GAZİANTEP ÜNİVERSİTESİ
Spor Bilimleri Dergisi

Cilt / Vol: 9, Sayı / Issue: 2
December / Aralık, 2024
ISSN: 2536-5339

Activities of Sports High Schools in Turkey: Evaluation with Data Envelopment Analysis and Determination of Improvement Targets**

İlkay ELİBOL[1] Özer YILDIZ *[1]

[1] Necmettin Erbakan Üniversitesi, Ahmet Keleşoğlu Eğitim Fakültesi, *KONYA*

10.31680/gaunjss.1580081

Orijinal Makale / Original Article

Geliş Tarihi / Received: 05.11.2024 **Kabul Tarihi / Accepted:** 25.12.2024 **Yayın Tarihi / Published:** 27.12.2024

Abstract

The aim of the research is to evaluate the effectiveness of sports high schools in Turkey that are similar in quality, non-thematic, and comparable to each other, using the data envelopment analysis method. The sample of the research consisted of 8 sports high schools that had graduated in 4 years or more, and the activities of these high schools in the 2021-2022 Academic Year were evaluated. The Frontier Analyst program has been used in the analysis of the data. In order to conduct the analysis, the student, teacher, classrooms, gym, placement rates of higher education institutions providing sports education and inputs and outputs of the sports high schools constituting the sample were processed. Sports high schools with similar characteristics were examined in two output-oriented models suitable for both constant and variable scale returns, in accordance with the CCR and BCC models. As a result of the research, it was determined that 4 out of 8 sports high schools were effective in the CCR model and 6 out of 8 sports high schools were effective in the BCC model. As a result of the profiles of the students placed in sports high schools and the infrastructure levels obtained, it has been determined that among the schools providing education in similar qualified schools, the schools with fewer students have deficiencies in fields, facilities and materials, but they tolerate this situation, and this tolerance occurs when the number of teachers is sufficient. It has been determined that the general academic success of the students is not very good, many of them cannot reach the scores required to enter another higher education institution outside their own field, and they are more likely to enroll in higher education in physical education and sports, which are their main goals.

Keywords: Sports High Schools, Activity, Data Envelopment Analysis, Output Orientation

Türkiye'de Spor Liselerinin Etkinlikleri: Veri Zarflama Analizi ile Değerlendirilmesi ve İyileştirme Hedeflerinin Belirlenmesi

Öz

Araştırmanın amacı Türkiye'deki spor liseleri arasında benzer nitelikli, tematik olmayan, birbiri ile karşılaştırması mümkün liselerin veri zarflama analizi yöntemi ile etkinliklerinin değerlendirilmesidir. Araştırmanın örneklemini 4 yıl ve üzerinde mezun vermiş 8 spor lisesi oluşturmuş ve bu liselerin 2021-2022 Eğitim Öğretim Yılı sürecindeki etkinlikleri değerlendirilmiştir. Verilerin analizinde Frontier Analyst programından yararlanılmıştır. Analizleri yapabilmek amacıyla örneklemi oluşturan spor liselerinin öğrenci, öğretmen, derslikler, spor salonu, spor eğitimi veren yükseköğretim kurumlarına yerleşme oranları ile girdi ve çıktıları işlenmiştir. Benzer nitelikleri olan spor liseleri CCR ve BCC modellerine uygun olarak hem sabit hem de değişken ölçek getirisine uygun iki modelde çıktı yönelimli incelenmiştir. Araştırma sonucunda, CCR modelde 8 spor lisesinden 4'ünün etkin olduğu, BCC modelde ise 8 spor lisesinden 6'sının etkin olduğu belirlenmiştir. Spor liselerine yerleşen öğrencilerin profilleri ve elde edilen altyapı düzeyleri neticesinde benzer nitelikli okullarda eğitim veren okullar arasında öğrenci sayıları az olan okulların saha, tesis ve malzeme eksiklikleri olduğu ancak bu duruma tahammül ettikleri, bu tahammül durumunun öğretmen sayıları yeterli düzeyde iken gerçekleştiği tespit edilmiştir. Öğrencilerin genel akademik başarılarının pekiyi olmadığı, birçoğunun kendi alanları dışında başka bir yükseköğretim kurumuna giriş için yeterli puanlara ulaşamadığı, temel hedefleri olan beden eğitimi ve spor alanlarında yükseköğretime daha çok yerleştikleri belirlenmiştir.

