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APPLICATION OF MULTICRITERIA ANALYSIS TO RESTORATION OF HISTORICAL PORTABLE ORGAN

INTRODUCTION

As time goes by, every historic object dilapidates and wears out. As the result, the values that it used to represent become obliterated and its effect on the public is weakened. Conservation and restoration of art works aim at preserving the extant matter and, if possible, at bringing the antiques to their former glory; the more so that the historical value of the objects increases with time.

Conservators' work, independently of their special fields of interest, should be preceded by research whose goal is the determination of the guidelines for the conservation efforts and the selection of the best methods of action. Inventory, documentation and research efforts are completed by a value analysis whose purpose is to precisely define several values of the object so as to emphasise and reveal the most important of them. A thorough analysis determines several possible methods of action, emphasising various groups of values. The basic value groups of historic objects and monuments have been formulated by Walter Frodl. These groups, expanded by musical issues, are used in this paper.

The possibility of a variant-based approach to the issue of the value analysis of historic items suggests that the methodology of the multicriteria decision support can be used for the selection of the best variant of conservation method of the individual item or monument. The possibility of shaping the selected values after the reconstruction of the object allows regarding the values as decision criteria. Possible ways of the instrument reconstruction constitute here decision variants.

In the 17th- and 18th-century Poland the portable organ, called the positive organ, was a very popular instrument¹; almost every parish was equipped with one. It was not only a church instrument, since the portable organ was used also to accompany dancers in ballrooms. Its popularity was due above all to the ease of handling and the possibility of easy transportation. Unfortunately, only 18 copies of this once so common instrument are nowadays extant in Poland (according to current research). One of the extant instruments from this group, found only recently, comes from Sokoły near Łapy in the Podlasie region of Poland. For many years the instrument had been stored disassembled, undergoing atmospheric and biological damage. Its condition made it impossible to use it either as a visual historic item (“piece of furniture”) or as a musical instrument. Such condition is called in Polish conservation science terminology a “destrukt”.

The value analysis of historic items is not only a theoretical consideration, but aims at determining the guidelines of conservation efforts and, in connection with experience and conservation science, allows for the selection of the best conservation methods for individual works of art. The precise estimation of value of the extant elements of the instrument became thus a research problem; on this basis the determination of several (10 to 20) variants of conservation programmes will be made. The purpose of this paper is the joint application of the analysis evaluating an historic organ and the Electre I method in the selection of the guidelines for conservation efforts in the case of the recently discovered organ.

This paper consists of six chapters. In Chapter 1 selected problems related to the analysis for the evaluation of an historic organ are described. Specified groups of values have been used for the construction of decision criteria. The history and original condition of the instrument in question have been described in Chapter 2. Possible methods of restoration of this instrument, treated as decision variants in multivariate analysis, have been presented in Chapter 3. The Electre I method is described in Chapter 4. Chapter 5 presents the application of the Electre I method proposed for the analysis of the problem in question, as well as conclusions following from it. The development of the restoration of the organ and the condition of the instrument after the restoration have been described in Chapter 6. In Conclusions the directions of further works are given.

¹ More on this topic see [6].

1. VALUES OF AN HISTORIC ORGAN AS DECISION CRITERIA

The first person to recognise and define the value of a separate group of historic objects – historic musical instruments – was the German scholar and musician Albert Schweitzer². Thanks to his authority the cause of preservation of historic organs gained many advocates among musicians as well as conservators and researchers.

The value analysis of historic objects, used nowadays in conservation science with respect to all kinds of historic objects and monuments, has been defined by Walter Frodl in the middle of the 20th century³, and was subsequently expanded and completed [2]; in the Polish legislation it resulted in an act concerning the preservation and protection of historic monuments [8]. According to this document an “historic monument or object” is “a building or an object, its element or subsystem, man-made or related to human activities which is an evidence of an epoch or an event from the past, whose preservation is of social value due to its historic, artistic or scientific value”.

