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A new curriculum evaluation model for gastronomy education in Turkey

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ABSTRACT

This paper presents a model to evaluate the curriculum of a gastronomy undergraduate program in Turkey. The Data Envelopment Analysis (DEA) method and fuzzy logic are applied to determine the educational performances of the curriculum courses. The evaluation was made by considering the perspectives reflecting the educational vision of the gastronomy department. The results reveal that each course contributes differently to various perspectives of gastronomy education, a number of courses may be removed from the curriculum, and the status of certain courses should be changed. The model is also effective in comparing the different curricula that provide the same education.

1. Introduction

Food and nutrition began its transformation from a necessity to a virtue in the war-filled twentieth century (Tormo-Santamaría & Bernabeu-Mestre, 2020), and since the beginning of the twenty-first century, studies of food and nutrition have been discussed together with many different disciplines within the framework of gastronomy. Today, gastronomy is described as having the ability and information about food and beverages that increase the pleasure of eating and drinking, which is also considered as 'the art of living' (Santich, 2004). In other words, food and nutritional routines that have been going on since the existence of humanity are now considered with science, art, cuisine, and culture through gastronomy (Cankül & Yıldız, 2020). As the scope of gastronomy has developed over the years, the debate over the adequacy of educational programs has also increased. This study therefore presents research on evaluating the educational performance of the curriculum, which plays an important role in gastronomy education.

Scarpato (2002) states that, in 2002, there were no professionals trained in the field of gastronomy, and that all gastronomic tourist resort managers, marketers, and community planners should be educated in terms of gastronomy. Fortunately, by the 2020s, the relationships between gastronomy and other disciplines have been clarified (Fooladi, Hopia, Lasa, & Arbolea, 2019; Seyitoğlu, 2019), and educational programs related to these disciplines have been put into effect (Hegarty, 2014) as well as trained professionals in the field of gastronomy being offered multiple doctoral programs (Acar & Altaş, 2018). Therefore, it is inevitable to discuss the scope and adequacy of educational programs that support this rapid development in a short period of time.

Educational programs focus on empowering learners to deal with future life and work (Tong, Nguyen, Nguyen, Nguyen, & VU, 2020). In terms of educational performance, a curriculum is a highly important element in the development of learners' competencies. However, it is also stated that when curriculum designs are not the primary focus of educational institutions, they are sometimes

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determined by runaway and random tendencies without being based on a specific educational philosophy (Tribe, 2014). Curricula reforms advance the position of universities in their mission to improve the human capital of learners (Puplampu & Mugo, 2020). In the literature, curricula updates are highly recommended for institutions (Stefanini, Rejowski, & Ferro, 2021). There have been certain performance studies on multiple gastronomy curricula (Cankül, 2019; Dalton, 2020; Priantini, Abdulhak, Wahyudin, & Kusumah, 2021; Seyitoğlu, 2019), and it has even been concluded that the curricula may not be effective as expected (Tong et al., 2020). For example, it is also known that gastronomy curricula in Turkey mostly focus on business courses (Seyitoğlu, 2019), and they are unsatisfactory for both students and academicians (Cankül, 2019). Studies show that there is an important need for curriculum development and improvement studies that will increase the quality of gastronomy education in Turkey. In addition, it is known that a number of gastronomy departments in Turkey develop curricula by copying the practices and structures of different successful organizations to catch the change required by the field (Karsavuran & Özdemir, 2019). Therefore, understanding which points of gastronomy are focused on and which points are not taken into account in the curricula can be considered as the first step of development. Just like the interdisciplinary cooperation between chefs and scientists suggested to strengthen the scientific basis of gastronomy studies by Frøst (2019), cooperation between educational institutions should be ensured for the development of curricula that include different aspects of gastronomy.

The quality of gastronomy higher education in Turkey is facing many challenges, such as a lack of standardization of physical situations in the laboratory, and the gastronomy profiles of academicians (Seyitoğlu, 2019). There is an increasing number of studies suggesting more effective gastronomy education in Turkey (Albayrak, 2022; Cankül, 2019; Seyitoğlu, 2019). Due to the different organizational cultures, know-how levels, and physical conditions of universities, both curricula and achievements can be differentiated implicitly in both compulsory and elective courses.

Nowadays, gastronomy includes numerous study areas, such as history, sociology, marketing, culture, business, anthropology, geography, and economics (Hegarty, 2009). Modern gastronomy addresses not only the production and presentation of food and beverages but also the location, timing, and conditions for their consumption (Santich, 2004). The acquisition of artistic and philosophical points of view is as important as offering hands-on training in gastronomy education (Cankül, 2019). Therefore, gastronomy education planners should consider the multi-disciplinary nature of gastronomy.

In view of this, it is possible to accept that each gastronomy education institution may have a different educational focus in its curricula. Although it has been complained about, the curricula are formed following the specializations of the faculty members (Albayrak, 2022), the physical facilities of the institute, and the local gastronomy culture. The achievements of gastronomy education are provided through the courses in the curricula. In this respect, each course has its own status and influence in enabling specific knowledge, because the curricula and the courses within it provide the framework of the information necessary for students (Tong et al., 2020).

Gastronomy education institutions try to provide students with versatile gains through curricula consisting of dozens of courses that contribute to different areas of gastronomy. However, gastronomy curricula have not yet reached a satisfactory maturity, and discussions on the ideal curriculum continue. Within the scope of this study, a model is proposed to analyze the curriculum of a gastronomy teaching program and to provide development guidelines. At this point, it was questioned what the aims of a gastronomy education faculty in Turkey are through its curriculum, as suggested by Tribe (2014), and what exactly the faculty prepares students for, revealing its perspectives in gastronomy education. These perspectives were presented as 'culinary arts', 'culture' and 'food and beverage (F&B) management' by the directors of the department. The curriculum of the department was evaluated according to the effectiveness of its courses under these defined perspectives. In each perspective, students are provided with a different aspect of gastronomy. In 'culinary arts', students are educated in the basics regarding foods and beverages, culinary concepts and techniques, creativity in culinary and culinary trends. In 'culture', the relationships of food to culture (Hegarty & O'Mahony, 2001), social aspects of gastronomy, and culinary history are considered. In 'F&B management', students are provided with management qualifications and the relationship of gastronomy with the hospitality industry (Santich, 2004), tourism (Seyitoğlu, 2019), gastronomic tourism, and F&B management. To the best of our knowledge, there has been no study that evaluates gastronomy education curriculum by considering the perspectives reflecting the educational vision of the institution, together with its courses. The important point of the study is to present a methodology to evaluate the contribution of the courses to gastronomy education by considering the perspectives that gastronomy encompasses.

