80	82
Usak University	811.59	76.92
Yozgat Bozok University	63	58

Source: THEQC (2021)
na: not available

2018 and 2019. Furthermore, it is important to note some universities do not have data about this issue.

When we compare the findings in Tables 2 and 3, it might be said that both the efficiency and performance of regional development-oriented universities activities' in contributing to society mostly fell from 2018 to 2019. On the other hand, Burdur Mehmet Akif Ersoy University efficiently used their human and financial inputs for contribution to society activities. It is one of the best performing universities in terms of contribution to society activities among the regional development-oriented universities. Although Duzce University was relatively efficient in both years, it displayed poor performance according to the implementation of contribution to society activities in 2019. In contrast, although Mus Alparslan University had a 100% fulfillment rate in conducting the social contribution activities in both years, and it was inefficient in 2019.

6. CONCLUSION

This paper evaluated the efficiency and performance of contribution to society activities of 15 regional development-oriented public universities in Turkey in 2018 and 2019. DEA method was applied to measure the efficiency of contribution to society activities. The results show that only two or three universities out of 15 were efficient relative to others considering existing human and financial inputs as conducting activities related to contribution to society. Moreover, four or seven universities had a 100% or higher fulfillment rate of the objectives about the social contribution activities in the university's strategic plan. Besides, the findings indicate that there was no direct positive relationship between the universities' selection year for the project and the efficiency scores. Therefore, it can be concluded that regional development-oriented universities in Turkey do not have effective policies to improve their efficiency and productivity of contribution

to society activities. This result contradicts with the objective and mission of these universities. The CoHE and regional development-oriented universities should consider some measurements to improve the performance of related universities' contribution to society activities to achieve the desired goal. The efficient use of inputs and their performance in contributing to society activities is an important issue.

Furthermore, universities should give importance to data collection in order to measure the efficiency and performance of contribution to society activities. With the lack of data in this area, it is difficult to assess current practices and develop policies to improve contribution to society activities. The CoHE's "University Monitoring and Evaluation Reports" and the THEQC's "Key Indicators Report" provide data for some activities, but they might be expanded or improved. Lastly, increasing the weight of contribution to society activities in the leading international rankings might be beneficial to improve the efficiency and performance of universities in this area.

On the other side, the results might be improved by diversifying data. More variables such as other activities related to the universities' contribution to society activities in the CoHE and THEQC reports can be added to the estimation model. Since these two reports are only related to the social dimension of the third mission of universities in Turkey, research dimension activities regarding the third mission of universities might be included to model. Additionally, future research should embrace a larger sample size since this study focused only on regional development-oriented universities in Turkey. Lastly, the findings of this study might be expected to provide critical administrative information to the university administrations about their contribution to society activities.

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