Taking into account the synthetic character of the group of objects dealt with in this paper – historic organs – one should add to the values listed above musical and technical values of historic instruments⁴; a precise definition of such values will help improve value analysis.

In the following discussion we suggest a division of the values of historical organs into four groups: historic, artistic, musical and utilitarian values. We will now describe the values constituting each of the four groups.

Historic values determine the character of the object as a document and its influence on the development of historical knowledge. Among the values of this group are *scientific values*, due to the fact that an organ is an historic object, requiring a scholarly description. Also in this group are *technical values*, determining the ingenuity of the construction, the quality of the workmanship and the scientific value of its current condition. Also *historic emotional values*, perceived not only by scientists and scholars, but also

² During the Third International Congress of the International Musical Society, which took place in Vienna on May 25-29, 1909, he was the first to direct attention to the necessity of the preservation of old instruments due to their numerous values.

³ The author used the Polish translation of Frodl's work [1].

⁴ More on this topic in [7].

by the public at large, belong here. The *ownership values*, i.e., values stemming from the ownership of the original item (without hypothetical additions) are connected with honest approach of the conservators to the historic object, in which that what is preserved should be emphasised above all, as opposed to that what we think might have been there. The group of *artistic values* is related to the perception of historic organs as works of art, and this is connected with the instrument's case. To this group belong *historic-artistic values*, determining whether the solutions chosen by the builders are typical or atypical as well as the importance of the original, its copy or its hypothetical reconstruction. *Artistic qualities* affect the public independently of the current fashion or style. The *artistic effect* of the case of historic organ should match musical impressions received by the audience from the musical compositions heard by it. *Musical values* become apparent during a musical performance. We deal here with the issue of style (*historical musical value*) and of sound (*musical quality*). All of them taken together may reinforce the *musical influence* on the amateur listener. It can happen that the regaining of musical value and the preservation of the original technical solutions are conflicting goals. In such case we face the problem of *utilitarian values* of the historic instrument. The notions of live organ and dead organ are related to this group of values. A *musically dead organ* is an instrument that nowadays cannot fulfil its function of a musical instrument. A *live instrument* is an instrument capable of being used in musical performance, affecting the audience in various ways. Like any historic object, an organ as a piece of furniture can be also visually dead – not suitable for being exhibited, or else visually alive (independently of its musical “vitality”) – beautiful, but unplayable.

A comparison of the values described above is shown in Figure 1.