The specific research questions of this study are.

- Under which educational perspectives is the aim to present the multidisciplinary nature of gastronomy to students in a gastronomy undergraduate program?
- What is the contribution (performance) of the courses in the curriculum to these defined perspectives of gastronomy education?
- Which of these perspectives of gastronomy education does the curriculum cover more, and which less, through its courses?

The results provide an important data source for defining the characteristics of gastronomy education and future needs-oriented curriculum reform.

2. Materials and methods

2.1. Research concept and objective

Institutions providing gastronomy education try to provide multifaceted gains to students through dozens of courses that contribute

to different fields of gastronomy. Within the context of this study, the curriculum of a higher education gastronomy department in Turkey was used, and it was seen that the outcomes of the gastronomy department were classified in three different educational perspectives; 'culinary arts', 'culture' and 'F&B management'. The purpose of this study is to estimate the contribution of the courses in the gastronomy education curriculum to these educational perspectives; in other words, the performance of the courses, using expert opinions. The research design for the curriculum evaluation model is presented in Fig. 1. Since faculty members are considered as key participants in the teaching and learning process (Hewitt & Clayton, 1999), it has been deemed appropriate to make evaluations using the academic staff of the higher education institution.

All of the courses in the 4-year curriculum (112 courses) were considered for the evaluations within the scope of specified gastronomy education perspectives. Only compulsory courses or those common to all departments in the university were not taken into consideration, as they may cause the basic courses of the department to take the same values as each other in the data envelopment analysis. The courses that were not included in the assessment are those which are compulsory for all faculties, such as History of Atatürk's Principles and Revolutions, basic mathematics, Turkish language, graduation thesis, and common elective social development courses, such as physical education, sign language, and theater. The judgments of the experts regarding the courses were obtained through a linguistic expression scale, and all the evaluations were gathered together by considering the weighted importance of the experts and the use of fuzzy theory. Within the scope of the evaluation, fuzzy logic was utilized, because it provides a flexible evaluation area for experts and enables more effective evaluation by quantifying the uncertainties in expert opinions. DEA was performed to determine the overall performance of the courses by considering these course evaluation values under three perspectives obtained by fuzzy operations. DEA measures the relative efficiency of every unit in an environment where multi-criteria evaluations are made for each unit, and determines the most efficient and least efficient units. Considering the distribution of courses under the three perspectives, and the fact that the boundaries and relationships between these perspectives are not clearly defined, DEA was preferred for a more efficient and comprehensive evaluation of the courses. Finally, in order to interpret the performance scores more effectively, the courses were classified using ABC analysis. ABC analysis is established on the Pareto principle, in other words, the 80/20 rule. According to the Pareto principle, it is assumed that 80% of gastronomy education is provided by Class A courses in the first 20% of the obtained performance ranking with the highest performance, and the courses in the last 20% of the ranking with the lowest performance are Class C courses with the lowest impact, with the courses in between being Class B courses. Classes A, B and C were assigned based on the values of the courses under certain perspectives and based on DEA analysis.

2.2. Data

In today's educational environment, there is little that can change the curricular reforms of faculties other than the collective decision of faculty members. Therefore, the evaluation of each curriculum by its own faculty members can enable the creation of decision support systems at the managerial level in the field of education. Therefore, for the curriculum evaluation presented in this

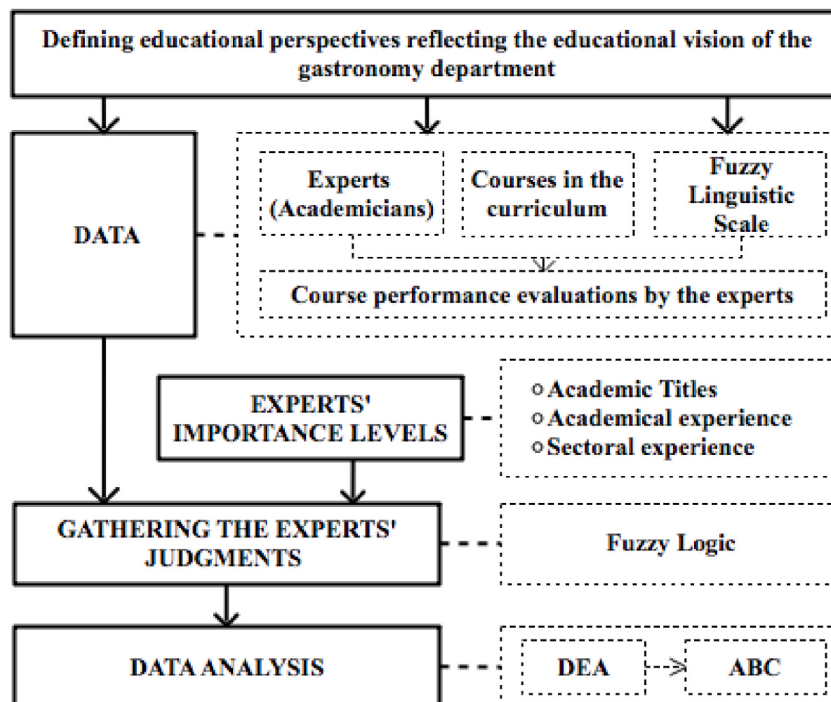


Fig. 1. Research design for curriculum evaluation model.

study, academics from the higher education department where the curriculum is taught were utilized. The academicians were given detailed information about the purpose of the research, and the gastronomy education perspectives as defined by the management, and evaluation forms were sent to collect their opinions on the performance assessment of the courses. Regardless of the types of the courses or number of credits, they were asked to impartially evaluate the courses based on content and learning outcomes only. It is also emphasized that the evaluations were not to be characterized as right or wrong, but only to get opinions. The aim was only to reveal the academicians' beliefs about the contribution of the courses to gastronomy education; in other words, their role in providing students with gastronomy achievements in general.

