Evaluating and Pricing the Musical Works Using Multi-attribute Decision-Making

Azadeh Dabbaghi
Research Institute of Petroleum Industry (RIPI), Tehran, Iran.
Email: dabbaghi@ut.ac.ir

ABSTRACT

The evaluation of an artwork is a qualitative and, in the meanwhile, a complicate task and it does not seem in the first glance that it can be accomplished by the interdisciplinary methods, especially the quantitative and mathematical evaluation techniques. In general, consideration of the numerous attributes, the use of the opinions of several decision-makers and qualitative nature of the indices cause the transformation of the evaluations and adoption of decisions into complex tasks. Although various decision-making techniques such as multi-criteria decision-making, mathematical programming, simulation, and the like have dashed to the assistance of the managers, the use of these methods is more common in the quantitative and industrial domains. The present study uses a combination of two prominent techniques of multi-attribute decision-making as well as group Delphi to come up with a methodology that can be applied in the evaluation of the works in the various domains of art. In this article, the combined methodology has been offered for designing and implementing the musical works' evaluation and pricing system and the obtained results have been subsequently presented.
Keywords: music, evaluation of the artwork's factors, multi-attribute decision-making, Delphi, pricing

Introduction

Analysis, evaluation and adoption of decision under real conditions generally entail the consideration of numerous attributes and use of the opinions of several decision-makers. This is while the simultaneous paying of attention to several indices as well as the achievement of a consensus in the evaluations is not easy. Moreover, the amount of the decision's complexness is directly associated with the number of attributes. In better words, the larger the number of the decision-making scales (meaning that the human beings' minds are incumbently obliged to simultaneously pay attention to numerous criteria for the adoption of the best decision), the more complex the decision-making problem would be. The qualitative nature of the attributes, as well, increases the complexity of the foresaid process. There is no doubt that the managers are to deal in this industrial world with many complex decisions. This is why the mathematical and engineering techniques of the industries in decision-making and evaluation have darted to the assistance of the managers. "Multicriteria decision-making and analysis" is one of the techniques used in various domains of the industrial management and engineering such as performance evaluation (Chou & Liang, 2001; Li et al.,2020; Saini & Khanduja, 2019), Quality (Piasecki& Kostyrko, 2020; Martínez-López & Gonzalez, 2020) and strategic management (Tsai,2020; Mavi Et al., 2020). These methods are largely applicable due to their comprehensiveness and ease of use in the other areas. Despite these techniques' application in various areas, its application in the cultural, artistic and other domains is faced with a lot of challenges. In these domains, the application and use of the quantitative and mathematical techniques for the experts' performing of qualitative evaluations is not simply accepted. However, there are examples of the multi-criteria decision-making methods' application. Lv (2014) utilized this technique for evaluating the Music Teachers' Professional Quality with the objective of

increasing the effectiveness of teaching. Taghizadeh and Salehi (2014) prioritized the instruction of Iran's national systems of melodic figures using Group-AHP. They specified the important scales of arranging the instruction of the melodic figures and evaluated and compared the precedence and subsequence of the instruction of every system of the melodic figures.