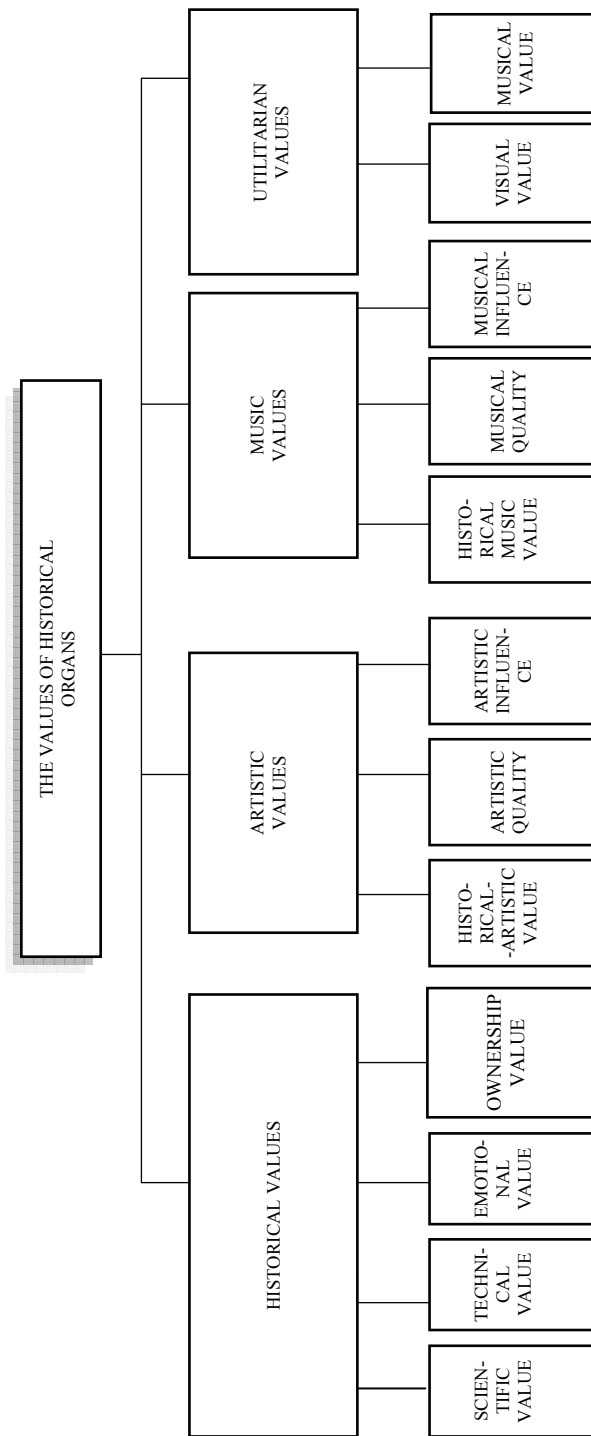


Fig. 1. The values of historical organs

The values listed above will be used as decision criteria in the problem of the selection of the best conservation variant⁵, discussed below. The decision criteria admit the values from 0 (lowest grade) to 5 (highest grade). The decision variants defined later in the paper will be evaluated by an expert, utilising during the evaluation his or her expert knowledge of the topic.

2. THE DESCRIPTION OF THE INSTRUMENT UNDERGOING THE RESTORATION

The basic feature distinguishing a portable organ from a stationary one are its small dimensions and a design allowing for placing of all elements characteristic for the organ-like instruments (pipes, wind chest, action, bellows) in a small, easy to handle case. The “compression” of the instrument’s mechanism is achieved by making the dimensions of the wind chest as small as possible, restricting the action to the direct transfer of the movement from the key to the pallet and mitring (often repeated) of the pipes or the use of common side walls of wooden pipes. Bellows of small dimensions always require a certain space for proper functioning, and that is why they are located on the instruments, underneath, or next to the case wall opposite the keyboard. The placing of the keyboard is also related to the localisation of the bellows, which follows from the construction of the wind chest.

The positive organ from Sokoły is an instrument of the two-chamber type, in which the lower one (larger) contains two wedge bellows, while the upper one (smaller), wind chest, pipes and keyboard. It is characteristic for this instrument that the lower chamber cover can be taken out and, after the bellows have been blocked, the upper chamber can be inserted into the lower one. Once this “package” is closed, the instrument is secured and can be transported conveniently. After the arrival at its destination, a two-part positive organ, when taken apart, is independent and does not require any auxiliary furniture.

The positive organ from Sokoły is preserved as a non-functional and visually unattractive object (“destrukt”) – each element was stored separately and individual parts were damaged. About 70% of the case, 90% of the mechanism and 10% of the sound system have been preserved. In this condition the value of the positive organ is recognisable by a narrow group of researchers who are able to visualise how to combine the individual parts.

⁵ In the following analysis we disregard the financial criterion, which should not influence the choice of the best (from the point of view of reconstruction) decision criterion.

3. POSSIBLE METHODS OF INSTRUMENT RESTORATION AS DECISION VARIANTS

On the basis of research and evaluation of the condition of the individual parts of the instrument (or their lack) 12 renovation treatments of the re-discovered instrument have been suggested. They are decision variants in the multivariate analysis conducted later. A grade has been attached to each variant, depending of the values that the instrument would gain after the reconstruction according to the given decision variant.

Variants discussed later are described below. The set of expert evaluations is shown in Table 1.