The provided forms consisted of a course evaluation table and a scale of linguistic expressions to be used for evaluation. While the rows in the evaluation table consist of the courses in the department curriculum, three perspectives determined and defined by the gastronomy department management constitute the evaluation columns. There are 26 compulsory courses (CC), 38 department elective courses (DEC), 4 foreign language courses (FLC) and 44 elective courses (EC), totaling 112 courses in the curriculum (https://www.anadolu.edu.tr/uploads/anadolu/files/universite_katalog/603f7c29a6c42.pdf). For each course in the curriculum, considering only the content and learning outcomes, the experts were asked to make three evaluations to determine the importance of the courses from the perspectives of 'culinary arts', 'culture' and 'F&B management'.

The courses offer different learning outcomes interactively with each other depending upon their content. A linguistic expression scale with fuzzy numerical equivalents was presented to provide experts with a flexible evaluation space to determine the impact of courses on different educational perspectives. This scale consists of linguistic expressions ranging from 'no impact' to 'absolutely impact' as shown in Table 1, which the experts can use to determine the level of contribution on various perspectives of gastronomy education through the courses' content and learning outcomes. These linguistic expressions, which have equivalents as fuzzy numbers, can be easily used in quantitative analysis through fuzzy theory. Fuzzy theory, which enables much more efficient calculations than the crisp approach in the quantification of vague expressions, was introduced by Zadeh (1965). The main contribution of the theory is its ability to represent the vague data (Kahraman, Cebeci, & Ulukan, 2003) and to enable the modeling of real-world problems, specifically through the linguistic expressions (Sari & Kahraman, 2015). Fuzzy theory transforms linguistic and inexact expressions presented with words into mathematical data sets through the fuzzy sets and membership functions (Zadeh, 1975). Therefore, the fuzzy set theory makes the evaluation process more flexible and capable of explaining experts' preferences (Kahraman et al., 2003).

2.3. Evaluating the importance levels of the experts

A group of experts consisting of academicians of the Gastronomy and Culinary Arts Department was used to evaluate the courses. Since the knowledge and experience levels of each expert may be different, the importance levels of the experts were determined within the context of the study. To find out the importance levels of the expert, their academic titles, and academic and sectoral experience were considered. A related weighting score table for the evaluation is presented in Table 2. At this point, it should be noted that since all of the study experts are faculty members, they cannot be expected to have zero years of academic background, but while a number of the academics have private sector experience related to gastronomy, some of them either have no experience or have a short-term experience of a few years (maximum 3 years). Even if the academic does not have sectoral experience, his/her sectoral knowledge should not be evaluated at zero level due to the collaboration with sectoral stakeholders and graduates throughout his/her teaching and academic life can be assumed that the sectoral experience score of this academic is the same as those with only a few years (maximum 3 years) of sectoral experience. The importance levels of the experts were calculated by normalizing their total scores under the criteria.

2.4. Gathering the experts' judgments

Let $\tilde{a} = (a_1, a_2, a_3, a_4)$ and $\tilde{b} = (b_1, b_2, b_3, b_4)$ be any two trapezoidal fuzzy numbers, with w being a positive real number representing the importance levels of the expert. To aggregate the different linguistic scales and to transform them to a common quantitative expression, certain fuzzy operations are used (Chen, Lin, & Huang, 2006). While Equations (1) and (2) represent the operations of summation and multiplication for the fuzzy numbers, respectively, Equation (3) shows the weighted average formula for the different fuzzy numbers.

$$\tilde{a} \oplus \tilde{b} = [a_1 + b_1, a_2 + b_2, a_3 + b_3, a_4 + b_4] \quad (1)$$

Table 1
Linguistic terms with corresponding fuzzy numbers.

Linguistic Scale for Contribution Level	Trapezoidal Fuzzy Number $\tilde{A} = (a_1, a_2, a_3, a_4)$
No impact (NI)	(0, 0, 0.1, 0.2)
Very low-level impact (VLI)	(0.1, 0.2, 0.2, 0.3)
Low-level impact (LI)	(0.2, 0.3, 0.4, 0.5)
Moderate impact (MI)	(0.4, 0.5, 0.5, 0.6)
High-level impact (HI)	(0.5, 0.6, 0.7, 0.8)
Very high-level impact (VHI)	(0.7, 0.8, 0.8, 0.9)
Absolutely impact (AI)	(0.8, 0.9, 1, 1)

Table 2
Importance scores of the experts.

Academic Title	Score	Academic experience (years)	Score	Sectoral experience (years)	Score
Prof.	5	+20	5	+15	5
Assoc. Prof.	4	15–19	4	10–14	4
Assis. Prof.	3	10–14	3	6–9	3
Dr. Researcher	2	5–9	2	3–5	2
Researcher Lecturer	1	0–4	1	0–3	1

$$\tilde{a} \otimes w = [a_1 * w, a_2 * w, a_3 * w, a_4 * w] \quad (2)$$

$$\tilde{A}^*(a_1, a_2, a_3, a_4) = \sum_{i=1}^m w_i * \tilde{A}_i(a_1, a_2, a_3, a_4) \quad (3)$$

where $\tilde{A}_i$ indicates the related fuzzy number of the linguistic term assigned by expert i , w_i represents the importance level of the expert i , and $\tilde{A}^*$ indicates the aggregated fuzzy value corresponding different expressions assigned by all the experts under the relevant evaluation criteria of the course.