Anahtar Kelimeler: Spor Liseleri, Etkinlik, Veri Zarflama Analizi, Çıktı Yönelimi

Sorumlu Yazar: Özer YILDIZ **E-mail:** oyildiz@konya.edu.tr

**This study is derived from a master's thesis submitted to the Graduate School of Educational Sciences at Necmettin Erbakan University.

Giriş

As stated in the framework of the National Education Fundamental Law; one of the most fundamental duties of schools is to prepare students for higher education or life and business fields in accordance with their talents, interests and abilities through various educational programs and schools. The development of national education is in line with the social, economic and cultural development goals, and education-manpower-employment relations are taken into consideration and standards regarding the personnel, buildings, facilities, equipment, tools and capacities of educational institutions are determined, and institutions are established in the most appropriate size according to these standards and are operated effectively (MEB, 1973). Based on these statements, using various resources in line with various goals in the education-training process, trying to be efficient and effective while doing these, and being able to see and eliminate deficiencies are extremely essential in terms of education management.

Institutions that are established and try to operate for a specific purpose can continue their existence if they can achieve these goals (Kaya, 1993). The degree to which the purposes are realized is an indicator of effectiveness (Aydın, 2010). Therefore, the high effectiveness of an institution is an indicator that it has achieved its purposes and is taking the right action. One of the basic purposes of educational institutions is to increase their effectiveness in an institutional sense. In other words, to take actions to ensure that the school reaches the desired and expected goals (Başar, 1995).

The resources that schools need in order to achieve their goals, namely inputs, are at the most reasonable level: human resources (students, teachers, administrators, civil servants, other employees), information technologies, institutional stakeholders (collaborating institutions, parents, community members), educational environments, curriculum, written sources (textbooks, teacher books, other sources), buildings, classrooms, facilities, guidance services, attitudes and values, and readiness levels. It is the duty of schools to bring together these and similar multiple input factors and transform them into various outputs using these factors. Some of these outputs can be listed as academic success, knowledge, skills, attitudes, behaviors, achievements in central exams, achievements in sports and social fields, cognitive gains (Knowledge,

comprehension, analysis, synthesis, evaluation, production), psychomotor gains, attitudes and values (Göksoy, 2018).

In order to measure the level of reaching the goals and objectives, efficiency and effectiveness of schools by using their resources effectively in line with similar goals and objectives and to determine what needs to be done to increase the efficiency of ineffective schools, obtaining concrete data by conducting efficiency analyses allows institutions to continue their functioning and establishment purposes. For this reason, in this research, by conducting relative efficiency analyses of sports high schools, effective and ineffective sports high schools are determined, and the types of deficiencies of schools outside the efficiency limit and what needs to be done to eliminate these deficiencies constitute the problem status of the research.

This research will provide the demonstration of the performance levels that sports high schools with the same status can reach while achieving the same goals and objectives. Data Envelopment Analysis will define schools that use their resources best as effective decision-making units and will show the output amounts required for ineffective schools to be effective. It will be demonstrated how effectively sports high schools can benefit from similar inputs, and together with the demonstration of relative efficiencies, it will be possible to see what the deficiencies are and what can be done to eliminate these deficiencies. The problems in the performances of schools with similar infrastructure and facilities being different will be compared with the target outputs and the use of the inputs they are dependent on will be questioned.

It is to ensure that sports high schools with similar infrastructure and inputs identify their deficiencies within the scope of education and training activities and that the outputs required to take part in an effective scale create realistic targets. The fact that the targets are correct and realistic means that the primary targets are reachable. It benefits motivation, institutional success, increasing preferability and increasing students' expectations due to the fact that the effectiveness criterion can be achieved with reachable targets. The ability of administrators to take the right steps with school stakeholders, to make their evaluations and plans correctly will facilitate their effectiveness. In this context, the effectiveness analysis of sports high schools in Turkey will ensure that the number of students who will transfer to higher education, academic success targets and continuity in vocational training are at a realistic and reachable level.

Method

Research Model

This study aims to measure the efficiency of sports high schools operating in Turkey and to determine improvement targets. In the study, in comparing multiple input and output factors, data envelopment analysis, one of the programming methods, was used for quantitative data obtained from schools. Data envelopment analysis is a method that determines the efficiency limit according to the most effective decision-making units and reveals the deficiencies of decision-making units outside the efficiency limit (Yolalan, 1993).