Situation I

Preservation of the instrument as a non-functional, visually unattractive object (“destrukt”) and its exhibition in the form of a group of museum exhibits.

Action: Securing of the individual parts by means of the so-called conservative treatment; reinforcement of the historic substance.

Result: Preservation of the 100% of the historic substance, but the organ is dead, visually interesting only for a small group of researchers (a collection of parts not resembling a musical instrument).

Situation II

Integration of the elements of the instrument using racks necessary to place the individual elements in proper places.

Action: Reinforcement of parts by means of conservative method, installation of racks (as little visible as possible).

Result: Minimal loss of the historic substance (ca. 1%) in order to assemble the racks. The organ remains dead, visually interesting only for a small group of researchers, but the ordered collection of parts begins to resemble a musical instrument.

Situation III

Integration of the parts of the instrument with full completion of the construction elements of the case (without covering the “windows” with reconstructed wood carved ornaments) according to their former shape as concluded from the preserved elements; completion of the missing parts of the mechanism. The pipes remain secured, but do not play.

Action: Cutting down the historic elements to join them with the added completions.

Result: Loss of a certain part of the historic substance (ca. 5%). The historical object becomes alive visually and is understandable for about half of the audience, but the organ as a musical instrument remains dead.

Situation IV

Integration of the parts of the instrument with full completion of the construction elements of the case according to their former shape, as concluded from the preserved elements; completion of the missing parts of the mechanism. Reconstruction of the polychrome and covering of the “windows” by a neutral filling (canvas, wooden grill). The pipes remain secured, but do not play.

Action: Cutting down the historic elements to join them with the added completions; covering of the valuable for researches carpentry joints by polychrome.

Result: Loss of a certain part of the historic substance (ca. 5%); visually, the object becomes definitely more attractive. The historic object becomes visually alive and pleasing to the audience; it is not uninteresting for a large part of audience, but it is still a dead instrument, without the functionality of a musical instrument.

Situation V

Integration of the parts of the instrument with full completion of the construction elements of the case according to their former shape, as concluded from the preserved elements; completion of the missing parts of the mechanism. Reconstruction of the polychrome. Hypothetical reconstruction of the wood carved ornaments filling out the “windows” (on the basis of comparative analysis – it is impossible to achieve the historical truth). The pipes remain secured, but do not play.

Action: Cutting down the historical elements to join them with the added completions; covering of the valuable for researches carpentry joints by polychrome.

Result: Loss of a certain part of the historic substance (ca. 5%); visually, the object becomes maximally attractive, but it still lacks the functionality of a musical instrument.

Situation VI

Integration of the parts of the instrument with full completion of the construction elements of the case (without covering the “windows” by reconstructed wood carved ornaments) according to their former shape, as concluded from the preserved elements; completion of the missing parts of the mechanism. Bringing the extant pipes to working condition and reconstruction of the missing pipes, so as to match the sound capabilities of the extant pipes.

Action: Cutting down the historical elements to join them with the added completions; aggressive conservation of the extant pipes.

Result: Loss of a certain part of the historic substance of the mechanism and case (ca. 5%), significant intervention into the condition of the historic pipes and loss of about 50% of their original condition to raise their technical value.

Result: Visually, the object is moderately attractive; utilitarian musical value appears, especially for people appreciating the original, historical sound.

Situation VII

Integration of the parts of the instrument with full completion of the construction elements of the case (without covering the “windows” by reconstructed wood carved ornaments) according to their former shape, as concluded from the preserved elements; completion of the missing parts of the mechanism. Exhibition of the extant historic pipes in a display case without giving them their former technical functionality. Reconstruction of the entire sound system according to preserved models.

Action: Cutting down the historical elements to join them with the added completions; complete reconstruction of the pipes.

Result: Loss of a certain part of the historic substance of the mechanism and case (ca. 5%), no aggressive intervention into historic pipes, achieving a hypothetical, reconstructed sound. The historic object becomes alive visually and understandable for about half of the audience. The instrument is alive, but its sound is entirely reconstructed.

