INTERNATIONAL JOURNAL ON ORANGE TECHNOLOGY

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

The Role of Layout in Architectural Design

Eldorjon Erkinjon ogli Cholponov
Master's Degree Student,
Tashkent Institute of Architecture and Civil Engineering, Tashkent, Uzbekistan
Zafarbek Erkinovich Matniyazov,
PhD of architecture, Associate Professor,
Tashkent Institute of Architecture and Civil Engineering, Tashkent, Uzbekistan
zafar18@mail.ru

----------***----------

Annotation: The problem of increasing the efficiency of the process of designing spatially developed objects of architecture and urban planning through the rational use of modern materials, technologies and technical means is considered. In particular, the foreign experience of using rapid prototyping technologies in architectural design is analyzed. It is proposed to use a compact technology of rapid prototyping for the introduction of automated prototyping in architectural and urban design practice.

Key words: architectural layout, layout, photo model, typology, function, volume-spatial modeling.

Introduction

At present, the process of architectural design is based on the widespread use of modern information technologies. Various computer-aided design systems allow, to one degree or another, to use the powerful potential of computer technology to increase the efficiency of procedures at each stage of the development of a future architectural or urban object. As a result, a human-machine complex of form creation is formed [1], the technical support of which is made up of the means of its computer support (fig. 1). Under these conditions, a specialist must possess not only professional knowledge, but also practical skills in using computer technologies for geometric modeling of design objects [2].

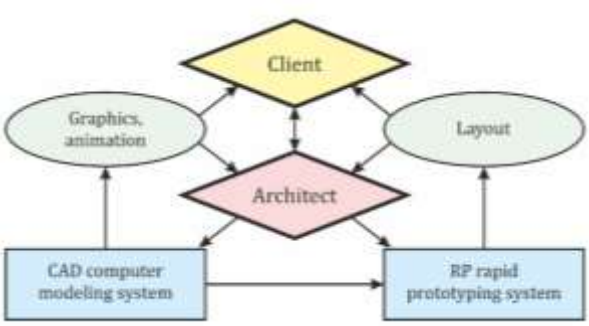

Figure 1. Means of computer support for architectural design and business communication

Therefore, to solve this problem during the period of professional training of students of architects and designers, it is not enough to use only graphic methods of sequential two-dimensional design on the plane of architectural drawings. It is necessary, along with the graphic execution of projects and works, to use the techniques of mock-up modeling. Architectural drawings give only a planar image of the object and do not allow to judge the designed building or structure in volume, that is, in its finished form. Therefore, architectural models are made that clearly express the designer's intent and provide significant assistance in designing a building or an ensemble of buildings, as well as in approving projects and demonstrating them. [3].

The process of creating an architectural work is the movement of a compositional model from the original idea (represented in the form of the simplest geometric shapes born by figurative association) through the organization of space from groups of complicated forms to the constructive-technological system of

INTERNATIONAL JOURNAL ON ORANGE TECHNOLOGY

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071

Volume: 4 Issue: 5 |May 2022

documents, expressed in the concept of "project".

Analysis of the Relevant Literature

Development of the architectural layout. No matter how paradoxical it may sound, it was revealed that the massive use of architectural prototyping occurred precisely in the 1920s. – the period of development of photography and offset printing (Table 1.).

Table 1.

Functional-chronological analysis of layouts

Years	Предпосылки	Prerequisites	Material	Functions
1920s	The advent of offset printing	Photo layout	Paper, cardboard	Photo object, final product
1930s	New political trends	Large scale mockup	Cardboard, paper, film	Representative, promotional
1950s	The emergence of new materials, the rise of modernism	Professionally executed in a mockup workshop	Cardboard, paper, film, aluminum, plastic	Replacing Drawings and Rendered Perspectives
1960s	The trend towards utopia	Mockutopia	Cardboard, paper, film, aluminum, plastic	Representation of new features and new ideas
1970s	New cultural trends	Layout art object	Cardboard, paper, film, aluminum, plastic	Piece of art
1980s	Invention of the endoscope	Simulation model, scale 1:500	Cardboard, paper, film, aluminum, plastic	Prevention of errors in complexes
1990s	stereolithography, 3D printing	Model of volumes and forms	Polymers, plastic	Finding a form, displaying facades
2000s	Market oversaturation	Author's art object	Any	Representation, search for forms, individual style