Because the aggregation results are in the form of fuzzy numbers, the process of transforming fuzzy numbers into crisp numbers, called defuzzification, is performed. The center of area method given in Equation (4), which is one of the most popular defuzzification techniques (Al Mamun, Howladar, & Sohail, 2019) was used.

$$X^* = \frac{1}{3} \times \frac{(a_4 + a_3)^2 - a_4 a_3 - (a_1 + a_2)^2 + a_1 a_2}{(a_4 + a_3 - a_2 - a_1)} \quad (4)$$

The linguistic expressions of the experts regarding the effectiveness levels of the courses under the three different perspectives were digitized using the fuzzy theory, and aggregated according to the experts' importance levels. The relative importance of each course was also calculated by the DEA method, which is based on the weighted optimization.

2.5. Data analysis

Performance analyses have always been a vital technique for managing systems better (Wanke, Barros, & Nwaogbe, 2016). As the number of considered criteria for the performance analyses increases, the problem of practical evaluation becomes more complex and unmanageable practically. DEA was suggested by Charnes, Cooper, and Rhodes (1978) and it is a non-parametric method for measuring and assessing the relative performances, efficiencies, and productivities of a set of entities, which are named decision-making units (DMUs) (Wanke et al., 2016). Ramanathan (2006) proposed a weighted linear optimization model for the DEA method and performs performance analysis of units whose inputs are considered to be the same, depending on their output. This weighted linear optimization model defines the optimal performance scores of all DMUs or, in other words, the level of importance of all of the courses under different criteria in the model. The model is shown below:

$$\begin{aligned} & \text{Maximize } \sum_{j=1}^J v_{mj} y_{mj} \\ & \text{Subject to } \sum_{j=1}^J v_{mj} y_{nj} \leq 1, \quad n = 1, 2, \dots, N \\ & v_{mj} \geq 0, j = 1, 2, \dots, J. \end{aligned} \quad (5)$$

The model gives the optimal score of course m based on the objective function and the constraints. While N represents the number of courses, J refers to the evaluation criteria, called the perspectives of gastronomy education. v_{mj} as the decision variable of the model represents the relative weights of the considered criteria j for the considered course m in the model. y_{mj} denotes the assigned score of the course m in terms of criteria j , and y_{nj} represents all courses in order. By changing the decision variable v_{mj} in the model, the model is solved repeatedly and gives the optimal total score for the course m . The constraints of $\sum_{j=1}^J v_{mj} y_{mj} \leq 1$ and $v_{mj} \geq 0$ ensure that the score each course can get is a maximum of 1, and a minimum of 0. Therefore, the model controls the weights of the criteria as the decision variable, so no course has a total score of more than 1, but ensures that each course gets the maximum score specified in the objective function. The model was implemented in the GAMS Studio optimization environment (version 1.5.2).

ABC analysis is used for a more effective interpretation of the performance scores obtained after the analysis. ABC analysis, which is frequently used in the inventory evaluation literature (Chu, Liang, & Liao, 2008; Ng, 2007; Ramanathan, 2006), is established on the Pareto principle, in other words 80/20 rule. When applied to course evaluation, it is assumed that those in the top 20% of the courses, according to the performance ranking, have an 80% impact on gastronomy teaching and these courses are defined as Class A courses. It is accepted that the 60% that comes after class A in the ranking is class B, known as the middle category, and the courses in the last 20%

segment are Class C courses, having the lowest impact. Class A courses are considered to have a high impact on students' gastronomy learning, while class B and C courses have a lesser impact, respectively.

3. Results

A total of 11 academicians of the faculty were asked to answer the evaluation forms according to the content and learning outcomes of the courses, using specified linguistic expressions. The linguistic expressions presented by the experts regarding the impact of each course under the specific gastronomy education perspectives were digitized through the fuzzy numbers presented in Table 1. On the other hand, the expert importance levels, which were used to aggregate the experts' assessments into a single value, were determined as in Table 3. When determining the w values, the total score value of each expert was divided by the sum of the scores of all of the experts as a normalization calculation. E10 is the expert with the highest importance weight ($11/86 = 0.128$), while E9 is the expert with the lowest importance weight ($4/86 = 0.047$). After the defuzzification process performed with Equation (4), the score values of all of the courses under the three perspectives were obtained. Utilizing the DEA model and ABC analysis method presented in the data analysis section, the general performance values and the categories A, B, and C of the courses were achieved.

The findings obtained as a result of applying the developed methodology to 112 courses evaluated within the Gastronomy and Culinary Arts curriculum are shown in Table 4.

The table includes the courses evaluated, their status, the scores obtained according to the three educational perspectives, and the performance values in the 0–1 range achieved by the DEA; whereupon the ABC categories are determined and their position in the rankings are presented. The considered courses in the curriculum of the department of Gastronomy and Culinary Arts have been ranked according to the gastronomy education perspectives and overall performances in consideration of the evaluations made by the academicians of the faculty. In descending order, the first 23 ($112 \times 0.20 \approx 23$) courses were assigned as class A, the last 23 as C class, and those remaining as B class.

Having analyzed the effectiveness of the courses, it was determined that, as expected, there were a number of differences regarding the perspectives. In the 'culinary arts', the courses directly related to cuisine such as 'Menu Planning', 'Introduction to Nutrition', 'Aliment Security and Hygiene' and 'World Culinary Cultures' were found to be more effective. In terms of the 'culture' perspective, the courses that deal with gastronomy culturally, such as 'Gastronomy History', 'Gastronomy Writing', 'New Trends in Gastronomy', 'Culinary Arts of the World' were of greater importance. Lastly, from the point of the 'F&B management' side of gastronomy education, management and business-related courses, such as 'F&B Management', 'F&B Marketing', 'Introduction to Accounting', and 'F&B Cost Control' came to the fore.

Fig. 2 presents the performances of class A courses, which were defined as the highest performing according to the result of DEA, under the determined perspectives. For example, 'Kitchen Management', which is one of the courses contributing the most within the scope of gastronomy education, has an enormous impact from the perspective of 'culinary arts', while it has a lesser impact in terms of 'F&B management' and 'culture'. Again, while the courses of 'Gastronomy History' and 'Gastronomy Writing' impact students a great deal from the perspective of 'culture', these courses have lesser effects upon the perspectives of 'culinary arts' and 'F&B management'.