Situation VIII

Integration of the parts of the instrument with full completion of the construction elements of the case according to their former shape, as concluded from the preserved elements; completion of the missing parts of the mechanism. Reconstruction of the polychrome and covering the “windows” by a neutral filling (canvas, wooden grill). Bringing the pipes to a working condition and reconstruction of the missing pipes, so as to match the sound capabilities of the extant pipes.

Action: Cutting down the historical elements to join them with the added completions; covering of the valuable for researches carpentry joints by polychrome; aggressive conservation of the extant pipes.

Result: Loss of a certain part of the historic substance of the mechanism and case (ca. 5%); visually the instrument becomes definitely more attractive; significant intervention into historic pipes and loss of about 50% of their original condition in order to raise their technical value.

Situation IX

Integration of the parts of the instrument with full completion of the construction elements of the case according to their former shape, as concluded from the preserved elements; completion of the missing parts of the mechanism. Reconstruction of the polychrome and covering the “windows” by a neutral filling (canvas, wooden grill). Exposition of the extant historical pipes in a display case without bringing them to a working condition. Reconstruction of the whole sound system according to preserved models.

Action: Cutting down the historical elements to join them with the added completions; covering of the valuable for researches carpentry joints by polychrome; full reconstruction of the pipes.

Result: Loss of a certain part of the historic substance of the mechanism and case (ca. 5%); visually the instrument becomes definitely more attractive. No aggressive intervention into historic pipes; achieving of a hypothetical, reconstructed sound.

Situation X

Integration of the parts of the instrument with full completion of the construction elements of the case according to their former shape, as concluded from the preserved elements and completion of the missing parts

of the mechanism. Reconstruction of the polychrome. Hypothetical reconstruction of the wood carved ornaments filling out the “windows” (on the basis of comparative analysis – it is impossible to achieve historical truth). Bringing the pipes to a working condition and reconstruction of the missing pipes so as to match the sound of the sound capabilities of the preserved pipes.

Action: Cutting down the historical elements to join them with the added completions; covering of the valuable for researches carpentry joints by polychrome; aggressive restoration of the preserved pipes.

Result: Loss of a certain part of the historic substance (ca. 5%); visually the instrument becomes maximally attractive. Significant aggressive intervention into historic pipes and loss of about 50% of their original state to raise their technical value.

Situation XI

Integration of the parts of the instrument with full completion of the construction elements of the case according to their former shape, as concluded from the preserved elements and completion of the missing parts of the mechanism. Reconstruction of the polychrome. Hypothetical reconstruction of the wood carved ornaments filling out the “windows” (on the basis of comparative analysis – it is impossible to achieve historical truth). Exhibition of the preserved historic pipes in a display case without bringing them to a working condition. Reconstruction of the whole sound system according to preserved models.

Action: Cutting down the historical elements to join them with the added completions; covering of the valuable for researches carpentry joints by polychrome; complete reconstruction of the pipes.

Result: Loss of a certain part of the historic substance (ca. 5%); visually the instrument becomes maximally attractive; no aggressive intervention into historic pipes; achieving a hypothetical, reconstructed sound.

Situation XII

Preservation of the instrument in its non-functional, visually unattractive condition (as a “destrukt”). Making of an accurate copy. The evaluation focuses on the values of the copy, which is presented to the public.

We do not deal here with an historic object anymore, but with a new, functional musical instrument.

