

COVID-19 Pandemic and Changes in Parents' School Preferences in Bursa Province

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This study examines families' preferences to choose the best educational institutions for their children in Bursa, Turkey, using the Analytical Hierarchy Process (AHP) and Simple Additive Weighting (SAW) Model. For this purpose, sixty-one face-to-face interviews were conducted with students and their parents at private high schools, public high schools, and open high schools in Bursa. Health concerns, quality, price, time management, safety, and self-confidence were considered criteria in determining families' decisions in private, public, and open high schools. The AHP results reveal that the most important criteria are health concerns with 44.91%, quality with 21.30%, safety with 12.02%, price with 8.88%, time management with 6.71%, and self-confidence is the least important criterion, which has a percentage of 6.24%. According to the criteria, values reached within the same method ranking use the criteria weights for health concerns, quality, safety, price, time management, and self-confidence. According to the AHP-weighted SAW method, private high schools are in the first place, public schools in the second place, and open high schools in the third place.

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Keywords: COVID-19, private high school, public high school, open high school, distance education

INTRODUCTION

From the beginning of 2020, with the news of a China-based pandemic, the world entered a very troubled period. Many sectors that encountered a new type of virus called coronavirus were severely affected. Governments all over the world have taken measures to combat the pandemic. As Yung-Chi Chen, Byrne, and Velez (2022) stated that: "On March 13, 2020, the United States declared a national emergency over the outbreak of Coronavirus Disease (COVID-19) as the novel, highly transmissible Coronavirus (SARS-CoV-2), which started rapidly spreading across the country. By the end of March 2020, more than half of the U.S. population was ordered to stay home under shelter-in-place orders to minimize close contact between people to reduce the spread of the virus."

The education sector was the most affected by the closure. The COVID-19 pandemic has led to an unprecedented deterioration in the education system. Due to the crisis, approximately 1.6 billion students in more than 190 countries have been affected negatively. Closing schools and other learning areas has affected 94 percent of the world's population, and 99 percent of this is in low-and middle-low-income countries. The crisis exacerbates pre-existing education disparities by reducing the opportunities for many of the most vulnerable children, youth, and adults – those living in poor or rural areas, girls, refugees, persons with disabilities, and forcibly displaced persons to continue their learning. Learning losses threaten not only the current generation but also the next generation. Technological improvements are also threatened because human capital is negatively affected due to individuals who do not receive the necessary education. As it is known, through technological progress, economic growth and, therefore, the standard of living can increase. Technology can be developed by human mental production ability, for which quality education is crucial. For example, according to a U.N. report, 2020, because of the economic impact of the pandemic alone, approximately 23.8 million children and youth (from pre-primary to tertiary) will be able to drop out of school or not have access to schools next yearⁱ

In this study, the best education model for the city of Bursa in Turkey will be analyzed with Analytical Hierarchy Process (AHP) and the Simple Additive Weighting (SAW) model. For this purpose, sixty-one face-to-face interviews were conducted with students and their parents at private high schools, public high schools, and open high schools in Bursa. Health, quality, price, time management, safety, and self-confidence are considered criteria for determining families' decisions about private, public, or open schools.

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This paper is organized as follows: This study firstly reviews the literature and then describes the methodology for the study, which includes the research design, questions, and data. Next, the findings are presented and discussed results. Finally, the study reveals a conclusion.

LITERATURE REVIEW

The World Economic Forum (2020) stated that COVID-19 caused the closure of schools all over the world. Globally, over 1.2 billion children are out of the classroom. Based on these facts, it is inevitable that there will be changes in the school preferences of the families.

Engzell et al. (2021) discussed the costs and benefits of the closure of the schools in the Netherland. The authors concluded that students made little or no progress with home-based education. Engzell et al. stressed that learning loss was most pronounced among students from disadvantaged homes. Haeck and Lifebvre (2020) claim that the closures of schools may increase inequalities in cognitive skills in Canada and the impact of school interruptions on knowledge accumulation. As Chen et al. pointed out (2021:3), the pandemic may affect people from different socioeconomic strata. The pandemic has even worsened inequalities between social classes. The authors explained the situation:

We observed that parents of low-income and lower-middle-class households (\leq US\$50,000), as well as parents of color, experienced more adverse instrumental and financial hardships, such as reduced pay or income, layoff, and job loss or potential job loss (2021:17).