The output-oriented model was preferred from the input and output-oriented models used in data envelopment analysis. According to this model, an increase in output is expected while the input amount is constant.

Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA), used for efficiency measurement purposes, takes its name from the fact that an efficiency frontier is located at any point on the production possibilities set, and the remaining decision units are below or above these points formed by the production possibilities set. In mathematical language, this point frontier is derived from the expression of the envelopment of decision units (Cooper, Seiford, & Tone, 2007). DEA is a nonparametric method based on linear programs that enables institutions, businesses or firms responsible for converting inputs into output to measure relative efficiency. The institutions, firms or companies in question are called Decision Making Units (DMUs). The DEA method determines the weights of multiple inputs and outputs according to their importance levels and creates the efficiency limit, allowing the comparison of whether the decision-making units are effective or ineffective. The efficiency limit is a set of all the possibilities that will be used in production. If all the possibilities are fully used, the efficiency score is defined as 1. In other words, it is said to be 100% efficient. The efficiency scores of institutions or firms that cannot use all the possibilities are below 1 and are stated as inefficient. Many efficiency analyses have been made about institutions and organizations using DEA.

The most basic measure of efficiency in Data Envelopment Analysis is expressed as the ratio of total weighted outputs to total weighted inputs. When the efficiency measure for any Decision Making Unit (DMU) is shown on a formula;

$$\frac{u_1y_1 + u_2y_2 + \cdots \ldots + u_ny_n}{v_1x_1 + v_2x_2 + \cdots \ldots + v_mx_m}$$

j. decision unit

n: outputs

m: inputs

un: weight for n. output

yn: n. output size

vm: m. input weight

xm: amount of m. input (total)

In DEA, methods such as CCR or BCC can be analyzed as output or input oriented. In the approach where inputs are focused, when the amount of output is fixed, the inputs are expected to be at the minimum level, while in the output oriented approach, when the amount of inputs is fixed, the outputs obtained are expected to be at the maximum level (Cooper, Seiford, & Tone, 2007).

Research Group

In the selection of sports high schools subject to the research, sports high schools that have graduated in 4 years or more were preferred. A total of 8 sports high schools that submitted their data and were valid are included in the study. The sports high schools listed below were included in the scope of the research and their activities in the 2021-2022 Academic Year were analyzed.

The schools included in the research and the letter codes given in the findings are as follows:

A: Şehit Hakan Yorulmaz Sports High School - Yahşihan/KIRIKKALE

B: Kars Sarıkamış Sports High School - Sarıkamış/KARS

C: Şehit Ahmet Mehmet Oruç Sports High School - Seyhan/ADANA

D: Adana Sarıçam Sports High School - Sarıçam/ADANA

E: Antalya Sports High School - Kepez/ANTALYA

F: Çorum Sports High School – Center of city/ÇORUM

G: Batman Sports High School - Center of city/BATMAN

H: Şehit Ferhat Erdin Sports High School - Center of city /AMASYA

Data Collection Tools and Techniques

The data to be used in the research was requested directly from the schools that were the subject of the study. Again, the current data was obtained from the schools' own websites with the approval of the directorate they were affiliated with. In the light of the information in the problem situation, the data on the input and output elements of education and training activities, which are the subject of the literature and much easier to obtain directly, were requested from the relevant school directorates within the scope of the dates included in the research permit. The schools' own websites also formed a secondary source for the collection of data by confirming the current data from the schools on the website. Since there is no element requiring an ethics committee decision in obtaining the data, there is no information specific to individuals or persons in the schools. Accordingly, the data obtained directly from the schools can be listed as follows:

- Number of students in the final year of sports high schools and students who can graduate
- Number of teachers in schools
- Number of classrooms in schools
- Number of gyms in schools
- The number of placements of students in their final year in higher education institutions that provide sports education.

Data Collection Process

After the institute notified that an ethics committee decision was not required for the research according to the ethics committee decision numbered 2022/7 dated 14.01.2022, the relevant directorates were contacted by obtaining research permits numbered E-62045208-605.01-55046278 dated 09.08.2022. The data subject to the thesis were obtained from the schools included in the research permit, via e-mail, telephone calls and the official websites of the schools.