Table 1

Comparison of the value criteria

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Historical-scientific value	10	8	6	6	6	6	6	6	6	6	6	0
Historical-technical value	4	6	10	8	8	6	10	6	10	6	10	0
Emotional value	10	10	10	8	6	10	6	6	4	4	2	0
Ownership value	10	10	10	9	5	8	5	9	4	5	0	0
Historical-artistic value	0	2	4	6	6	4	4	6	6	8	8	0
Artistic quality	0	0	2	4	8	2	2	4	4	8	8	8
Artistic influence	2	2	6	8	10	6	6	8	8	10	10	10
Historical-musical value	0	0	0	0	0	10	4	10	4	10	4	4
Musical quality	0	0	0	0	0	8	10	8	10	8	10	10
Musical influence	0	0	0	0	0	8	10	8	10	8	10	10
Visual-utilitarian value	2	4	6	8	10	6	6	8	8	10	10	10
Musical-utilitarian value	0	0	0	0	0	8	10	8	10	8	10	10

4. THE ELECTRE I METHOD

Let A be the set of decision alternatives, and F be the set of criteria:

$$A = \{ a_1, a_2, \dots, a_m \}$$

$$F = \{ f_1, f_2, \dots, f_n \}$$

Let's assume that criteria are defined in such a way that larger values are preferred to smaller ones. A weighting coefficient w_k is assigned to each criterion. It reflects the importance of the criterion for the decision maker.

For each pair (a_i, a_j) the concordance index is calculated as follows:

$$c(a_i, a_j) = \frac{\sum_{k=1}^n w_k \varphi_k(a_i, a_j)}{\sum_{k=1}^n w_k}$$

where:

$$\varphi_k(a_i, a_j) = \begin{cases} 1, & \text{if } f_k(a_i) \geq f_k(a_j) \\ 0 & \text{otherwise} \end{cases}$$

We assume that the global outranking relation between a_i and a_j takes place if two conditions hold: concordance condition and non-discordance condition. The former can be formulated as follows:

$$c(a_i, a_j) \geq s \quad \wedge \quad s \in [0,5; 1]$$

where s is the concordance threshold, defined by the decision maker.

Non-discordance condition is defined as follows:

$$f_k(a_i) + v_k[f_k(a_i)] \geq f_k(a_j) \quad \text{for } k = 1, \dots, n$$

where $v_k[f_k(a_i)]$ is the veto threshold for criterion f_k , defined by the decision maker.

Non-discordance condition means that the hypothesis “ a_i outranks a_j ” should be rejected if for at least one criterion the difference between criterion values for alternatives a_j i a_i is greater than the value of the veto threshold $v_k[f_k(a_i)]$.

The ELECTRE I procedure operates as follows:

1. Construction of the set of concordances C_s :

$$C_s = \{(a_i, a_j) \in A \times A : c(a_i, a_j) \geq s \wedge s \in [0,5;1]\}$$

2. Construction of the set of discordances:

$$D_v = \{(a_i, a_j) \in A \times A : \exists_k f_k(a_j) > f_k(a_i) + v_k[f_k(a_i)]\}$$

3. Composition of the outranking relation is defined as follows:

$$S(s, v) = C_s \cap \bar{D}_v$$

$$\text{where : } \bar{D}_v = (A \times A) \setminus D_v$$

4. Construction of the graph reflecting relations between the alternatives.

5. VALUATION OF INSTRUMENT RECONSTRUCTION VARIANTS

On the basis of experts' opinion, the following weights were assigned to the individual criteria:

$$\begin{array}{llll} k_1 = 50; & k_2 = 50; & k_3 = 30; & k_4 = 130; \\ k_5 = 50; & k_6 = 30; & k_7 = 30; & k_8 = 80; \\ k_9 = 50; & k_{10} = 30; & k_{11} = 15; & k_{12} = 30 \end{array}$$

It was also assumed that the use of veto thresholds was not necessary.

The application of the Electre I method requires the definition of the concordance set and, on this basis, of the outranking relation (since we do not use the veto thresholds, the discordance set plays no role here). Next, graphs of dependence between alternatives have been constructed, with the thresholds being gradually lowered until a sufficiently rich outranking relation is achieved.

The calculated values of the concordance indices are shown in Table 2.