The literature shows that closures of schools can negatively affect students' academic skills and perseverance (for example, Cooper et al. 1996; Meyers and Thomasson 2017; Belot and Webbink 2010), and these effects may differ according to socioeconomic status. The authors discuss the cost of the interruption in education, emphasizing the absence of summer schools.

The closures of schools in many countries due to the pandemic increase the inequality in education since opportunities are not the same in public and private schools. For example, it is known that private schools work more devotedly to prevent customer losses during the pandemic. Therefore, families may prefer private high schools to public ones because these differences in opportunity create a skill difference between students, which in turn causes income differences later. Thus, while rising inequalities from the pandemic manifest themselves in university entrance success, the increase in inequality of opportunity will likely be longer. Carneiro and Heckman, 2003 and Chetty et al. (2011) discussed school closures during the pandemic process and the effects of the duration of school interruption on students' skills and income.

In such cases, what needs to be done is not to close schools completely but to identify groups affected by COVID-19. Vlachos et al. (2020) examined the effect of school closures on SARS-Cov-2 among parents and teachers. The authors found that exposure to open schools resulted in a slight increase in infections among parents. On the other hand, this result is not the same as teachers. According to the study, teachers are seriously affected by the pandemic. Then, the priority should be to vaccinate teachers instead of closing schools constantly.

Kaffenberger (2021) developed a model to reveal the educational results of the COVID-19 pandemic. According to the model, the long-term repercussions for children's learning could be devastating, with today's grade 3 students losing as much as 1.5 years' worth of learning (or more) by the time they reach grade 10 due to their time out of school. Therefore, governments can, however, introduce measures that mitigate some or all these consequences. According to the study, practical remediation efforts should be implemented to eliminate the learning losses in the long run when face-to-face education begins.

Learning losses due to the pandemic are tried to be compensated for by online education. Online education experience and opportunities differ from school to school. To prevent the spread of the COVID-19 pandemic, the contours of the education system are changing, and online education has become the primary means of instruction. About this subject, Muthuprasad et al. (2021) investigated students' perceptions and preferences for online education in India during the COVID-19 pandemic. Most students revealed a positive attitude towards online classes during the pandemic.

On the other hand, the authors reported some constraints to online education, such as technological constraints, delayed feedback, and the inability of the instructor to handle some problems related to online courses and technology. These technological deficiencies are felt more in those with low socioeconomic levels and rural areas. Jameson, Stegenga, Ryan, and Green (2020) made it clear that "the efforts to support remote learning must focus on the need for equity of access to supports and services."

The anxiety and depression students experience are other problems with online education, as AlAzzam et al. study revealed (AlAzzam, Abuhamad, Abdalrahim, and Hamdan-Mansour, 2021:5-6).

RESEARCH DESIGN and METHOD

Research Questions

This study has focused on the following three research questions:

1. To find the criteria that determine families' school preferences during the pandemic.
2. To rank the criteria of health, quality, price, time management, safety, and self-confidence according to the priorities in determining the high school preferences of families.
3. To determine the best education model at the high school level.
4. To explain the reasons why families prefer private high schools.

Research Method⁴

Analytic Hierarchy Process (AHP)

This study uses the Analytic Hierarchy Process AHP process, a mathematical method developed by Thomas L. Saaty in 1970 (Saaty and Niemira, 2006, 1), to determine the most important criteria. The AHP is a method that demonstrates the relationship between criteria and alternatives using the decision maker's knowledge and intuition with a simple hierarchical structure for complex problems (Mandavgade et al., 2021 & Esen et al., 2019). This method is based on a binary comparison of criteria and alternatives. This method can employ more than one qualitative or quantitative criteria. Complex problems can be analyzed in a hierarchical structure that extends from the primary goal to the sub-criteria (Demirkol, 2021). The stages of the AHP method can be presented as follows (Saaty & Vargas, 2012; Coffey & Claudio, 2021; Sharma et al. 2020; Saaty, 1990)

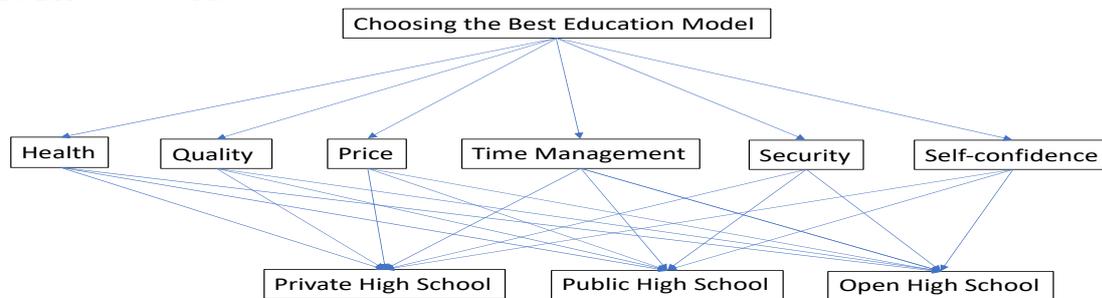
The AHP, a hierarchical structure consisting of at least three levels, is established first. At the highest level of the hierarchy, there is the primary goal, then the criteria, sub-criteria, and options at the lowest level.