In the request for research permission planned to be obtained from the Ministry of Education, schools that have graduated in the last 4 academic years were included, and the number of sports high schools to receive research permission and conduct research was determined as 18. While there is no change in the inputs among the factors determined as input and output, the research does not have exact numbers in the outputs due to the fact that the schools do not have grade data for the previous

years after the graduation of the students, different scoring types at university entrances and participation in the track and field exams of the departments of higher education institutions that provide sports education after graduation. It had to be cleared of outputs that would affect its reliability. In addition, while the data of the last 4 years was to be requested in the selection of the schools to be the subject of the research, only the 2021-2022 Academic Year was taken as basis due to similar reasons. In this context, total factor efficiency and reasons for variability by year were also excluded from the research. During the process of requesting data from the schools, it was observed that the information on the websites was mostly incorrect. More than half of the schools did not respond to the e-mails in the contact information section. Again, the same number of schools could not be reached by phone throughout the year, and no feedback was provided. In total, 8 schools that were the subject of the study sent their data in detail. However, confirmation of the information on the websites was requested and the data that was found inappropriate or incorrect was excluded from the study.

Data Analysis

The Frontier Analyst Package program used for DEA was used to analyze the data. The data used as input for the analysis:

- Number of students in the final grades
- Number of teachers
- Number of classrooms
- Number of gyms.

The data to be used as output is:

- The number of students placed in higher education institutions that provide sports education.

In the analysis of data, it is undesirable to see the input factors as earned values and to decrease them, on the contrary, it is desired to increase them. Since increasing, developing and improving the number of teachers, students, classrooms and other input factors nationwide will be among the targets, expecting the increase of output factors means that the study will reveal more accurate results. For this reason, both the output-oriented CCR model based on the assumption of constant returns and the BCC model providing variable returns to scale were applied in an output-oriented manner.

Results

This section includes the results of the statistical analyses performed on the research data. Table 1 shows the results of the correlation values of inputs and outputs in measuring the activities of sports high schools.

Table 1. Correlation Values of Inputs and Outputs in Measuring the Efficiency of Sports High Schools

	Teacher	Student	Classroom	Gyms
Admission to Higher Education Institutions providing sports education	+0,93	+1	+0,96	+0,8

Table 1 shows the correlation values between the inputs (number of teachers, students, classrooms, and gyms) and the outputs (number of students entering higher education institutions that provide sports education). As a result of the analysis, the correlation values were determined as (+0.93) for teachers, (+1) for students, (+0.96) for classrooms, and (+0.8) for gyms. In total, the correlation value constituted a sufficient security indicator for the research.

Table 2 shows the letter codes of sports high schools and the numerical values of input and output factors.

Table 2. Letter Codes of Sports High Schools and Numerical Values of Input and Output Factors

Schools	Teacher	Student	Classroom	Gym	N.P.H.E.I.P.S.E
A	22	50	2	5	25
B	16	39	2	1	14
C	39	118	5	15	20
D	34	112	4	5	44
E	27	74	4	1	20
F	21	40	2	1	17
G	13	56	2	1	18
H	7	25	1	1	13

Input: Teacher, Student, Classroom, Gym **Output:** N.P.H.E.I.P.S.E

N.P.H.E.I.P.S.E: Number of placements in higher education institutions providing sports education

Table 3 includes the input (teachers, students, classrooms, gym) and output (number of students placed in higher education institutions providing sports education) data of sports high schools and the relative efficiency scores analyzed in the output-oriented CCR model.

Table 3. Relative Efficiency Scores Solved in Output-Oriented CCR Model with Input (Teacher, Student, Classroom, Gym) and Output (Number of Students Placed in Higher Education Institutions Providing Sports Education) Data of Sports High Schools

Units	Comparison 1	
Unit name	Score	Efficient
A	96,2%	
B	86,7%	
C	32,6%	
D	84,6%	
E	100,0%	✓
F	100,0%	✓
G	100,0%	✓
H	100,0%	✓

The input and output values given in Table 2 were analyzed in an output-oriented manner in the CCR model, and the efficiency scores of sports high schools expressed with letter codes are shown in Table 3.