Table 2

Concordance matrix

	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}
a_1	1.00	0.80	0.70	0.70	0.70	0.37	0.37	0.37	0.37	0.37	0.37	0.54
a_2	0.91	1.00	0.70	0.70	0.70	0.45	0.37	0.45	0.37	0.45	0.37	0.54
a_3	0.91	0.91	1.00	0.78	0.78	0.67	0.67	0.45	0.45	0.45	0.45	0.54
a_4	0.63	0.63	0.63	1.00	0.87	0.62	0.58	0.67	0.58	0.45	0.37	0.54
a_5	0.63	0.63	0.63	0.72	1.00	0.39	0.58	0.44	0.58	0.58	0.50	0.67
a_6	0.69	0.69	0.69	0.47	0.70	1.00	0.72	0.56	0.50	0.78	0.50	0.68
a_7	0.63	0.63	0.72	0.50	0.78	0.58	1.00	0.42	0.78	0.64	0.78	0.87
a_8	0.63	0.63	0.63	0.86	0.78	0.95	0.72	1.00	0.72	0.78	0.50	0.68
a_9	0.63	0.63	0.72	0.72	0.59	0.58	0.72	0.58	1.00	0.42	0.78	0.87
a_{10}	0.63	0.63	0.63	0.63	0.86	0.72	0.67	0.72	0.72	1.00	0.72	0.81
a_{11}	0.63	0.63	0.72	0.72	0.72	0.58	0.72	0.58	0.72	0.58	1.00	1.00
a_{12}	0.55	0.46	0.46	0.46	0.46	0.32	0.46	0.32	0.46	0.32	0.69	1.00

Graph of the outranking relation for $s = 0.95$ is presented in Figure 2.

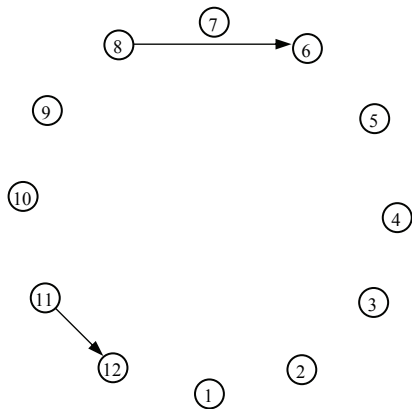


Fig. 2. The graph for $s = 0,95$

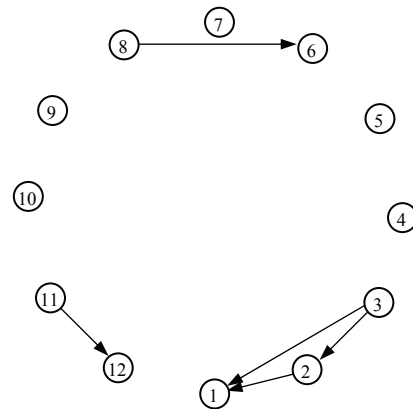


Fig. 3. The graph for $s = 0,91$

We obtain the following ranking:

1. $a_1, a_2, a_3, a_4, a_5, a_7, a_8, a_9, a_{10}, a_{11}$
2. a_6, a_{12}

The obtained ranking is not sufficient to determine the best decision alternative. Therefore, we lower the threshold. Figure 3 shows the outranking relation graph for $s = 0.91$.

We obtain the following ranking:

1. $a_3, a_4, a_5, a_7, a_8, a_9, a_{10}, a_{11}$
2. a_2, a_6, a_{12}
3. a_1

Again, the obtained ranking does not allow us to choose unambiguously the best alternative either. We continue to lower the threshold. Figure 4 shows the outranking relation graph for $s = 0.86$.

We obtain the ranking:

1. $a_3, a_7, a_8, a_9, a_{10}, a_{11}$
2. a_2, a_4, a_6, a_{12}
3. a_1

Six decision variants, $a_3, a_7, a_8, a_9, a_{10}$ and a_{11} , get the best evaluation. We continue to lower the threshold. Figure 5 shows the outranking relation graph for $s = 0.78$.

