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MULTIFUNCTIONAL SPORTS CENTER ANALYSIS WITH AN EXAMPLE OF THE KOMBANK ARENA

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Abstract. *Modern sports facilities in the world today do not only meet the needs of sports, rooms for trainers and competition features for athletes and sports industry, but also a lot of other functions in the field of shopping, entertainment, hospitality, educational and even political services. These modern sports complexes resemble increasingly modern supermarkets, in appearance, multi- functionality, organization, marketing, consumer orientation of the population. They present more complex open and closed areas and facilities, functionally related to the rationalization and cost- effective not only to the interests of users (audience, performers), but also to the interests of the owners (shareholders, government, individuals or organizations). Objects themselves are building systems and architectural standards, local traditions and market needs of the population, as well as legal regulations, limited improvisations and deficiencies in construction and the usage of their space. Kombank arena is also a product of the achieved level of science, society, standards and requirements of its customers. City of Belgrade, as the founder, directed the building area of 48,000 sqm, with six floors, maximum height of 36 meters, the range of 132x102 meters and cost about 70 million euros to sports and cultural events (sports competition events and concerts in all musical genres, several cultural events and political rallies), while ignoring trade and catering facilities. Based on the foregoing, it can be determined that the program in Belgrade is similar to many programs like Madison Square Garden and the United Center, which will be used to compare in this work.*

Key words: *Multifunkcional sports objects, Kombank arena*

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INTRODUCTION

From the ancient times until today, the human community built the sport as a sport activity (exercise), consciousness, organization (clubs and federations of sports branches), institutions for their own development (facilities, educational institutions). Lately sport becomes a commercial activity, which is focused on the sports market, profit, the laws of supply and demand of goods and services. The core of sports is a billion active exercisers (anatomical- physiological, motor- functional and cultural- social needs), so the sporting public, consumers of sports (especially under the influence of means of mass communication) basis for a new production- economic business- sports industry (Krsmanovic, Velickovic, 2014).

In the 21st century there is a growing need to improve planning and furnishing of sports centers (Krsmanović & Veličković, 2014). They are required to be multi-functional to meet various social needs (Krsmanović & Velicković, 2014). Modern sports complexes must have their program, level of service, relationship with users and exceptional organization to meet the high standards that change every day (Krsmanović & Veličković, 2014). In the world there are a lot of rules and standards for construction of buildings and they must be respected. Just the appearance of the object is not significant anymore, but also how it affects our increasingly damaged planet. The great challenge is to fulfill all requirements of designers and architects, planners and urbanist, but the world is healthier and wealthier with that (Krsmanović & Veličković, 2014). New materials impose and invite new ways of building by transforming the boundaries of what is possible and imaginable (Coelho & Maes, 2009). Materials are like words. The richer your design vocabulary is, the more distinctive design solutions you can express (Alesina, Lupton, 2010). A key issue when introducing flexibility to project design is the readiness for changes at any given stage of realizing the project. In current times, fast technological advancement is an important factor causing significant difficulties in designing construction objects (Kosmieja & Paslawsk, 2016).

Developed countries are working to improve the materials for the construction (aesthetic and functional), to introduce new standards for the rest of the world and explain why it is better to move forward and keep finding better solutions. Developing countries (that includes Macedonia, Serbia, Montenegro, Bulgaria, Bosnia and Herzegovina...) just preparing for the introduction of the basic principles of the "new" urban planning and construction that the world has long been applied.

The situation of sports facilities in Serbia points that positive changes are minimal, which is not surprising when you consider that the theoretical development and application of scientific research in sport is insufficient. Sports facilities were built decades ago, and innovations in the field of organization, the use of human and financial resources, require new strategies in the management of sports facilities (Krsmanović & Veličković, 2014). In this article we will explain what the new technologies are bringing to the world and how they are applied in the construction, furnishing and equipping of modern sports facilities. As an example, we have Kombank arena, which is put into operation in 2005. We will point to its qualities, but also on its shortcomings that appeared after the whole decade of facility use. Consideration will also demonstrate the characteristics (location, building, structure, capacity, purpose, etc.) to highlight its role and importance in the sport and in the wider sense. The very fact that it is the only sports and cultural facility of the highest level in the state of Serbia is devastating and needs a lot of work to ensure that this will change in the future, and that every major city in Serbia has one facility of its kind.