Table 4 shows the current input and output values and target output values of ineffective schools analyzed in the output-oriented CCR model of sports high schools

Table 4. Current Input and Output Values and Target Output Values of Ineffective Sports High Schools Solved in Output-Oriented CCR Model

96,15% A

Potential Improvements

Variable	Actual	Target	Potential Improvement
Classroom	2,00	2,00	0,00 %
Gym	5,00	2,00	-60,00 %
NPHEIPS	25,00	26,00	4,00 %
Student	50,00	50,00	0,00 %
Teacher	22,00	14,00	-36,36 %

86,67% B

Potential Improvements

Variable	Actual	Target	Potential Improvement
Classroom	2,00	1,74	-12,79 %
Gym	1,00	1,00	0,00 %
NPHEIPS	14,00	16,15	15,39 %
Student	39,00	39,00	0,00 %
Teacher	16,00	16,00	0,00 %

32,59% C

Potential Improvements

Variable	Actual	Target	Potential Improvement
Classroom	5,00	4,72	-5,60 %
Gym	15,00	4,72	-68,53 %
NPHEIPS	20,00	61,36	206,80 %
Student	118,00	118,00	0,00 %
Teacher	39,00	33,04	-15,28 %

84,62% D

Potential Improvements

Variable	Actual	Target	Potential Improvement
Classroom	4,00	4,00	0,00 %
Gym	5,00	4,00	-20,00 %
NPHEIPS	44,00	52,00	18,18 %
Student	112,00	100,00	-10,71 %
Teacher	34,00	28,00	-17,65 %

Table 3 and Table 4 show the current and required target values for schools with ineffective efficiency scores, based on the results of the output-oriented analysis with the CCR model.

The decision unit with code A is very close to the limit of being efficient. In the target value data, when the number of students who are accepted to higher education institutions that provide sports education is increased by 1, it is seen as fully efficient. While the current number of students who are accepted to higher education institutions that provide sports education is 25, the target efficient value is 26.

While the efficiency score of decision unit B is 86.7%, the number of students accepted to higher education institutions providing sports education is 14 and the target output value is 16+.

Decision unit C was determined as the school with the lowest value. In order for the 32.6% efficiency score to be effective, the number of entrances to higher education institutions providing target sports education out of 118 students in the final year is 61. The current value is 20.

D decision unit is another ineffective decision unit. 44 out of 112 students with 84.6% efficiency score entered higher education institutions that provide sports education. The target value is 52.

Sports high schools with codes E, F, G and H are considered fully active.

Table 5 includes the input and output data of sports high schools and the relative efficiency scores analyzed in the output-oriented BCC model.

Table 5. Relative Efficiency Scores Solved in Output-Oriented BCC Model with Input and Output Data of Sports High Schools

Units	Comparison 1	
Unit name	Score	Efficient
A	100,0%	✓
B	86,7%	
C	45,5%	
D	100,0%	✓
E	100,0%	✓
F	100,0%	✓
G	100,0%	✓
H	100,0%	✓

In Table 5, in the results obtained with the BCC model, that is, according to the assumption of varying returns to scale approach, there are differences in efficiency values compared to the CCR model.

Efficiency scores were determined to be effective for decision unit A in the BCC model, 86.7% for decision unit B, and 45.5% for decision unit C. Decision units D, E, F, G, and H were also determined to be effective. The variable returns to scale system, which was created by taking into account the similarities in the reference decision units, re-evaluated the reference sets, reducing the number of inefficient decision units while increasing the efficiency values.

Table 6 shows the current input and output values and target output values of ineffective schools analyzed in the output-oriented BCC model of sports high schools.

Table 6. Current Input and Output Values and Target Output Values of Inefficient Sports High Schools Solved in Output-Oriented BCC Model

86,67% B

Potential Improvements

Variable	Actual	Target	Potential Improvement
Classroom	2,00	1,74	-12,79 %
Gym	1,00	1,00	0,00 %
NPHEIPS	14,00	16,15	15,39 %
Student	39,00	39,00	0,00 %
Teacher	16,00	16,00	0,00 %

45,45% C

Potential Improvements

Variable	Actual	Target	Potential Improvement
Classroom	5,00	4,00	-20,00 %
Gym	15,00	5,00	-66,67 %
NPHEIPS	20,00	44,00	120,00 %
Student	118,00	112,00	-5,08 %
Teacher	39,00	34,00	-12,82 %

According to the results obtained from the model reports, when the CCR and BCC models are considered together, the H decision unit has the highest reference value for the effective decision units in the reference set. It has 5 reference points for CCR and 2 reference points for BCC.

When the CCR inactive decision units are considered; the H decision unit is taken as the reference in all the numbers of students, teachers, classrooms, gym and higher education institutions providing sports education.