Standardization of the resources, activities and productions and, subsequently, the evaluation and pricing of them have always been one of the important responsibilities and decisions in the area of the product and service offering. One of the cultural and artistic products of the national media is the musical works. Better said, one of the responsibilities of the national media is the production and supply of the various musical genres (species) for broadcast through the national media networks. Offering a systematic method for qualitative evaluation of the produced musical works (including in Tehran and other provincial capitals) and determination of the prices (sums of money payable) for these works are the subjects of the present study. The evaluation of the produced musical works is carried out in a council comprised of the experts of music appraisal known as the "supreme pricing council". The evaluation hence the pricing of these works was carried out for years based on the rates specified in an enacted letter that divided the produced musical works in terms of difference in the structure of them commonly into four classes of "A", "B", "C" and "D" in such a way that the more complex a constructed work the higher its class; for example, the symphonic and national works fall in the class "A"; the traditional musical works fall in the class "B"; the pop and combined pop works fall in class "C" and the solo and child works fall in the class "D". However, it was perceived in the course of time that the higher the class of a work, the more important it is; it seems as if the composition of a work in class "D" means the offering of a weak or low-value work and the motivation required for the producing of works with the quality of the genres like solo, child, traditional and others was diminished with the pass of time. This is while these works could compete with the works in higher classes in terms of their artistic competency and, in the meantime, have had their special and large number of addressees. One of the important goals in the production of an artwork is its impression. A musical part that can become eternal and a masterpiece only with the use of one or two musical instruments was increased into a large volume of work and a large number of musical instruments so that it can be evaluated as a musical work with a higher class; and, the work that could have been the best musical work if composed simply was totally spoiled by doing so. The issue went on to the extent that the planning in the production of the musical works moved towards the production of the musical works "A" or, at most, "B" to the extent that no work could be found evaluated as "C" or "D".

The evaluation of the musical works into one of the four aforesaid classes was carried out based on a score table. The division of the scores and their allocation between the factors of a musical work had also their own shortcomings. Interference in the spans of the set scores, non-fixedness of the weight of every factor's in various classes and incumbent use of the decimal numbers for determining a score all of which were amongst the shortfalls of the prior evaluation methods.

Although using the foresaid rate letter as the basis for the pricing had been able to cause the required integration in the evaluations, the revision of the musical works' evaluation method was envisioned necessary considering the abovementioned flaws and in proportion to the newly emerging needs (such as increase in the course of the prices and salary and wage and others of the kind).

In this study, a method comprised of the two outstanding techniques in the area of the multi-criteria decision-making and analysis (AHP and SAW) has been used for the evaluations. On the other hand, for making a group decision and achieve the data agreed by the experts, the offered quantitative technique has been combined with Delphi group decision-making method. The obtained combined method is the method capable of using the opinions of several decision-makers and offering qualitative attributes for adopting decisions under the conditions that there is a need for the consideration of numerous indices. This method is specifically applicable to the area of the content/art evaluation. The present article shows the application of the offered combined method for the evaluation of the musical works. Based on the offered method, an evaluation and pricing system has been utilized within the format of the applied designing software and for the evaluation of the musical works in the pricing council.

The structure of the materials presented in this article following the introduction is as follows: in the second Section, the stages of the combined method's implementation have been presented within the format of a flowchart. In the third Section, the used techniques will be introduced. In the fourth Section, the stages of the implementation of the combined method are presented for evaluation of the musical works and they will be explicated in a step-to-step manner. The fifth Section deals with the quality and advantages of an application's development for the implementation of a comprehensive system. The sixth Section offers the results of the method's application and gives suggestion for further future research.

1. research methodology and Stages of Implementation:

The combined method offered in this study can be exhibited within the format of the stages shown in figure (1).
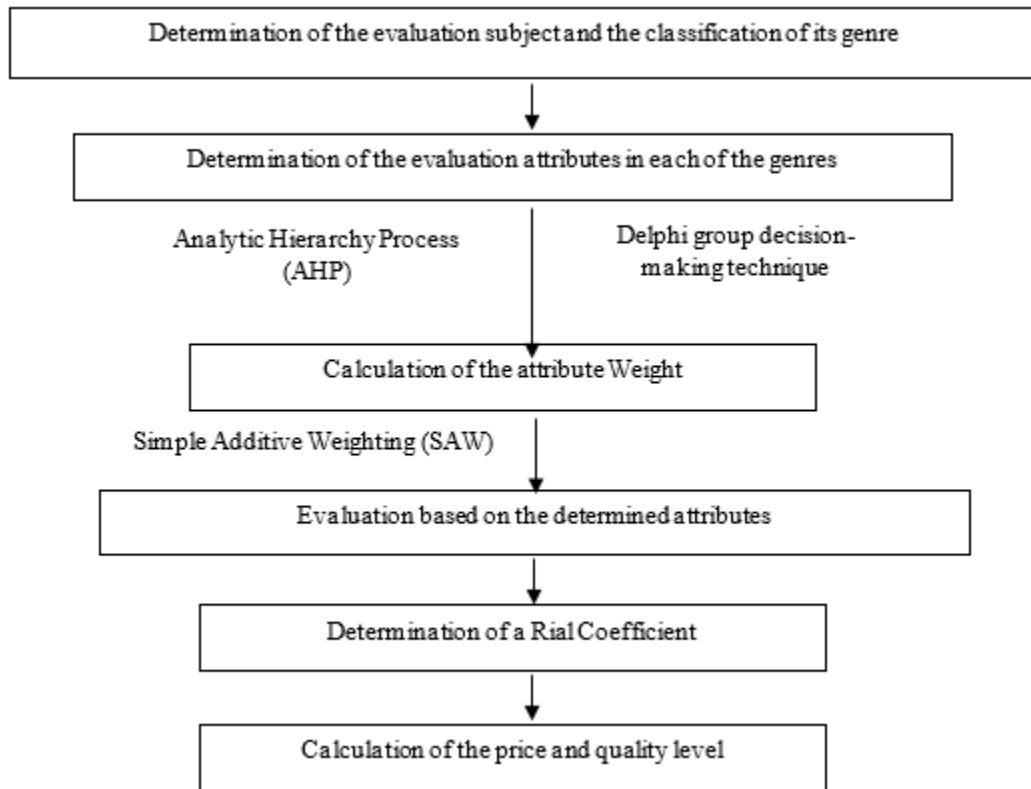

Figure (1): stages of the presented combined method for multi-criteria group decision-making

2. Introducing the Used Techniques:

    2.1. Analytic Hierarchy Process (AHP):

In most of the multi-criteria decision-making methods, the use of weight is necessary. The weights express the relative importance of the goals. The goal to which a higher weight is allocated enjoys a higher importance from the perspective of the decision-maker. The weights are usually designated by W and Wj is the weight of the j-th goal. In mathematical relations pertinent to the computation of the weights, the system of the weights is normalized (Ghodsipour, 2007) in such a way that:

$$\sum_j w_j = 1 \quad , 0 < w_j < 1$$

In the analytic hierarchy process and following the formation of the decision hierarchy and determination of the evaluation attributes, the attributes of every level are compared in respect to the

corresponding element in a higher level in a pairwise manner. In these pairwise comparisons, the decision-makers usually apply qualitative judgments in such a way that if the index A is compared with the index B, the decision-maker would say that the A's importance is higher than the B's as explained in Table (1) (Nazri et al., 2016). In fact, Table (1) shows the range of the preferences for the pairwise comparisons.

Table 1: the preferences in the pairwise comparisons

Extremely preferred	9
Very strongly preferred	7
Strongly preferred	5
Moderately preferred	3
Equally preferred	1
Preferences between the intervals	2, 4, 6 and 8

The attributes existent in every level are compared in a pairwise manner in terms of the corresponding elements in the higher level hence a matrix is obtained. It has to be noted that the preference of an index over itself is equal to unity in a pairwise comparison hence all of the elements on the diameter of the pairwise comparison matrix are equal in value to one. In addition, if A is preferred to B for a value of two, the preference of B to A is equal to ½ (Reciprocal relationships) or, in other words, if a_{ij} be the importance of the i-th attribute in respect to j-th index, we would have the following in pairwise comparison matrix:

$$a_{ij} = \frac{1}{a_{ji}}$$

$$a_{ii} = 1$$

The human mind can establish relationships between the components in such a way that a logical consistency and stability can be existent between them. Information about the consistency of the judgments is important due to the reason that the random judgments based on the senses can be prevented. One of the advantages of the pairwise comparison process is controlling the consistency of the decision. In other words, the consistency of a decision can be continuously calculated in this process and judgment can be made about the goodness or badness or acceptance or rejection of that judgment.