To graduate, students must take the courses of 'English I-II' and the following 'Academic English III-IV', and as their second foreign language course (FLC) they additionally choose one of the courses from 'Italian I-II-III-IV' or 'French I-II-III-IV'. However, within the scope of Gastronomy and Culinary Arts program education, it has been concluded that 'English I-II' and 'French I-II-III-IV' courses are high-performance class A courses according to the results of the DEA, while the 'Academic English III-IV' course has a low performance level within the scope of C class. In this case, it may be recommended to expand the English courses to I-II-III-IV with general English courses that can replace 'Academic English III-IV' and the course of 'French I-II-III-IV' may be offered as a compulsory second language course, in addition to the compulsory English course.

In Fig. 3, the curriculum analysis, according to the performance and status of the courses, is presented. It is possible to monitor how various A, B, and C classes, determined by the results of the study, are represented in the curriculum according to the status of the courses (CC, DEC, EC, FLC). It can be specified that the curriculum of the department covers the 'F&B management' perspective at most with 12 CCs in class A, while it covers 'Culinary Arts' with 10 CCs and the 'culture' perspective with only 8 CCs. In terms of the class A DECs, it can be emphasized that, while the curriculum is more inclusive for the 'culinary arts' perspective with 11 DECs, it covers less

Table 3
Expert information.

	Expert Title	Score	Academic experience (years)	Score	Sectoral experience (years)	Score	Scores'Sum	w
E1	Assoc. Prof.	4	15–19	4	0–3	1	9	0.105
E2	Assoc. Prof.	4	+20	5	0–3	1	10	0.116
E3	Dr. Researcher	2	5–9	2	0–3	1	5	0.058
E4	Assis. Prof.	3	10–14	3	6–9	3	9	0.105
E5	Lecturer	1	10–14	3	+15	5	9	0.105
E6	Dr. Researcher	2	5–9	2	3–5	2	6	0.070
E7	Dr. Researcher	2	5–9	2	0–3	1	5	0.058
E8	Assis. Prof.	3	+20	5	0–3	1	9	0.105
E9	Dr. Researcher.	2	0–4	1	0–3	1	4	0.047
E10	Assoc. Prof.	4	+20	5	3–5	2	11	0.128
E11	Assis. Prof.	3	15–19	4	3–5	2	9	0.105

Table 4

Performance ranking of the courses according to DEA results, and analysis scores.

Courses	Type	Culinary Arts	Culture	F&B Man.	DEA	Courses	Type	Culinary Arts	Culture	F&B Man.	DEA
Kitchen Management	CC	A 0.898	B 0.651	B 0.766	A 1.000	Mixology	DEC	A 0.775	B 0.543	B 0.571	B 0.863
Menu Planning	DEC	A 0.867	B 0.619	A 0.885	A 1.000	Effective Communication Techniques	DEC	B 0.667	B 0.688	B 0.744	B 0.860
French I-II-III-IV	FLC	A 0.847	A 0.788	B 0.766	A 1.000	Regional Cuisines I-II	DEC	A 0.767	B 0.575	B 0.569	B 0.860
Gastronomy History	CC	A 0.803	A 0.884	B 0.585	A 1.000	Coffee Industry	DEC	B 0.695	B 0.628	B 0.751	B 0.860
World Culinary Cult.	DEC	A 0.803	A 0.847	B 0.751	A 1.000	Pastry	DEC	A 0.769	C 0.457	C 0.436	B 0.857
English I-II	FLC	A 0.773	A 0.851	A 0.854	A 1.000	Spanish I-II	EC	B 0.687	A 0.706	B 0.703	B 0.856
F&B Management	CC	B 0.748	B 0.654	A 0.908	A 1.000	Wild Edible Plants	DEC	B 0.753	B 0.591	C 0.401	B 0.853
Gastronomic Writing	DEC	B 0.573	A 0.894	C 0.416	A 1.000	Professional Ethics	DEC	B 0.709	B 0.589	B 0.743	B 0.849
Basic Health Infor. and First Aid	CC	A 0.823	A 0.715	A 0.855	A 0.992	Tourism Legislation	EC	C 0.506	C 0.448	B 0.770	B 0.849
New Trends in Gastronomy	DEC	B 0.715	A 0.861	B 0.638	A 0.983	Creativity	DEC	B 0.716	B 0.673	B 0.578	B 0.848
Aliment Security and Hygiene	CC	A 0.822	A 0.721	A 0.821	A 0.982	Quality Man. in the Service Sector	DEC	B 0.606	C 0.458	B 0.765	B 0.843
F&B Marketing	CC	B 0.612	B 0.559	A 0.885	A 0.975	Food Styling and Photography	DEC	B 0.723	B 0.640	B 0.565	B 0.843
Introduction to Accounting	CC	B 0.598	B 0.583	A 0.882	A 0.972	Cost Accounting	CC	B 0.670	B 0.510	B 0.754	B 0.839
F&B Cost Control	CC	B 0.733	B 0.547	A 0.879	A 0.970	Institutionalization in Tourism Business	EC	C 0.448	C 0.422	B 0.756	B 0.833
Ottoman Culinary	DEC	A 0.840	A 0.708	B 0.583	A 0.968	Green Restaurant	DEC	B 0.644	B 0.557	B 0.748	B 0.833
Food Chemistry	DEC	A 0.852	B 0.671	C 0.423	A 0.966	Ergonomic Restaurant Design and Safety	DEC	B 0.625	B 0.521	B 0.747	B 0.825
Business Administration	EC	C 0.515	B 0.498	A 0.874	A 0.963	Food Technology	DEC	B 0.717	B 0.591	B 0.584	B 0.821
Introduction to Nutrition	CC	A 0.815	A 0.758	B 0.601	A 0.962	Plate Design	DEC	B 0.735	C 0.489	C 0.476	B 0.818
Introduction to Business	CC	C 0.513	B 0.556	A 0.871	A 0.960	Korean Cuisine	DEC	B 0.730	B 0.539	C 0.374	B 0.816
Banquet Management	DEC	B 0.708	C 0.498	A 0.869	A 0.957	Basic Photography	DEC	B 0.674	B 0.678	C 0.427	B 0.815
Culinary Arts of the World I-II	DEC	A 0.804	A 0.756	B 0.634	A 0.952	Critical Thinking	EC	C 0.499	B 0.697	B 0.666	B 0.815
Entrepreneurship	EC	B 0.585	B 0.614	A 0.860	A 0.948	Bar Management	DEC	B 0.559	B 0.671	B 0.700	B 0.813
Fundamentals of Information Techniques	CC	A 0.795	A 0.731	B 0.750	A 0.945	Basic Chocolate Production Techniques	DEC	B 0.727	C 0.474	C 0.388	B 0.809
Restaurant Management	DEC	B 0.635	B 0.631	A 0.849	B 0.941	Fundamentals Concepts of Law	CC	B 0.579	B 0.539	B 0.729	B 0.807
Basic Cooking Techniques I-II	CC	A 0.844	B 0.574	C 0.458	B 0.940	Technique of Dough Shaping I-II	DEC	B 0.721	C 0.437	C 0.265	B 0.803
Bread Making	DEC	A 0.842	B 0.551	C 0.292	B 0.938	Sectoral Relations in Tourism	DEC	C 0.412	B 0.519	B 0.722	B 0.795
Food, Culture and Community	DEC	B 0.737	A 0.823	B 0.596	B 0.937	Food Geography	DEC	B 0.675	B 0.624	B 0.606	B 0.795
Computer Applications in F&B Management	DEC	B 0.726	B 0.613	A 0.843	B 0.936	Culture and Tourism in Turkey	EC	C 0.495	B 0.685	B 0.563	B 0.788
Labor and Social Security Law	CC	B 0.585	B 0.542	A 0.847	B 0.933	Practices of Ready to Cook Product	DEC	B 0.683	B 0.580	C 0.513	B 0.788