The AHP consists of four stages. These are as follows.

1. Creating Hierarchical Structure

In the AHP, the goal is at the top of the hierarchy. After the primary goal is determined, the factors affecting the goal are placed at a lower level. Alternatives are found at the lowest level of the hierarchy (Özbek and Eren, 2013, 49). Six primary factors and three alternatives have been identified for this study. The hierarchical structure according to the specified criteria and alternatives is shown in Figure 1.

Figure 1: Hierarchical Model



1. Creating a Binary Comparison Matrix

The primary goal is to determine the relative importance of the criteria, sub-criteria, and their effect on the overall goal. The 1-9 scale suggested by Saaty is used for comparisons (Ömürbek et al., 2013, 105-106). Table 1 shows the binary comparisons scale to obtain the comparison matrix (Ömürbek et al., 2016, 177).

⁴ The publication ethics rules, which are determined by Sakarya University were complied with in the study.

Table 1: Significance Levels Used in Comparison

Severity	Value definition	Description
1	Equality	Both activities contribute equally to the purpose
3	Less Important (Little Superiority)	As a result of experience and evaluations, one activity is a little more preferred than the other
5	Pretty Important (Extra Superiority)	As a result of experience and evaluations, one activity is much more preferred than another.
7	Very important (Very Superior)	One activity is strongly preferred over another.
9	Highly important (Sharp Superior)	One activity is preferred to the other with the highest possible degree.
2,4,6	Intermediate Values (Reconciliation Values)	If words are insufficient to make an assessment, a value in the middle of the numerical values is given.

Source: Thomas L. Saaty, "The Analytic Hierarchy and Analytic Network Measurement Processes: Applications to Decisions Under Risk," *European Journal of Pure and Applied Mathematics*, Vol 1, 2008, p. 125.

2. Calculation of criterion weights and consistency of comparison matrices

After the binary comparison matrices are obtained, the normalized matrices are created, and the relative priorities are estimated. The order of importance of the criteria and alternatives is determined according to the relative priorities. Next, we assess if the pairwise comparison matrices are consistent or not. The consistency ratio must be estimated to understand whether a comparison matrix is consistent or not. The consistency rate (CR) is calculated using Equations 1 and 2. CI refers to the consistency indicator, and the random index (RI) is the randomness indicator. If $CR < 0.1$, the comparison matrix is consistent.

$$CI = \frac{\delta_{max} - n}{n - 1}$$

$$CR = \frac{CI}{RI}$$

The random index (RI) value is in Table 2 below.

Table 2: The random index (RI) values

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

3. The weights of each criterion and the importance of the alternatives provide the priority value of each alternative separately.

The Simple Additive Weighting (SAW) Method

Churchman and Ackoff developed the SAW method in 1954. The method is the most straightforward and applicable multi-criteria decision-making, the linear combination or scoring method. Since different units cannot be added, the data should be normalized in the SAW method. The total score for each alternative is obtained by multiplying the normalized values of that alternative by various criteria: the dimensionless evaluations and the weights of the criteria and then adding up all of them. It is preferred that the value of one criterion is not affected by the values of other criteria for any reason since the contribution of each criterion to the total score is independent of the others (Orhan & Aytakin, 2020: 764; Ömürbek et al., 2016, 179).

SAW method steps are shown below. (Ömürbek et al., 2016: 180; Yeh, 2003: 291; Milan Janic and Reggiani, 2002: 119; Orhan and Aytakin, 2020: 764).