Consistent matrix: if n be the scale with this explanation that $C_1, C_2, C_3, ... C_n$ and their pairwise comparison matrix are in the following form:

$$A = \| a_{ij} \| \quad , i, j = 1, 2, ..., n$$

Where, aij denotes the preferences of the elements of Ci to the elements of Cj, if we have the following in this matrix:

$$a_{ik} \times a_{kj} = a_{ij} \quad , i, j, k = 1, 2, ..., n$$

Then, we can say that matrix A is consistent. It can be generally stated that the eigenvalue is equal to the length of the matrix in every consistent matrix (AW=nw).

Every pairwise comparison matrix might be consistent or inconsistent. When the number of the compared attributes is high and, specifically, when the attributes are qualitative and the decision-maker is required to judge about their importance, it happens less frequently for a pairwise comparison matrix to be perfect like the above-defined one. Thus, an index named CR or the consistency ratio is defined (Saaty, 2001) as follows:

$$\lambda_{\max} = \frac{\sum a_{ij} W_j}{W_i}$$

$$C_I = \frac{\lambda_{\max} - n}{n - 1}$$

$$C_R = \frac{C_I}{R_I}$$

Where, R_I can be extracted per every n (pairwise comparison matrix's dimension) from the following Table:

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	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59	

If the assumed pairwise comparison matrix's consistency can be accepted. Therefore, the weight calculation in this state is simple and it is obtained from the normalization of every column, meaning that if the pairwise comparison matrix takes the following form:

$$A = \begin{pmatrix} a_{11} & a_{12} & & a_{1j} \\ a_{21} & a_{22} & & a_{2j} \\ & & & \\ a_{i1} & u_{i2} & & a_{ij} \end{pmatrix}_{n \times n}$$

Nij would be the normalized amount for every aij and it is obtained from the following relation:

$$n_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}}$$

Then, for every n-attributes, Wi can be computed in the following form:

$$W_i = \frac{\sum_{j=1}^{n} n_{ij}}{n}$$

In this method, if k be the number of the experts, each of the pairwise comparison matrix's entries can be calculated in the following form:

$$a_{ij} = \sqrt[k]{\prod_{r=1}^{k} a_{ijr}}$$

Where, aij is the idea of the r-th expert about the amount of the relative importance of the i-th index in respect to the j-th index.

2.2. Simple Additive Weighting (SAW):

If the amount of the relative importance (weight) of the attribute is shown with the vector $W = (w_1, w_2, ..., w_n)$ and the following Matrix U expresses the preference of the alternatives in comparison with the attributes (Sahir et al., 2017):

$$U = \begin{pmatrix} u_{11} & u_{12} & & u_{1j} \\ u_{21} & u_{22} & & u_{2j} \\ & & & \\ u_{i1} & u_{i2} & & u_{ij} \end{pmatrix}_{m \times n}$$

Where, uij expresses the amount of the optimality of the i-th alternative in respect to the j-th choice, the total number of the alternatives would be equal to m and the number of the attributes would be equal to n. In this case, the optimality of the i-th alternative can be evaluated in the following form:

$$U_i = \frac{\sum_{j=1}^{n} u_{ij} w_j}{\sum_{j=1}^{n} w_j}$$

And, it will be used as a basis for selecting and ranking the alternatives in this method.

It is worth mentioning that if k be the number of the experts, each cell of the above matrix can be calculated in the following form:

$$u_{ij} = \frac{\sum_{r=1}^{k} u_{ijr}}{k}$$

Where, aij is the r-th expert's opinion about the amount of the optimality of the i-th alternative respect to the j-th attribute.