Courses	Type	Culinary Arts	Culture	F&B Man.	DEA	Courses	Type	Culinary Arts	Culture	F&B Man.	DEA								
Turkish Cuisine Culture	CC	B	0.758	A	0.776	B	0.709	B	0.933	Basic Mathematics	CC	B	0.648	B	0.604	B	0.630	B	0.779
Public Relations	EC	B	0.525	B	0.532	A	0.844	B	0.930	Digital Tourism	EC	B	0.536	B	0.608	B	0.673	B	0.772
Budgeting in F&B Businesses	DEC	B	0.613	B	0.534	A	0.841	B	0.926	Cultural Heritage of Turkey	EC	B	0.537	B	0.672	C	0.517	B	0.769
Food Laws and Regulations	CC	B	0.764	B	0.674	A	0.792	B	0.923	Accessible Tourism	EC	C	0.424	C	0.425	B	0.696	B	0.767
German I-II	EC	B	0.728	A	0.771	B	0.770	B	0.922	Banquet Practices	DEC	B	0.666	C	0.465	B	0.669	C	0.766
Human Resources Management	CC	B	0.547	B	0.564	A	0.832	B	0.916	Folklore	EC	C	0.523	B	0.661	C	0.534	C	0.760
Service Techniques	CC	A	0.784	B	0.621	B	0.778	B	0.915	Social Psychology	EC	B	0.571	C	0.495	B	0.684	C	0.755
Nutrition Anthropology	DEC	B	0.759	A	0.753	C	0.432	B	0.914	Rhetoric	DEC	B	0.594	B	0.571	B	0.657	C	0.754
Scientific Research Methods	CC	B	0.725	A	0.769	B	0.697	B	0.908	Ecology and Tourism	EC	B	0.609	B	0.606	B	0.614	C	0.750
Introduction to Economy	CC	B	0.545	B	0.598	A	0.822	B	0.907	Organizational Behavior	EC	B	0.525	C	0.451	B	0.679	C	0.748
Aesthetics and Art Philosophy	CC	B	0.747	A	0.742	B	0.611	B	0.900	Academic English III-IV	FLC	C	0.514	B	0.642	B	0.584	C	0.747
Introduction to the Kitchen	CC	A	0.772	B	0.636	B	0.710	B	0.893	History of Art	EC	B	0.576	B	0.639	C	0.520	C	0.735
Russian I-II	EC	B	0.728	A	0.723	B	0.720	B	0.892	Cultural Diversity and Communication	EC	C	0.504	B	0.626	B	0.565	C	0.728
Italian I-II-III-IV	FLC	B	0.704	A	0.747	B	0.746	B	0.892	Congress and Event Management	DEC	C	0.450	C	0.476	B	0.648	C	0.716
Customer Relationships	EC	B	0.560	C	0.483	A	0.806	B	0.888	Intercultural Communication	EC	C	0.489	B	0.609	B	0.561	C	0.709
Fermented Beverages	DEC	A	0.778	B	0.620	B	0.645	B	0.885	Types of Tourism I-II	DEC	B	0.530	B	0.543	B	0.615	C	0.703
Cuisine Practices I-II	CC	A	0.788	B	0.577	C	0.439	B	0.880	International Tourism Management	EC	C	0.421	C	0.466	B	0.634	C	0.701
Event Marketing	EC	C	0.481	B	0.548	A	0.796	B	0.877	Tourism Economy	EC	C	0.386	C	0.439	B	0.633	C	0.697
Distilled Beverages	DEC	B	0.740	B	0.697	B	0.647	B	0.877	PR Campaigns in Tourism	DEC	C	0.383	C	0.394	B	0.620	C	0.683
Project Preparation and Management	CC	B	0.733	B	0.677	B	0.696	B	0.874	Face-to-Face Cultural Interaction	EC	B	0.529	B	0.515	B	0.586	C	0.673
Gastronomy Seminars I-II	DEC	B	0.732	B	0.701	B	0.662	B	0.874	Ergonomics in Tourism	EC	C	0.407	C	0.440	B	0.568	C	0.634
Career Opportunities in F&B Industry	DEC	B	0.663	B	0.626	B	0.775	B	0.872	Support Services in Hotel Businesses	EC	B	0.533	C	0.428	B	0.547	C	0.629
Humans and Taste	DEC	B	0.601	A	0.765	B	0.553	B	0.872	Lifestyle Entrepreneurship	DEC	C	0.498	C	0.422	B	0.544	C	0.616
Cultural History	EC	B	0.595	A	0.768	C	0.510	B	0.868	Creative Cities	DEC	C	0.485	B	0.510	C	0.501	C	0.610
Industrial Kitchen Planning	DEC	B	0.748	B	0.640	B	0.640	B	0.865	Tourism, Media, Communication	EC	C	0.356	C	0.444	C	0.505	C	0.5761
Introduction to Communication	CC	B	0.530	B	0.556	A	0.785	B	0.865	Web Designing	EC	C	0.368	C	0.363	C	0.522	C	0.576
Creative Kitchen Practices	DEC	A	0.775	B	0.544	C	0.438	B	0.864	Tourism Guidance Seminars	EC	C	0.281	C	0.298	C	0.323	C	0.373