CASE STUDY: KOMBANK ARENA

Kombank arena can not be compared with the magnificent sports facilities in the world such as the Olympic center in Rio de Janeiro, the National Aquatics Centre in Beijing, but we can strive toward that in curent Serbian conditions and economic situation we can not have better and nicer facilities. In this paper we will explain in which ways Kombank arena can be transformed and used for various events and then we will compare this information with several international arenas. Arena can be transformed and adapted for various events by changing auditorium (reduced and adjusted form), also with lighting, decoration can be placed as desired and ideas of the organizers, corridors and stairways are can partially adapt to different needs, restaurants and cafes too, and so on.

The aim of this paper is to show the extent to which the Republic of Serbia advanced in architecture and design, but also to explain what can still be done to improve the current situation. The advancement in technology, which is an integral part of human life in the future will increasingly affect architects and designers to create better, more beautiful and more efficient solutions, ie. to satisfy customers with products that meet the technical and functional, aesthetic, economic and ergonomic requirements. This paper explains that the creators of these objects drive the market forward, expanding the aesthetic human needs, pushing the boundaries of design and that they are the main innovators in the future of new, change of consciousness, interests, etc.

Technical recommendations (standards) and the requirements of construction and modernization of stadiums by international sports associations are public and detailed. Most of these rules are respected by teams who built sports facilities in Serbia, but, as with any construction, investors were watching and looking to save money on everything they can. A number of irregularitiesis identified in the course of research material for this work, and they are more related to the fact that some things are not done according to the law.

Kombank arena is modeled after an American sports facility (United Center), which at the time of the start of construction of the Arena was at the stage of opening for visitors. This sports facility is divided into six levels and has a well-structured local network. According to the modern appearance and excellent architectural solution is indeed laudable. It has the latest equipment, as now inevitable VIP boxes with all their characteristics that represent a special form of benefits that go with today's sports, entertainment and business. Arena complex makes the building which include: large hall, small hall and parking. According to the capacity of the auditorium's arena is among the highest in Europe.

In 1992 a decision was made starting with terms of reference "T 2000", a building company was „Energoprojekt- DD Architecture and Urbanism“. Author of the project was the architect Vlada Slavica. Construction was finally completed in 2004 and city of Belgrade gets the opportunity to organize a Diamond Ball Tournament, and a year later European championship in basketball (Krsmanović & Veličković, 2014).

Hall is dedicated made to meet requirements of the following programs: sport program (martial arts, basketball, volleyball, table tennis, tennis, handball, football, gymnastics, athletics, hurdle jumping, ice hockey, figure skating; concerts- musical performances; theatrical performances, circus performances.

The object itself acording to the project task consists of the following functional environments:

- The battleground (arena), which should satisfy the requirements of all mentioned programs, including racing track length of 200 meters with six lanes. Planed racing tracks should be mounting (mobile), and permanent ice sheet dimensions 60x30 meters is planned, where it would be placed flooring for indoor sports. To organise the musical and theatrical performances envisages setting the stage to a short range of the hall. Bearing in mind that ice sheet is planet, and there are program requirements, it is understandable that different floors have become one of the conditions for the good functioning of the facility.
- The auditorium was designed with a fixed 14-15000 seats in the stands, 4,500 seats on telescopic stands and about 800-1,000 seats in the VIP boxes. Number of seats in the auditorium should be dimensioned to satisfy the following requirements: basketball 20-21000 seats, for hockey and figure skating 18,500 seats, 17,000 seats for athletics, boxing and other martial arts between 8 and 10,000 seats.
- Commercial Lodges (apartments): Each lodge has a capacity of 10-14 seats, has an entrance, dressing room, toilets, mini bar, consul for the buffet, a seating area, a private auditorium with 2-3 rows and 5-7 chair in a row. The lodge is physically separated from the hall with windows, and the auditorium is located in the area of the hall. The connection between the audience and the lodge are glass doors.
- Spaces dedicated to administration are: staff offices, manager office with the conference room, sanitary facilities, separate entrance and parking space. The press places are not intended as permanent, but are placed depending on the program contents in the hall and with each place has provided the possibility for connection of the monitor and phone. Television studio, whose work is not tied exclusively to sports competition and performances inside the hall has a separate entrance. In the halls auditorium space, the room for TV cameras is provided, while around the perimeter of the hall, above the grandstand area, commands for light and sound, as well as cabins and commentators. It also include space for Press center with the hall.
- Spaces dedicated for athletes and performers provide: space for equipment and props, dressing rooms with sanitary facilities (group and individual), sauna and trim cabinets, medical clinic, the warm-up rooms for athletes and doping control. All these rooms are functionally separated, and access to them should not intersect with other lines of movement in the hall.
- Storage space and facilities intended for engineering and maintenance are properly sized (room for accommodation of heating, ventilation, lighting, sound systems, TV techniques, as well as fire-fighting installation, maintenance workshops, warehouses of spare parts, storage furniture and sports equipment, athletics track, fenced parking space for trucks performers and vehicles for technical applications arena).