2.3. Delphi Technique:

The use of the opinions by several decision-makers instead of one decision-maker would surely cause the large complexity of the analysis and evaluation of a decision. This is not only due to the difficulty of achieving agreement for but other factors like the possible conflicts between the members of the decision-making groups and their continent enjoyment of the various goals and scales may cause these complexities. Various instruments have been so far offered for contributing to group decision-making, provocation of the group creativity, reduction of the conflicts and fast achievement of the results such as brainstorming, nominal group technique and Delphi. The latter can be defined in sum as "Delphi may be characterized as a method for structuring a group communication process so that the process is effective

in allowing a group of individuals, as a whole, to deal with a complex problem."(Linstone & Turoff, 2002). Since, in this study:

- The invitation and presence of the members of the experts' group in a session is hardly possible.
- There is a possibility of error or bias in the individuals' notions due to the face-to-face confrontation with the other group members.
- The research team is interested in collecting the notions of each of the experts disregarding the hierarchy or the organizational position of them.
- The research team is interested in reducing the effect of the presence of the high-ranking visages and the peers' pressures on the decision-making.

Thus, Delphi method has been applied for acquiring and collecting the experts' ideas. This method generally has the following steps (Alizadeh, 2006):

Step One: decision or problem's expression

Step Two: collecting the notions of the group in the first round

Step Three: summarization of the results of the first round and requesting ideas for the second round

Step Four: collecting ideas for the second round

Step Five: summarizing the results of the second round and requesting the offering of ideas for the third round

Step Six: collecting ideas for the third round

Step Seven: summarization of the third round's results

Step Eight: final summarization

Of course, considering the nature of the problem, if there is a need for larger or lower numbers of rounds for achieving group agreement, the abovementioned stages can be proportionally increased or decreased.

3. proposing an Evaluation and Pricing System for the Musical Works:

In this Section, the method offered in the second Section will be explicated in a step-to-step manner.

3.1. Classification of the Musical genres:

During the various sessions held with the officials and the experts, the collection of the musical works were classified within the format of the following six genres according to the interests of the addressees, the musical culture and art as well as the standards of the musical works production and supply in the national media:

1) Orchestral Music:

Including the symphonic orchestra[1], national orchestra[2] and traditional musical instruments' orchestra[3];

2) Iranian Music:

Including the group of the traditional and local musical instruments;

3) Pop music

4) Child music

5) A Cappella music[4]

6) Solo music

---

[1] *It includes the group of the wood wind instruments, brass wind instruments, percussion instruments and string instruments. This orchestra can have between 50 and 80 musical instrumentalists based on the number and type of the written music.*

[2] *It includes the entire originally Iranian instruments in addition to the string and wood wind instruments.*

[3] *It includes the entire originally Iranian instruments, including pipe (reed), Tar (a type of guitar), Setar (a type of guitar), Lute (harp), hammer and dulcimer, Qānūn, Kamancheh, Qaychak (a sort of bowed lute), Tombak (goblet drum) and Daf (tambourine).*

[4] *This kind of music includes choir, solo and group singing. In this group, the performance of the solo recital of the musical segments is done without the musical instruments' accompaniment.*

3.2. Determining the attributes for the Evaluation of Each of the genres:

Determination of the attributes influencing the decision-making and evaluation is amongst the early and significant steps in the creation of an evaluation and multi-attribute decision-making system. Before now, the evaluation of all the musical works was carried out disregarding their genres based on four attributes, namely composition of music, singing, supervision and poetry. In this study and with the objective of determining the attributes influencing the evaluation of the musical works produced in each of the genres, a questionnaire was prepared and completed through interviewing with the musical experts[5]. This way, the definitions of each of the attributes were clarified and the collection of the attributes that had to be viewed as the criterion of evaluation regarding each of the attributes was collected. It is worth mentioning that the evaluation attributes of each genre can be considered as the very primary factors of the work's production. The collection of the information obtained in this stage has been summarized in Table (2).