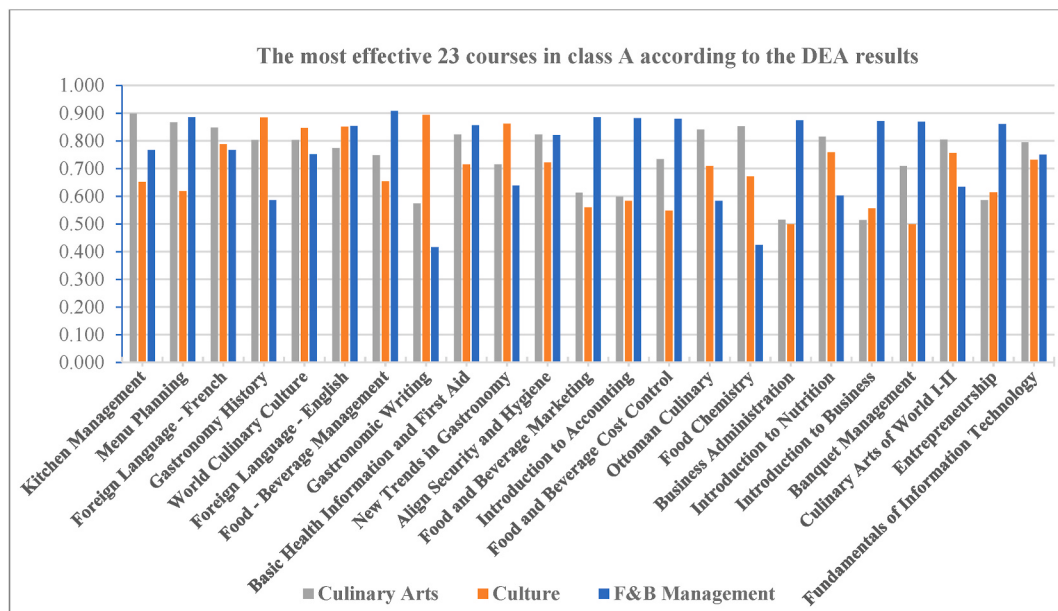


Fig. 2. Performances of class A courses under the defined gastronomy education perspectives according to the DEA results.

for the perspective of 'culture' with 8 DEC and 'F&B management' with 5 DEC.

When the other states between the classes assigned according to the DEA results and the courses' positions in the curriculum are examined, it can be seen that 11 of the 23 courses in class A, which are considered to be of high performance, are CCs in the curriculum, 8 are DEC, and 2 are ECs chosen by the students. 11 of the 27 CCs in the curriculum are Class A and 16 of these are Class B. It can be accepted as a satisfactory result that no course determined as class C according to the results of DEA is offered to students as a CC.

On the course basis, it can be seen that there are 2 CCs defined as class C from the 'F&B management' perspective. As shown in Table 4, these courses are 'Basic Cooking Techniques I-II' and 'Cuisine Practices I-II'. Although they are specified as class C in terms of 'F&B management', these courses are class A from the perspective of 'culinary arts'. This reveals the importance of specialization in the gastronomy department, which includes various disciplines. In other words, it can be suggested that to specialize in the perspective of 'F&B management' a student may take the courses which were found as class A, instead of those 2 CCs. From Table 4, it can be seen that these courses may be listed as 5 DEC consisting of 'Menu Planning', 'Banquet Management', 'Restaurant Management', 'Computer Applications in F&B Management' and 'Budgeting in F&B Businesses'; and there can also be 5 ECs consisting of 'Business Administration', 'Entrepreneurship', 'Public Relations', 'Customer Relationships' and 'Event Marketing'.

Fig. 3 also shows the number of courses that can be offered according to other branches. While it may be suggested for a student to

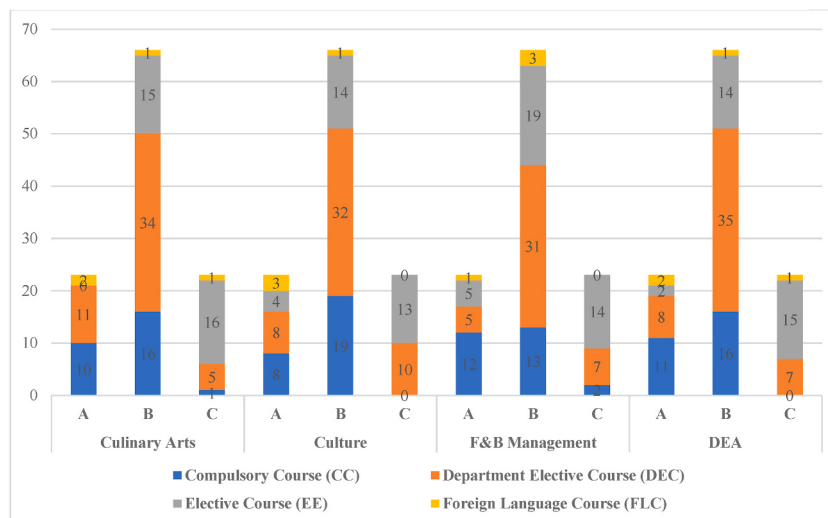


Fig. 3. Curriculum analysis according to the performance and status of the courses.

branch out in the field of 'culture' they may take the courses of 'French I-II-III-IV' and 'Italian I-II-III-IV' in addition to English, together with the 8 DEC and 4 ECs in class A, a student to branch out in 'culinary arts' can be offered 11 DEC and the course of 'French I-II-III-IV' in addition to the CCs.