Line of site is designed as a continuous curve regardless of whether seats are fixed or assembly. For ease of construction and assembly of stands, watching lines following the steps of 4-5 lines, where the distance between rows is 81 centimeters. The maximum height of the fixed part of the stands is 58 centimeters and the maximum slope is 36. Bearing in mind the required polivalency, fixed stands are retained at a height of 3.5 meters on the long side and 5.5 meters on the short sides of the auditorium. In that way space is formed at the level of 100 on 5.000m² and can accommodate an racing track with six lanes length of 200

meters. The basic tenet of the entire building is a high level of comfort to the audience, which is provided through a form of communication, sanitary facilities, retail outlets. One of the most important elements is dimensioning of the number of seats. They are designed so that they are all the same, no matter what kind of performances, and have folding armrests. On the fixed part of the grandstand seats are fixed to the vertical wall stands for easy cleaning and passing. Each row contains the following 18 seats, and those located in the VIP lodges have a better processing and more comfortable dimensions.

In the space devoted to viewers special attention should be paid to vertical and horizontal communication for visitors. In this case is provided a sufficient number of elevators and stairs, optimal location and size, as well as a sufficient number of entrances to the hall and into the stands. Also, there are places to purchase tickets, information, halls of assembly before the show and during the breaks, coffee counters, adequate number of toilets... Bearing in mind that a large number of people moves through the object, designers predicted that the halls are of significant dimensions can be of multipurpose use (various promotions, exhibitions...).

All technical and auxiliary facilities are in natur concrete and without special treatment on the walls. Sanitary facilities, changing rooms and a kitchen have ceramic tiles, and lodge and management have wooden barrier on the walls. As for the ceiling, the basic attitude is that there is no lowered ceiling wherever its possible. Facilities such as lodges and TV studio has low ceilings type "Armstrong". The materials used to build in the Arena was the most modern and the best that could be found at the time of construction. Following types of electric lighting are provided in the object: working, auxiliary, anti-panic, decorative lighting facades, sports facilities and scene lighting. Entrance area of the building are accented portal which marks the spot of the main entrance. The side facades are designed in a similar way, but with a slightly more diverse architectonic elements. As far as processing and materials, the designer is believed that the building should primarily operate by form, and then the material. Therefore, the full weight are coated with stone which was roughly treated in a circular form and a smooth stone at the entrance portal. Transparent parts of the facility were glazed with stop-ray glass with a support structure made of anodized aluminum, which is a neutral color.

To help getting around and to synchronize the movements of the masses and controlled the incident, but also avoid their frustration, the entrances and parking zones are marked, along which in or out of establishment, the pedestrian zone, which lead to the level of the stands, section seats, interior entrance, rows and seats. It goes without saying that special attention is paid to the marking of the resting place, first aid spaces, booths tenants and zones for persons with disabilities. For them are especially marked each passage, toilets and seating. Number of parking places is determined by norms of the Plan subject area, ie. 1,333 parking spaces.