Step 1: Normalizing the Decision Matrix: The decision matrix consisting of m alternatives and n evaluation criteria is normalized by using Equation 1.

$$r_{ij} = \frac{x_{ij}}{\max x_{ij}} \quad I = 1, 2, \dots, m; \quad j = 1, 2, \dots, n \quad j \text{ if it is the utility feature} \quad (1)$$

$$r_{ij} = \frac{\min x_{ij}}{x_{ij}} \quad I = 1, 2, \dots, m; \quad j = 1, 2, \dots, n \quad j \text{ if it is the cost feature} \quad (2)$$

Step 2: Estimation of Preference Values for the Alternatives: Total preference values of each alternative are calculated by using Equation 2.

$$S_i = \sum_{j=1}^M W_j r_{ij} \quad i=1,2, \dots, n \quad (3)$$

Data Collection and Analysis Process

There are 229 high schools in Bursa, including private high schools, public high schools, and open high schools. Sixty-one face-to-face interviews were conducted with students and their parents with a random sampling method at private high schools, public high schools, and open high schools in Bursa. The AHP method was used to determine the criteria weights used for the evaluation. Later, binary comparisons were made for the criteria to determine the criterion weights with the AHP method. The geometric averages were estimated with the binary comparisons, and the decision matrix was constructed as shown in Table 3.

Table 3: Decision Matrix

Health	1,000000	4,9946853	5,0558526	5,6720745	3,57252	5,1671409
Quality	0,2002128	1,0000000	3,4716679	2,4671160	4,0586361	2,7789033
Price	0,1977906	0,2880460	1,0000000	2,2840841	0,7310494	1,0706473
Time						
Management	0,1763023	0,4053316	0,4378123	1,0000000	0,7208507	1,2239829
Security	0,2799143	0,2463882	1,3678966	1,3872499	1,0000000	3,5737065
Self-confidence	0,1935306	0,3598542	0,9340144	0,8170049	0,2798215	1,0000000
Total	2,0477506	7,2943053	12,2672438	13,6275293	10,3628797	14,8143809

Table 4 shows the main factors, health, quality, price, time use, safety, and self-confidence, which determine the selection of the best school, the binary comparison matrix with priorities, and the consistency ratio. The estimated consistency ratio is 0.0743306. Since this ratio is less than 0.1, the matrix is consistent. The consistency rate of the matrices is given under the relevant tables.

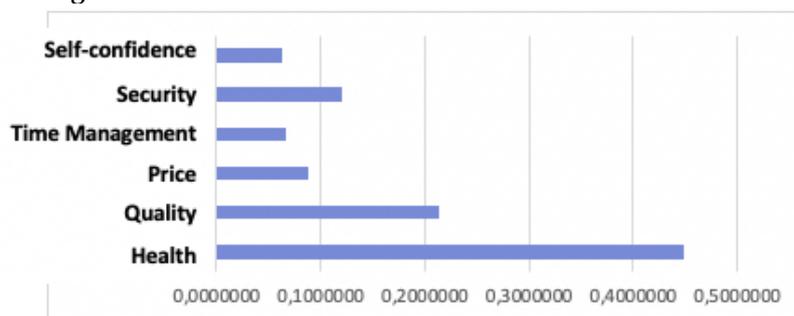
Table 4: Normalized Matrix

						Priority Vector (ai)	
Health	0.4883407	0.6847376	0.4121425	0.4162218	0.3447422	0.3487922	0.4491628
Quality	0.0977721	0.1370932	0.2830031	0.1810391	0.3916514	0.1875815	0.2130234
Price	0.0965892	0.0394892	0.0815179	0.1676081	0.0705450	0.0722708	0.0880034
Time							
Management	0.0860956	0.0555682	0.0356895	0.0733809	0.0695608	0.0826213	0.0671527
Security	0.1366935	0.0337782	0.1115081	0.1017976	0.0964983	0.2412323	0.1202513
Self-Confidence	0.0945089	0.0493336	0.0761389	0.0599525	0.0270023	0.0675020	0.0624064
Consistency Rate = 0,0743306							

Research Questions One and Two

Figure 2 shows the AHP results. The most important criteria are health with 44.916%, quality with 21.302%, safety with 12.025%, price with 8.880%, time management with 6.715%, and self-confidence, the least important criterion, 6.240%.

Figure 2: Criteria Weights



SAW Method Application

The decision matrix was created first to apply the SAW method, shown in Table 5. The three different education institutions were evaluated in this study.