Table 2: attributes for the evaluation of the musical works in every genre

Genre	Evaluation attributes
Orchestral	1)Composition; 2) arrangement; 3) supervision on recording; 4) singing; 5) lyrics
Iranian	1)Composition; 2) arrangement; 3) supervision on recording; 4) singing; 5) lyrics
Pop	1)Composition; 2) arrangement; 3) supervision on recording; 4) singing; 5) lyrics
Child	1)Composition; 2) arrangement; 3) supervision on recording; 4) singing; 5) lyrics
A Cappella	1)Composition and arrangement; 2) supervision on recording; 3) singing and 4) lyrics
Solo	1)Solo and 2) supervision on recording

In A Cappella music, since the composition and arrangement cannot be practically implemented and evaluated within the format of two separate and isolate factors, these two factors have been merged and they are evaluated as a single index in this genre.

3.3. Calculation of the Weights of the Attributes Through the Application of the AHP and Delphi Methods:

In the common methods of the multicriteria decision-making and after the determination of the attributes, the importance rates of each of them are calculated. The goal of this stage is the calculation of the amount of the relative importance (weight) of the indices (attributes). The performed investigations and the collected information during the stages 1-4 and 2-4 of the study signify that the relative importance of the attributes is not necessarily identical for all of the genres; due to the same reason, the information has been collected and the corresponding calculations have been done in this stage in separate for the various genres. In order to adopt group decisions and use the notions of the expert group, Delphi was the method of choice for the reasons mentioned in the Section (3-3).

Step One: the pairwise comparisons' questionnaire was designed with the objective of the determination of the attributes' relative weight based on the AHP method. In this questionnaire, one attribute was compared in respect to another (in a pairwise manner) by every expert and based on the values inserted in Table (1).

Step Two: the first round of the interviews was carried out. In every round and meanwhile interviewing with every single one of the experts, the questionnaires were completed and the notions of each of the decision-making group's members were transcribed.

Step Three: using the collected data, the group pairwise comparisons matrix was formed and the consistency ratio, mentioned in the Section (3-1) was calculated. Considering the inconsistency of the notions collected in the first round, it was envisaged necessary to once again refer to the experts, particularly the individuals whose ideas were more contradictory to the opinions of the group.

---

[5] *By the experts, we mean 16 superior Iranian music professionals and masters who were at hand due to the temporal and geographical constraints and could be interviewed so as to provide answers to the questions.*

Step Four: in this step, the second round of the interviews was completed. The experts were informed of the group members' opinions and reasoning and their revised opinions were collected. The results of the collected data and the calculations of the CR are expressive of the consistency of the group decision-making matrix and creation of consistency between the decision-makers.

Steps Five, Six and Seven: since the experts' agreement on the relative weights of the attributes was achieved in the end of the second round, the repetition of the steps in the third round was not viewed as being necessary.

Step Eight: the collected data were analyzed using expert choice software and the inconsistency rates and weights of each of the attributes were calculated. Table (3) gives the calculations performed in Table (3).

Table 3: The attribute weights evaluated in every genre

weight Genre	Composer	Arranger	Recording supervisor	Singer	Poet	Sum
Orchestral	0.198	0.363	0.092	0.191	0.156	1
Iranian	0.201	0.340	0.080	0.221	0.158	1
Pop	0.210	0.355	0.068	0.202	0.165	1
Child	0.204	0.380	0.101	0.149	0.166	1
A Cappella	0.364 (composition and arrangement)		0.182	0.318	0.136	1
Solo	0.563 (soloist)		0.237 (accompanied instrumentalist)	0.2 (recording supervisor)		1

3.4. Evaluating the Musical Work Based on the Determined Attributes:

Based on SAW technique (introduced in Section 3-2), for the calculation of Ui, since the weight of the attributes' vector has been normalized in Section 3-3, the amount of $(\sum_{j=1}^{n} w_j = 1)$ is set. The main objective of this research is not the ranking of the musical works against each other; In fact, this research has focused on the evaluation of one alternative based on the determined attributes (Section 4-2) and the weights (Section 4-2). So, Ui is calculated with i=1 for the evaluation of the musical work.