When the BCC ineffective decision-making units are considered, it is seen that it creates reference points for itself and decision-making unit B over all inputs and

outputs. Based on all these, it can be said that decision-making unit H is strongly effective.

Discussion and Conclusion

The CCR efficiency criterion of sports high schools, which is the subject of the research, can be described as a pure efficiency indicator. The efficiency criterion is an analysis that is used to make decisions in line with the results obtained among similar institutions, organizations or similar input-output focused systems. 171 out of 517 students from the schools subject to the efficiency analysis entered higher education institutions that provide sports education.

As seen in Table 2, when the values belonging to the A decision unit are examined, there are 50 students and 22 teachers. There are 25 students per class in the school with 2 classrooms. The technical facilities in the school are above average compared to other schools. According to Table 3, the efficiency score of the A decision unit is seen as 96.2% and the current and target values are given in Table 4. While the university entrance value indicating entrance to higher education institutions providing sports education is 25, the target value is seen as 26. It is the school that is outside the efficiency limit among the other decision units and is closest to the efficiency limit. If the school given with the letter code A had placed 1 more student in the higher education institution, it would have been among the CCR effective schools. When the strategic plan and teacher evaluations on the school website belonging to the A decision unit are examined, it is generally stated that the students are successful in sports areas but their attitudes towards the course are weak. This situation can be interpreted as the students' interest in sports is higher than their interest in the course. It can also be said that the students take academic success into less consideration. In studies supporting the research findings, Kargın Göktaş (2019) determined that sports high school students' attitudes towards school were low but their attitudes towards sports were high; Genç et al. (2013) found that sports high school students stated that numerical courses were difficult and that they did not care enough about these courses, but they both cared about courses related to the field of sports and wanted to be successful in these courses.

When Table 2 is examined, there are 39 students, 16 teachers and 2 classrooms for decision unit B. The sports gym consist of 1 open basketball court as stated. The

number of teachers is sufficient, but the number of students appears to be below the school strategic plan and the determined capacity. According to Table 3 and Table 4, the efficiency score is 86.67% and the number of students entering higher education institutions providing sports education is 14. In order to create the efficiency score, it is necessary to send 16 or more students to higher education institutions providing sports education with the same inputs. The reasons for being far from the efficiency limit can be shown as; sports high schools are at the bottom of the list of students' school preferences, and while the entrance scores are sufficient for the track, the general high school entrance scores are quite low. On the other hand, it is seen that the entrance grade to higher education institutions providing sports education is above the general average. It is thought that the number of classrooms affects the result outside the definition of technical efficiency and the main reason for this is the low number of students.

According to the data in Table 2, decision-making unit C obtained the number of higher education entrance exams with 39 teachers, 118 students, 5 classrooms, 15 gyms and 20 of its students providing sports education.

In Table 3, it was determined that the C decision unit was at the lowest level with an efficiency score of 32.59% in the CCR model. This situation was included in the school strategic plan. Students' interest in lessons and their interest in sports and games are inversely proportional. While the C decision unit has sufficient teachers, students, classrooms and sports areas, it has the lowest placement rate in higher education institutions that provide sports education. At the same time, the inverse relationship between academic and sports success can be attributed to factors such as the school frequently producing professional players and having high rates in cup winnings.

According to Table 2 and Table 3, D decision unit has 112 students, 4 classrooms, 34 teachers, 5 sports areas that can be used for different purposes, and has an efficiency score of 84.62% for the CCR model by placing 44 students in higher education institutions that provide sports education. Again, as in C decision unit, although it has sufficient inputs and opportunities, it is expected to be effective only by sending the target value of 52 students to higher education institutions that provide sports education according to Table 4. D decision unit, which has similar

characteristics and a similar climate structure with C decision unit, needs to be able to place 8 more students in higher education institutions in order for CCR to be effective.

According to Table 5 and Table 6, BCC inefficient schools are sports high schools with codes B and C. In the CCR model, the decision unit A, which is outside the efficiency limit, is seen as efficient in the BCC model. In the BCC method, which is based on the assumption of variable returns to scale, the result close to the efficiency score in the CCR method is shown directly on the efficiency limit.