Step 1: Normalizing the Decision Matrix

Table 5: Decision Matrix

Criteria	Criteria type	Weight	Alternatives		
			Private high schools	Public high schools	Open high schools
Health	Max	0.4491628	6.0869331	4.0203783	4.5234394
Quality	Max	0.2130234	6.2900515	4.0203783	4.5508958
Price	Max	0.0880034	0.1766057	0.1285338	5.2401261
Time Management	Max	0.0671527	5.0403083	3.9376099	3.2568794
Security	Max	0.1202513	7.3220346	7.4136000	3.5099497
Self-confidence	Max	0.0624064	4.9085619	7.3420061	4.7505297

The type of all criteria in the decision matrix created is maximization. Benefit criteria were used for all criteria, and the highest values were taken as the best values. Equation 1 was used to normalize the decision matrix.

Table 6: Normalized Decision Matrix

Health	0.4491628	1.0000000	0.6604933	0.7431393
Quality	0.2130234	0.8197381	1.0000000	0.5930862
Price	0.0880034	0.0337026	0.0245288	1.0000000
Time Management	0.0671527	1.0000000	0.7812240	0.6461667
Security	0.1202513	0.9876490	1.0000000	0.4734474
Self-confidence	0.0624064	0.6685587	1.0000000	0.6470343

Step 2: Calculating Preference Values of Alternatives. By multiplying the values in the normalized decision matrix by the criterion weights, the total preference values of each alternative are calculated using Equation 3. SAW Sj criterion values are given in Table 7.

Table 7: Total Preference Values of Each Alternative

	Private high schools	Public high schools	Open high schools	Weight
Health	0.4491628	0.2966690	0.3337906	0.4491628
Quality	0.1746234	0.2130234	0.1263412	0.2130234
Price	0.0029659	0.0021586	0.0880034	0.0880034
Time management	0.0671527	0.0524613	0.0433919	0.0671527
Security	0.1187661	0.1202513	0.0569327	0.1202513
Self-confidence	0.0417223	0.0624064	0.0403791	0.0624064
Total	0.8543933	0.7469700	0.6888388	1.0000000

The selection values and ranks of the education schools obtained according to the SAW method are presented in Table 8.

Table 8: Normalized Values of Criterion

	Private high schools	Public high schools	Open high schools	Total
	0.8543933	0.7469700	0.6888388	2.2902021
	0.3730646	0.3261590	0.3007764	
Order	1.0000000	2.0000000	3.0000000	

Research Question Three

Ranking according to the criteria values, calculated according to the SAW method by using the criteria weights for health, quality, safety, price, time management, and self-confidence. According to the AHP-weighted SAW method, private high schools are in the first place, public schools in the second place, and open high schools in the third place.

Research Question Four

Health concerns have been found as the most important criterion for families in their private school preferences. This result is consistent and meaningful during the pandemic period. The class size in private schools is more suitable than in public schools is important in terms of health criteria. The other criteria in selecting private high schools are the quality criterion. Although public schools are free, families prefer private high schools because of their quality of education.

RESULTS

Since the outbreak of COVID-19, important changes have occurred in many areas of life. As one of these important areas, the pandemic seriously affected the education sector: Many schools worldwide were closed, and online education was considered an alternative to formal education. Although online education came to the fore as an opportunity during the pandemic, it also brought problems, such as accessibility and affordability of computer and internet facilities.

Choosing the right educational institution for their children became important for families due to increased risks amid the pandemic. Therefore, it seems important to identify which factors are important for families to choose a school. The present study analyses the families' preferences regarding high schools in Bursa, Turkey. This study is important in determining the priorities of families in school choices during the pandemic. This study reveals that the criteria which are thought to be effective in families' selection of high school are as follows: Health, quality, safety, price, time management, and self-confidence.

According to the AHP method, the criteria affecting the school type choice of families are listed as follows: health, quality, safety, price, time management, and self-confidence. The AHP results reveal that the most important criteria are health concerns with 44.916%, quality with 21.302%, safety with 12.025%, price with 8.880%, time management with 6.715%, and self-confidence, the least important criterion, 6.240%. Ranking according to the criteria values, calculated according to the SAW method by using the criteria weights for health, quality, safety, price, time management, and self-confidence. According to the AHP-weighted SAW method, private high schools come first. Public schools are in second place, and open high schools are in third place.

Bursa is one of the most industrialized cities in Turkey, and the students' parents, many of them working for high-tech companies, are mostly college-educated. Therefore, the parents' preferences might not closely represent the country averages. Further studies can include the subcategories of the institutions undertaken in this study and new institutions that distinguish themselves from the existing ones with new teaching methods. We recommend that subsequent studies be carried out in different cities in Turkey and analyze all alternative educational institutions and their attractiveness throughout the country.

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