In this stage, it is necessary for each of the experts present in the pricing council session (evaluation expert) to announce his preference about a given musical work based on each of the attributes (u_{ijr}). In this study and in order to facilitate the experts' judgment, integrate the assessments and coordinate the opinions, u_{ijr} was defined for all of the musical genres in the interval of $1 \leq u_{ijr} \leq 10$. This way, each of the experts present in the pricing council's session expresses the amount of the optimality of the musical work heard therein according to each of the attributes within the format of u_{ijr} and in a written form on an individual paper. After performing the corresponding calculations in SAW method, the amount of Ui which is a value in the [1, 10] interval and called hereon as the musical work "score" can be obtained.

3.5. Calculation of the Work's Price and Quality Level:

The payable price of the work is calculated based on the musical work score and considering a monetary coefficient. The question that is raised in this stage is that if, as an example, a work in orchestral genre and another in child genre deserve both to receive a score of eight, should they both be given an identical amount of money? Considering that the structure of the artwork, the volume of the work and the number of the applied musical instruments and the amount of the use of the musical factors differ in various genres, two strategies are available for responding to the foresaid question:

1) For every genre, a specific monetary genre is considered;

2) The score should be moderated in every genre in such a way that the determination of a fixed monetary coefficient can be responsive to all the genres.

The adoption of the second strategy provides more flexibility for the application of the evaluation system meaning that if a certain monetary coefficient is considered in a period of time (saying annually) according to the organization's credits, the costs of the production factors and the amounts of the past payments, the developed system would be capable of application in consecutive years with the mere increase (or reduction) in the foresaid monetary coefficient and without any need for the exertion of revision. In order to implement the second strategy, sessions will be held in the presence of the experts and the minimum and the maximum scores of the artworks in every genre will be agreed in three quality levels and in a general form as well as in separate for the indices. Resultantly, the scores' table will be prepared for every genre which will be as explained in Table (4) for the child genre.

Table 4: the scores of the child music

Quality level	Index score										Total work (sum)	
	Composer		Arranger		Recording supervisor		Singer		Poet			
Excellent	18	13	29	22	8	6	13	8	12	10	80	59
Good	12.999	8	21.999	15	5.999	4	7.999	6	9.999	6	58.995	39
Intermediate	7.999	3	14.999	8	3.999	2	5.999	3	5.999	4	38.995	20

The modified score of the artwork can be obtained using the following relation:

$$U_i' = \alpha + (U_i - 1)b$$
$$b = \left[(\beta - \alpha - 9)/9\right] + 1$$

Where,

Ui is the score of the work (result of the calculations in the Section 3-4-2)

U_i' is the artwork's modified score

$[\alpha, \beta]$ is the score interval determined for every genre; for example, in child genre, $\alpha = 20$ and $\beta = 80$.

The monetary coefficient is set according to the organization's budget, cost of the production factors and the past history of the payments made for the musical works. This way, the price of an artwork (music) is the product of the multiplication of the artwork's modified score by the set monetary coefficient. By having the work's modified score and table of scores, the quality level of the artwork as well as the price and quality level of the attributes can be determined.

4. Implementing the Evaluation System and Designing a Software:

Based on the multi criteria decision-making techniques and Delphi method, presented and utilized in Sections 3 and 4, a combined method has been utilized for the evaluation of the musical works. In order to implement this method as a comprehensive evaluation system, software was developed. This system is the basis of the evaluation of the musical works in the pricing council. The followings are the advantages of such a software system:

- Ease of performing the calculations
- Creation of a systematic and coordinated procedure for inserting and recording the evaluation information
- Procedural unity for the quality of performing the evaluations in the pricing council's sessions
- Reduction in the calculation error
- Collecting of the software outputs (results of the artwork's evaluation) in a database

- Possibility of acquiring instantaneous and periodical reports
- Possibility of fast search for the artworks based on the time period or keywords
  This software has been codified using C# programming language in visual.net environment