When Table 5 and Table 6 are examined, it is seen that B decision unit is 86.67% efficient and C decision unit is 45.45% efficient, respectively. While the target values do not differ with the CCR model for B decision unit, the number of higher education placements for C decision unit was reduced from 61 in the CCR model to 44. D decision unit reached 100% efficiency score in the BCC model from 84.6% in the CCR model. Although B decision unit is more efficient in the CCR model compared to D decision unit, it almost did not change its efficiency score according to the BBC model based on the variable returns to scale assumption. The reason for this situation is the inverse relationship between the number of students and the number of classrooms. Since the insufficiency of the input factor should remain constant in the output-oriented model, it kept the efficiency value constant due to the knowledge that other schools cannot reach the relative output numbers.

When the research findings are evaluated in general, although it is directly proportional to the university placement averages when all secondary education institutions in Turkey are taken as basis, apart from this situation, there is no entry to higher education institutions that provide sufficient sports education in sports high schools that are specialized in sports and expected to reach sufficient skill levels in terms of entering the physical education and sports departments of universities. The high school entrance scores of students who enter sports high schools are not high. Placement is in line with sports and talents. The same situation is valid for universities. Although it is expected that students who enter sports high schools will be placed in higher education institutions that provide higher level sports education with the same knowledge, it has been observed that this result has not been achieved. In a study supporting the research findings, Çakır (2016) stated that sports talent is required in the entrance exams for sports high schools, but it is also important to develop the academic success criterion effect in order to ensure both success at school and

success in continuing higher education after school. Maehr and Meyer (1997) stated that the first steps in achieving academic success start with basic level achievements, that the work done correctly is approved and motivated towards success, and that the student's belief in success increases with appreciation.

In this context, in sports high schools, where students enter with low high school entrance scores but where sports skills are tested at a higher rate, improvements can be made in course content and achievement levels to increase academic success and students' motivation and motivation can be increased. All schools have shown the same situation, namely students' disinterest in lessons, as the basis for low performance in entering higher education institutions that provide sports education. It has been observed that students with low interest and motivation in lessons are more successful in sports fields. In light of this information, it is thought that teachers who teach basic courses other than sports in sports high schools will increase motivation if they explain course content at a basic level and in ways that students can more easily understand. In studies supporting this interpretation, Şimşek (2022) stated that determining the learning styles and multiple intelligence areas of sports high school students and determining educational activities according to these characteristics will increase their academic success; Fisher and Stafford (1999) determined that the most important element of positive academic experience in high schools is the relationship with the supportive attitudes of teachers.

In addition, it can be expected that higher levels of success will be achieved by teaching courses specific to sports high schools in a way that will benefit the student, revising course contents, and using different teaching methods and techniques. In a study supporting this interpretation, Yıldız and Güven (2011) revealed that the course contents and achievements of Fine Arts and Sports High Schools should be revised and appropriate teaching programs should be created. Beekhoven and Dekkers (2005) determined that the type and content of education given at school affect students' attitudes towards school.

As a result, in the light of the data obtained from schools through official channels, it was observed that the general academic success of the students studying in sports high schools was not very good, and many of them could not reach sufficient scores to enter another higher education institution outside their own fields. It is thought that the students who plan a career in their own sports field are different from other

students and the reason for this situation is that they have passed the sports skill tests applied at the entrance to high schools and are licensed sports students. It was observed that thanks to the foundations of sports success, students are more likely to be placed in higher education in the fields of physical education and sports, which are their basic goals. The general placement rate of students in higher education institutions providing sports education is at the level of 40% in the study sample group. Apart from this rate, the decision-making units that have the same rate despite having fewer opportunities are found to be effective in the study. Similar input and output rates were achieved in all schools that were considered effective. It was determined as another data seen in the study that schools with small populations are equipped with fewer opportunities. The presence of sufficient field teachers in schools with small student populations means that individual differences are more responded to. On the other hand, the number of students per class, branch and teacher in this group may give the idea that they receive more contribution from their schools.

Suggestions

When the efficiency of sports high schools was measured, it was seen that 4 out of 8 schools were effective in the CCR model, while 4 of them were not able to use their resources sufficiently. In the BBC model, 6 out of 8 schools were effective. While the efficiency criterion was evaluated based on resource use and target outputs among schools, output surpluses were not taken into account. Conducting studies aimed at target output surplus, i.e. increasing the number of transitions to target higher education, will change the efficiency value and efficiency limits.