It can be suggested that 3 courses (Tourism Guidance Seminars, Web Designing, and Tourism, Media, Communication) defined as class C both according to the DEA analysis, and according to all three of the perspectives, should be removed from the curriculum. If the curriculum is required to operate the same performance in all three perspectives, it can be said that it needs to increase the number of compulsory courses in class A that can be effective in the perspectives of the 'culture' and 'culinary arts'.

4. Discussion

Curriculum designs are shaped by various influences, such as precedents, the expertise of the academics of the institution, cost, patronage, existing physical infrastructure, and so on (Tribe, 2014). In other words, since the gastronomy courses at each university can differ according to the academicians and facilities, the gastronomy education vision of universities may also vary. When this situation is considered on a countrywide basis, it can be predicted that the food and nutrition cultures of countries will also create differences in the gastronomy curricula of each country. At this point, as suggested by Tribe (2014), we questioned what the purposes of the curriculum are, and precisely what it prepares students for in a gastronomy higher education institution in Turkey, and we defined three gastronomy educational perspectives belonging to the institution; culinary arts, culture, F&B management.

The results of the study show that even courses that have a high impact on gastronomy education can make different contributions to different areas of gastronomy education. This shows that despite the multidisciplinary structure of gastronomy, there may be sub-fields that are not mentioned at all, or not mentioned at all in the curricula. Curriculum reviews, which offer an analytical approach to recognizing and correcting such situations, are important studies.

When the status of the courses in the curriculum is compared with the performance values assigned as a result of the study (Fig. 3), it can be understood that the curriculum has the highest number of compulsory courses from the perspective of F&B management education and the least emphasis on the cultural perspective. This finding is in line with a study by Seyitoğlu (2019), which states that the gastronomy curriculum in Turkey is mostly focused on business courses.

In the Turkish curricula examined, it was observed that there is no educational perspective or courses that aim to teach analytical subjects, such as physical and chemical analysis of foods. This can be explained by the assumption that food science in Turkish higher education is seen as a field that is mostly handled within the framework of food engineering, which needs to be demonstrated through studies.

Considering the proposed methodology, the curriculums may be revised by removing courses, changing their status or credits, and adding new courses that take into account different educational perspectives of gastronomy. However, curriculum revision practices in institutes require much more than analytical assessment. It is important to seek the views of a wide range of stakeholders, including academics, students, alumni, and industry representatives. However, the findings of analytical curriculum reviews with multiple academics familiar with the curriculum may be used as a basis for discussion with other stakeholders. For example, stakeholders could be consulted on the removal of courses that have the least impact on gastronomy education compared to other courses. A similar implication was conducted for the considered gastronomy department, and the results of this study were accepted as a first step towards curriculum revision. The curriculum revision was performed after multiple interviews with students, alumni, and industry stakeholders (<https://www.anadolu.edu.tr/en/academics/faculties/1576/gastronomi-ve-mutfak-sanatleri-bolumu/courses>).

5. Conclusion

Although it is stated in the literature that it may be difficult to make a consistent evaluation for curricula created with subjective approaches (Hsieh, 2013), this study proposes an analytical evaluation approach that can be used for different curricula. Within the scope of the study, the contributions of the courses in the curriculum to the defined gastronomy educational perspectives, and which perspective the curriculum more or less covers, are evaluated. It is revealed that improvements should be made in the curriculum in the fields of culture and culinary arts covering various disciplines of gastronomy. Since the curriculum does not include courses on analytical sub-topics, such as the physical and chemical analysis of foods, it is recommended that a new educational perspective be defined for the department and that relevant courses be included in the curriculum. Therefore, the study creates an environment where the concrete aims of the curriculum proposed by Tribe (2014) can be presented and discussed theoretically. Descriptively, it provides a methodology to assess whether educational gastronomy institutions focus more or less on certain areas of gastronomy through their curricula.

One of the aims of the study is to provide a basis for reforming a curriculum considering the different educational visions of the universities to develop strategies in accordance with the advanced curriculum in the education, and the studies that will enable students to choose courses that are suitable for their competencies. Considering the inadequacy of the curricula of gastronomy institutions, and the need to update them (Stefanini et al., 2021), it is thought that the presented methodology will pave the way for needs-based curriculum reforms. We believe that the paper will help in the development of flexible course planning for more productive curricula to meet the personal requirements of students.

Given the variability of the field of gastronomy throughout the world, it may not be possible to generalize the findings. Since all of the study experts are composed of academicians conducting research in the field of gastronomy, their evaluations on the curriculum with which they are acquainted reveal important findings. Considering the proposed methodology, the curriculums may be revised by removing courses, changing their status or credits, and adding new courses that take into account the different educational

perspectives of gastronomy. As Tuna and Başdal (2021) state, the greatest benefit of evaluating an education program is that it will reveal the shortcomings and strengths of that program through a structured evaluation methodology. The proposed evaluation model offers an alternative structured way for curriculum developers.

In future studies, the scale of the study could be extended considering all courses given by any given country's universities and gathering more academicians' judgments. Helpful solutions are required for education managers by reforming the curricula to close the gap in undergraduate quality between labor supply and demand (Tong et al., 2020). Therefore, the reflections of curriculum arrangement and gastronomy education perspectives on graduate employment could also be investigated.

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CRediT authorship contribution statement

Author 1: Conceptualization, investigation, methodology, analyzing, writing original draft, editing, Author 2: Conceptualization, investigation, visualization, supervision, editing.

Declaration of competing interest

The authors declare no conflict of interest.

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