Monitoring the games and sports results is carried out using a movable, lit image, which can be operated electronically, successive changes in the scope of sight of the audience. The control panel is guided system, consisting of a table of results, supportive structure and mechanism for monitoring changes. Working space is protected with the result of operations in the press box, equipped with a control and built-in monitoring system using figures (time, score, current operations). There is a system of advertising that is aimed at the audience, and supports equipment for sound and visual advertising, as well as control of the results. It locates in the cabin, in the area for journalists. Before the

start of each event for which it may need this type of equipment, validity of the system for dissemination is examined (Krsmanović & Veličković, 2014).

All air conditioning systems, ventilation, air curtains, air heating and preparation of sanitary hot water systems are equipped with automatic control and regulation. Central monitoring and control system for heating and cooling is provided, which is part of the control of all installations in the object.

Not one dimension of the Arena was not formed on an idea or creation, but only an analysis of movement. We'll give an example: the passage between rows is 126 cm, ie. 2x60 + rod in the center for those who are more difficult to move, so that the slope of the auditorium, which has only 35 degrees and going after the curve line to viewers equally well able to monitor events from anywhere at the level for which the ticket was bought. Another important element is the speed of emptying hall, a calculation data showed that for people in the Arena it takes just 9.5 minutes to exit. According to unofficial stopwatch measured information, which is conducted on the Diamond Ball tournament by architect Vlada Slavica, taking visitors out of the Arena takes only 5 minutes. Construction of the hall is partly deviated from the idea of the designer, and this is primarily related to the lack of ice sheet under the floorboards. All numerical data used in this chapter, as well as in some other parts of the work, descended from the Proceedings of the Arena.[1]

In organizing a sports event it is a must to clearly and unambiguously set goals as measurable targets. The formulation of the objectives should include all the main areas and units of the program. Should determine the dates, duration of activities, specific timelines and critical dates in connection with the planning stages. Arena, in terms of multifunctionality, has, like other modern arenas, large and well-equipped and available central room: a large hall in which depending on the event changes the lining and the size of the area, ie. floor and its location. It is conceived and in addition to sports programs and concert - host musical performances, circus and theater. Use permit was granted 01.10.2007. and that same year through thirty different programs hosted over 400,000 visitors.

When we analyze Kombank arena and two selected arenas- American Madison Square Garden and United Center, which is described in detail and published in a research paper "Interior design and furnishing of sports centers of the 21st century in terms of their multifunctional organization and content on the case of the Belgrade Arena", it is clear that these are three exceptional multifunctional facilities. All three meet the high standards of modern sport and culture events. It is particularly important that the great attention is paid to the demands and suit the visitors, who, in addition to meet the needs in terms of observing the actual sporting event, have many ease (quickly and easily arriving at their place, the diverse range of food and drinks, the opportunity to watch the event on numerous screens, souvenirs...). Data on these objects are presented in the table 1 (Krsmanović, 2011).

Table 1 Comparative analysis of the three sports facilities

Object	Kombank arena	Madison Square Garden	United Center
Year of construction	2004.	1968.	1994.
Price of construction	70.000.000$	123.000.000$	175.000.000$
Capacity of tribune sport / concert	19.394/ 25.000	19.763/ 20.000	21.711/ 23.500
Record-breaking sports visits	22.567	23.190	23.129
Events / the number of visitors (annually)	40 / 700.000	400 / 10.000.000	200 / 7.500.000
Property	Belgrade city	Company Cablevision	Private- two persons
Private Parking	Yes	No	Yes
Sport	Yes	Yes	Yes
Culture / own theater	Yes / No	Yes / Yes	Yes / Yes
Business	Yes	Yes	Yes
Political meetings	Yes	Yes	Yes
Restaurants / Bars	No	Yes	Yes
Distance from the airport	13.5 km	24 and 26 km	19 and 29 km

Price of construction indicates that it is a premises is built for top events and a longer period of exploitation, because of their multifunctional purpose to return and justify invested funds. But it depends primarily on the disposition, ie. engagement of structures by population and economic power of surroundings, and a state where they are located. What first catches the eye is that in Kombank arena invested significantly less money than in the other two buildings. It also has a 5 to 10 times fewer number of events organized per year, so we can come to the conclusion that the City of Belgrade, as its owner, makes that Arena is in a much less favorable position than the other two analyzed arena. In all other features, services and programs Arena can be measured with the best international arenas.