Accordingly:

- By increasing the level of cooperation between sports high schools and higher education institutions that provide sports education, the number of students transferring from sports high schools can be increased.
- Avoiding restrictions, which are backwards practices aimed at increasing efficiency, for whatever reason, and on the contrary, increasing investments and incentives at appropriate levels may increase the interest in sports high schools.
- Increasing interest in sports high schools can increase academic expectations by raising the competitive element inherent in sports to a higher level.

- The absence of expert teachers in non-field courses, as in the thematic departments of sports high schools, may help to catch up with the number of athletes participating in higher education institutions or professional leagues that provide sports education.
- For candidate students of sports high schools, specifying which sports branches the school is competent in can be a good guide in directing candidate students to the school. Proper guidance of candidate students can ensure better output levels.
- In schools that do not have sufficient facilities, meeting the need for indoor sports areas for students during the winter months and improving facilities, fields and playgrounds can be expected to increase students' gains.
- Facility and field improvements will ensure that students' training levels and development are better during the winter months, which may lead to greater success in higher education institution exams in the fields of physical education and sports.
- A database that researchers can access can be created so that the activities of sports high schools can be easily examined and the data can be easily accessed.
- In future studies, it may be recommended that more sports high schools participate and their activities over at least four years be examined using data envelopment analysis.

References

Başar, H. (1995). Öğretmenlerin değerlendirilmesi. Ankara: Pegem Yayınları.

Beekhoven, S., & Dekkers, H. (2005). Early school leaving in the lower vocational track: triangulation of qualitative and quantitative data. Adolescence, 40(157), 197-213.

Cooper, W. W., Seiford, L. M., & Tone, K. (2007). Data envelopment analysis: A comprehensive text with models, applications, references and DEA-solver software. Berlin: Springer Publishing.

Çakır, F. (2016). Spor lisesi öğrencilerinin öğrenim süreci ve akademik başarı ilişkilerinin incelenmesi. (Yüksek Lisans Tezi). Mehmet Akif Ersoy Üniversitesi Eğitim Bilimleri Enstitüsü, Burdur.

Fisher, T. A., & Stafford, M. E. (1999). Reliability and validity of the career influence inventory: A pilot study. Journal of Career Assessment, 7(2), 187-202.

Genç, E., Batmaz, H.Ç., Coşkuner, Z., Pala, R., Çınar, V., & Biçer, S.Y. (2013). Güzel sanatlar ve spor lisesi, spor bölümü öğrencilerinin sayısal derslere karşı tutumları (Elazığ örneği). International Journal of Social Science, 6(3), 1163-1177.

Göksoy, S. (2018). Eğitimde etkililiğin artırılabilmesi için sistem modelinin okul ve öğrenme ortamına uyarlanabilirliği. Uluslararası Liderlik Eğitimi Dergisi, 3(3), 1-15.

Kargın Göktaş, N. (2019). Spor lisesi öğrencilerinin okul iklimi algıları ile spora yönelik tutumları arasındaki ilişki. Yüksek Lisans Tezi. Muğla Sıtkı Koçman Üniversitesi Sağlık Bilimleri Enstitüsü, Muğla.

Kaya, Y. K. (1993). Eğitim yönetimi kuram ve Türkiye'deki uygulamalar. Ankara: Set Ofset Matbaacılık.

Maehr, M., & Meyer, H. (1997). Understanding motivation and schooling: Where we've been, where we are, and where we need to go. Educational Psychology Review, 9, 371-409.

Millî Eğitim Bakanlığı. (MEB). (1973). 6-14. Maddeler. https://www.mevzuat.gov.tr/MevzuatMetin/1.5.1739.pdf

Şimşek, D. (2022). Spor liselerinde öğrenim gören öğrencilerin sahip oldukları çoklu zeka alanları ve öğrenme stillerinin akademik başarılarına etkisinin incelenmesi (Kayseri ili örneği). (Yüksek Lisans Tezi). Erciyes Üniversitesi Sağlık Bilimleri Enstitüsü, Kayseri.

Yıldız, Ö., & Güven, Ö. (2011). Güzel sanatlar ve spor liseleri spor alanı dersleri öğretim programlarının değerlendirilmesi. Millî Eğitim Dergisi, 41(29), 210-229.

Yolalan, R. (1993). İşletmelerarası göreli etkinlik ölçümü. Ankara: Millî Prodüktivite Merkezi Yayınları.