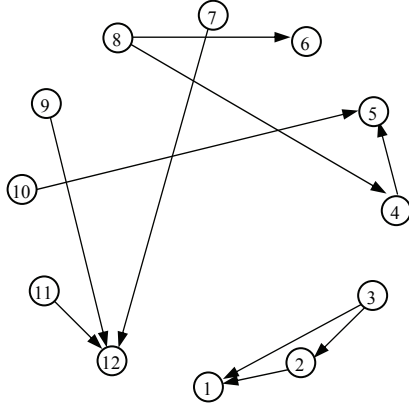


Fig. 4. The graph for $s = 0.86$

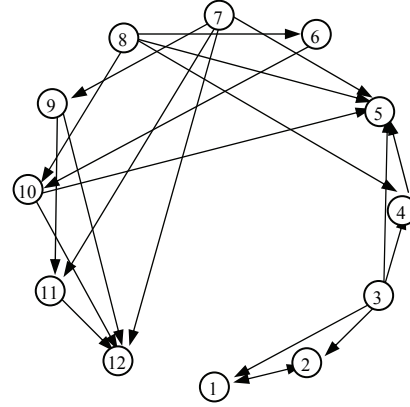


Fig. 5. The graph for $s = 0.78$

We obtain ranking:

1. a_3, a_7, a_8
2. a_1, a_2, a_4, a_6, a_9
3. a_{10}, a_{11}
4. a_5, a_{12}

Three decision alternatives, a_3, a_7 and a_8 , get the best evaluation. It turns out that further lowering of the threshold will enable us to distinguish between them. Figure 6 shows the outranking relation graph for $s = 0.72$.

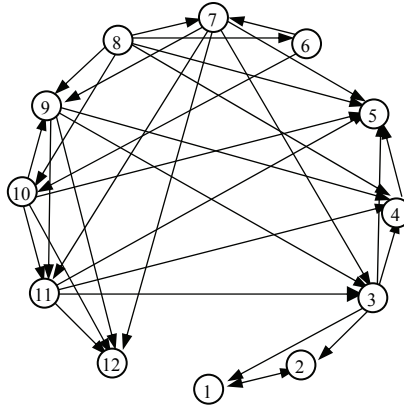


Fig. 6. The graph for $s = 0.72$

We obtain ranking:

1. a_8, a_{10}
2. a_6, a_9, a_{11}
3. a_7
4. a_3, a_{12}
5. a_1, a_2, a_4, a_5

Thus, two alternatives, a_8 and a_{10} get the best evaluation. As continuing lowering the value of the concordance threshold does not result in generating more detailed ranking, so we decide to stop the procedure and propose the decision maker to choose between alternative a_8 and a_{10} . Alternative a_8 is recommended, as it has got the best evaluation in all rankings that have been constructed.

6. THE PROCESS OF RECONSTRUCTION OF THE INSTRUMENT

In accordance with the assumptions of the variant a_{11} , recommended by the Electre I method, the conservation of the positive organ from Sokoły aims at emphasising the musical values of the instrument; at the same time we will try to preserve as much of the historic substance as possible and to introduce as few hypothetically reconstructed elements as possible. This was done by integration of the instrument parts with full completion of the construction elements of the case according to their original form as concluded from the preserved elements and by completion of the missing parts of the mechanism. The polychrome has been reconstructed, while the windows have been covered with a neutral filling (canvas). Missing parts of the sound system have been reconstructed and adapted to the 21 preserved pipes.

The reconstruction of the instrument was finished in 2004. Figure 7 shows the instrument before the reconstruction and Figure 8 – after the reconstruction.



Fig. 7. The instrument before the reconstruction



Fig. 8. The instrument after the reconstruction

CONCLUSIONS

In the paper, possibilities of application of multi-criteria decision support in choosing an approach to conservation of historical organ have been presented. The work resulted in the renovation of a valuable instrument made by Polish organ-builders. It seems that this methodology may be applied also for a wider range of objects of historical value, although this would require an analysis of the set of criteria under consideration. Another issue requiring an analysis would be the course of action in the case when decision variants are evaluated by a group of experts.

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