DISCUSSION

The opinion of authors of this paper is that the emergence of global markets for sports industry has caused the emergence of new disciplines within the business philosophy, which take account of the needs, desires and attitudes of consumers who have emerged and developed through the centuries- old competition, emphasis, self-actualization, and the success of free time due to rapid industrialization and technological progress (Krsmanović & Veličković, 2014). Managing of sports facility is a discipline that involves understanding the many natural, technical and social areas, the study of the environment in which the segment exists (Krsmanović & Veličković, 2014).

Interior designers can create attractive and appealing product design or virtual needs, and thus send a promotional message for future buyers to grasp and use of tourist services and facilities (Alesina, & Lupton, 2010). The design is focused on its details, originality, uniqueness, distinctiveness, ie. on human social, psychological and intellectual nature. This approach requires a creative designer, original style, visual identity, in order to offer the market observed and attractive design to the market (Krsmanović, Veličković, & Veličković, 2017).

All sports facilities differ, and the differences regarding the mission, functions and managerial approach (Krsmanović, 2011). For example, is has no obligation to create social and sports events in public buildings, and private facilities may have limited charitable and non-profit activities (Krsmanović & Veličković, 2014). Adequate application of the known functions of general management and adequate setting up and implementing management functions of sports facilities is essential for successful operation of sports facilities (Krsmanović, 2006). When talking about the management of sports facilities it usually suggests the following functions: sports, human resources, financial, legal, security, marketing functions, administration, information, function maintenance and hygiene functions (Krsmanović & Veličković, 2014).

CONCLUSION

Kombank Arena, the largest closed sports facility in the Balkans, plays an important role in the system of competitive sports. Bearing in mind that it can be classified into newer sports facilities, it is clear that the requirements posed are very high. It provides its users with different contents of events, exceptional comfort, security and a wide range of ancillary services. Special attention is dedicated to the people with special needs, which is reflected in easy and safe access to places in parking lots, bleachers and other locations within the facility. As the only facility of its kind in Serbia, Arena has all the characteristics of a modern multifunctional facility. Its location in New Belgrade, near the highway, near the airport, with good road accesses and internal organization, to fully meet the locational characteristics necessary for the building of this character. Adequate space and equipment enable successful organization of major sporting events, entertainment, music and other events. For programs and features facilities of this kind can be argued that they should be capcitate and equipment for processing of different kinds of plays that can attract 20,000 people. When the possibilities are known and the repertoire of similar facilities in the world, then the terms of reference for the Arena becomes a well-balanced plan, with the possibility of development that accompanies the new technologies and achievements.

It is obvious that the functioning of Kombank arena increasingly justify past investments and contributions to sport and cultural and artistic life of Belgrade. Like other arenas that are recognizable in their communities, this sports facility has become one of the symbols of the city, and prestigious place for a performance. This is supported by the fact that this object held three different cultural or sports events per week, which is very difficult due to changes in the interior.

Sports facilities that we take for an example and the comparison in this study, United Center (a leading entertainment center in the United States and a model for the creation of the Arena), and Madison Square Garden (the world's most famous arena), represent the magnificent and exceptional examples of multifunctional sports and business objects that have a large number of events and visitors throughout the year. This makes a significant contribution to the industry of sport. Compared with these two objects Arena does not stay behind in the structure of the organization of events, but looking at the number of annual events in it and their economic effects, there is an important difference. However, if the Republic of Serbia wants to keep up with the world of sport, existance of Belgrade Arena is necessary, and Serbian athletes have deserve that with their results.

Planning and construction of a sports facility should meet the principles and functions related to the capital expences, cost of implementation (income), customer satisfaction (and the audience), the functions of athletes and sports management (exercise, training, competition and entertainment) at the end (Dugalić, 2007). Unfortunately, sports facilities in the Balkans seem more than modest in comparison to those that exist in the world, the external space has the appearance of "socialist realism", a space is underused. They are mostly inaccessible, and parking spaces do not meet the requirements. The opinion of authors of this paper is that these objects are crying out for business restructuring and this problem should be solved by enabling the recruitment of young and educated people who have a vision of improvement and a lot of new ideas. Many young people are educated for the administration and management of sports facilities, but very small percentage actually use that knowledge into practice.