Conclusions and Suggestions for Future Studies

In this study, a multi attribute group decision making approach was adopted for evaluations in the various artistic domains. The present article showed the application of the method as a case study in the evaluation of the musical works. Based on this method, a software was developed for the evaluation and pricing of the musical works and the opinions of the musical evaluators (experts present in the musical works' pricing council) can be inserted therein. This software performs the corresponding calculations and estimates the score, price and quality level of the artwork and each of the production factors and agents. The software output (as the pricing council's minute) is stored in a database. It is enabling the acquiring of reports and search in an instantaneous and periodical manner. Meanwhile creating a systematic and coordinated procedure for the insertion and recording of the evaluation information, the use of the developed pricing and evaluation system can cause a procedural unity for the quality of performing the evaluations in the various sessions of the pricing council in Tehran and other provincial centers.

As a suggestion for the future studies and under the conditions that there are vague, imprecise and insufficient data for the evaluation of the artworks, decision-making theories for uncertainty conditions such as fuzzy theories, grey theories and utility theory can be applied for performing better data evaluations and analyses.

References

1.	Alizadeh, A.R. (2006) conducting research using Delphi technique. Yousef Press (in Persian).
2.	Chou, T. Y., & Liang, G. S. (2001). Application of a fuzzy multi-criteria decision-making model for shipping company performance evaluation. Maritime Policy & Management, 28(4), 375-392.
3.	Ghodsi-pour, S. H. (2007). Analytical hierarchy process (AHP), Amirkabir University of Tech. Pub., Tehran.
4.	Li, L., Mao, C., Sun, H., Yuan, Y., & Lei, B. (2020). Digital Twin Driven Green Performance Evaluation Methodology of Intelligent Manufacturing: Hybrid Model Based on Fuzzy Rough-Sets AHP, Multistage Weight Synthesis, and PROMETHEE II. Complexity, 2020.
5.	Linstone, H. A., & Turoff, M. (Eds.). (2002). The delphi method techniques and applications, MA: Addison-Wesley.
6.	Lv, X. X. (2014). Research on Music Teachers' Professional Quality Evaluation Based on AHP. In Applied Mechanics and Materials (Vol. 543, pp. 4319-4322). Trans Tech Publications Ltd.
7.	Martínez-López, J. I., & Gonzalez, C. M. A. (2020, April). Evaluation of Decision-making Quality using Multi-attribute Decision Matrix and Design Thinking. In 2020 IEEE Global Engineering Education Conference (EDUCON) (pp. 622-629). IEEE.
8.	Mavi, R. K., Gheibdoust, H., Khanfar, A. A., & Mavi, N. K. (2019). Ranking factors influencing strategic management of university business incubators with ANP. Management Decision.
9.	Nazri, E. M., Balhuwaisl, M., & Kasim, M. M. (2016). A pre-evaluation step towards a guaranteed consistent AHP-based pairwise comparison. Journal of Advanced Research in Social and Behavioural Sciences, 4(1), 73-80.
10.	Piasecki, M., & Kostyrko, K. (2020). Development of Weighting Scheme for Indoor Air Quality Model Using a Multi-Attribute Decision Making Method. Energies, 13(12), 3120.
11.	Saaty, Thomas L. & Vargas, Luis G. Models, Methods, Concepts & Applications of the Analytic Hierarchy Process. Kluwer Academic Publishers: Norwell, Mass. 2001.
12.	Sahir, S. H., Rosmawati, R., & Minan, K. (2017). Simple Additive Weighting Method to Determining Employee Salary Increase Rate. Int. J. Sci. Res. Sci. Technol, 3(8), 42-48.
13.	Saini, N., & Khanduja, D. (2019). Financial Performance Evaluation Using MADM Approaches in Indian Banks. In Advances in Interdisciplinary Engineering (pp. 439-449). Springer, Singapore.
14.	Taghizadeh,M.& Salehi, A.(2014). Prioritizing the training of Iranian national musical instruments using Group-AHP. National Conference of Applied Statistics (NCAS2014)

15.   Tsai, P. H. (2020). Strategic evaluation criteria to assess competitiveness of the service industry in Taiwan. Journal of Policy Modeling.