Culture of furnishing and decorating an object is a source of positive energy and the field of development of the creativity and talent. As carefully arranged it enriches the identity of the whole city or a community. Decorating and furnishing primarily required to pay attention and respect the rules of symmetry and balance. The modern design and an even distribution model of furniture that would satisfy all the functional needs and adequate decoration atmosphere, contribute that the aesthetic requirements are met. The rules of spatial organization are of great importance to the harmonious schedule. The appropriate choice of furniture and decorations will achieve the maximum balance of comfort and organization of space. The flexibility of the design provides the opportunity to adapt to potential changes (Arboleda & Abraham, 2006). Universal design respects human diversity and promote inclusion in all life activities. Caring for the degree of usability of an object or the space can be the next step in the development of design in general, that is the one step that will allocate certain concepts from the competition. Universal design as well as the philosophy of accessibility, based on the recognition, acceptance and encouragement of the rights of all human beings at all levels of society, including people living with a limitation in activities in a context which ensures a high level of health, safety, comfort and environmental protection. Accessibility is an essential attribute of the sustainability of the built environment wich have a person as center.

Character of space for recreation (the manner and degree of editing and equipping) is based on a series of recreational activities and facilities, as well as the ways of their development depending on the needs and demands of their customers, the degree of preservation, ways and measures to improve the natural and man-made values in the observed urban environment. Sports facilities, as buildings are primarily constructed with the aim to satisfy the general social needs in the field of sports creativity and human health and recreational needs of youth and citizens. In transitional economic conditions, in terms of new economic relations, with very complex economic and social problems, legal and political settlement remains the sport as a social necessity and an upgrade to the "tail" events or social-state solution. Of course, in this context, is the fate of sports facilities.

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ANALIZA MULTIFUNKCIONALNIH SPORTSKIH CENTARA SA PRIMEROM KOMBANK ARENE

Moderni sportski objekti u svetu zadovoljavaju ne samo sportske potrebe, kao prostori za trenažne i takmičarske funkcije sportista i sportskih grana, već i niz drugih funkcija iz oblasti trgovačkih, zabavnih, ugostiteljskih, obrazovnih, pa čak i političkih usluga. Ovi moderni sportski kompleksi sve više liče na savremene megamarkete, po izgledu, multifunkcionalnosti, organizaciji, marketingu, potrošačkoj usmerenosti stanovništva. Ujedno, predstavljaju sklop otvorenih i zatvorenih površina i objekata, funkcionalno i upravljački povezanih, kako bi što racionalnije i tržišno isplativije zadovoljili ne samo interese korisnika (publike, izvođača), već i interese vlasnika (akcionara, države, pojedinaca ili organizacija). Sami objekti su sistemom građevinsko- arhitektonskih standarda, lokalne tradicije i tržišnih potreba stanovništva, ali i pravnih propisa, ograničili improvizacije i nedostatke u izgradnji i korišćenju njihovih prostora. Kombank arena je, za sada, proizvod dostignutog tehnološkog razvoja, društva, standarda i potreba njenih korisnika. Grad Beograd kao osnivač usmerio je objekat površine od 48.000 m², sa šest etaža, maksimalne visine od 36 metara, raspona 132x102 metra i cene koštanja od oko 70 miliona evra ka sportskim i kulturnim manifestacijama (sportske takmičarske priredbe i koncerti iz svih muzičkih pravaca, kao i mnogobrojne kulturne manifestacije i politički skupovi), zanemarivši pritom trgovačke i ugostiteljske sadržaje. Na osnovu svega navedenog će se utvrditi u radu da su programi u Areni dosta slični programima Medison Skver Gardena i Junajted Centra, koji će se u radu koristiti za upoređivanje.

Ključne reči: *Multifunkcionalni sportski objekti, Kombank arena*