As early as 1910, new technologies made it possible to shoot, and most importantly, to replicate any objects in magazines and books, which was a significant step forward in comparison with the printing technologies of the 19th century, which made it possible to distribute mainly drawings. Up to this point, architects published in magazines mainly sketches and hand drawings of future projects, but this does not mean that layouts before the 1920s. didn't exist. It was, as evidenced by the few photographs that have come down to us, but it was the technical potential of realistic photographs of architectural models by the 1920s. made layout attractive to architects again. At the same time, the concept of a photo model appeared. It was used conditionally, since the layouts of that time had nothing to do with architectural

Figure 2. Church of the Star. Otto Bartning, 1922

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

modeling, and were often created precisely in order to be the object of photography. From this, their size and materials were formed.

So, for example, for the Church of the Star Otto Bartning (Bartning's Sternkirche), according to extant sources, two working architectural models and one reduced special model were made, which served the sole purpose of getting a good photo. As a result, only the fifth model with a detail that was delivered like a piece of cake and showed all the internal content was created not only for photography, but also for demonstration at exhibitions (fig. 2).

In the 1970s, prototyping split into two separate and very opposite directions:
-the "simulation model" technique, which allowed models to participate in civil processes;
-the “endoscope” technique, which uses the then new optical devices in the form of a thin adjustable tube with a lens at the end

Up to this point, the layout was designed large and necessarily collapsible. So, for example, earlier and large-scale models were completely replaced by smaller-scale models (1:500), which are easy to construct and allow you to create images that mimic dimensional layouts or a future real building. Especially useful was the use of the endoscope in the design of large multifunctional complexes and open public spaces of a huge area. This device helped to avoid planning miscalculations already at the initial stages, removing the main possible error in the design process - the loss of human scale. Models of endoscopic devices of that time broadcast the image transmitted through a fiber optic light guide to the screen. A camera could also be connected to the device, which made it possible to further study the received images. Thanks to the scale of layouts, even a multiple of 500 m, it became possible to create entire streets, building complexes and quarters in which their volumes and ratios of proportions are a multiple of the scale model of a person placed in them, and to display images of viewpoints using an endoscope in such a way that the viewer saw the result as a completely existing quarter or complex in real size, filled with human figures [4].

The second popular trend in 1970 was the layout as an object of art and its active integration into art. At that time, the model began to not only convey the architectural design as such. The layout, like the drawing of an architectural presentation, had its own moment of artistic existence, sometimes even completely independent of the object that it represented [4].

In 1990, the world was faced with new technologies that advanced architectural models, increasingly referred to as models. Computers began to control milling machines, 3D printers with stereolithography technology appeared, allowing you to print an entire model from one material. From that moment on, the model began to live a double life, existing in a computer and being able to be printed in physical form on the appropriate equipment. It should be noted that even after creating a virtual model, the layout is still embodied in volume through printing and other production operations. Thus, virtual reality does not yet displace physical tangible reality and its volumes [4; 5].

Types of architectural layouts and their purpose. Any layout is created on the basis of orthogonal drawings. Architectural layout is one of the types of layout. In layout, the following types of architectural layouts are distinguished [4; 6; 7]:

• Model (scheme) of landscaping is a building and the space around it, subject to landscaping.

• Interior Model - A model showing interior space layouts, finishes, colors, furniture and decorations.

• Landscaping layouts - layouts of landscape design development with footpaths, bridges, gazebos, floral patterns and decorations. Landscaping layouts typically show common areas and in some cases include models

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

of buildings.

• Town-planning layouts - layouts, as a rule, of a small scale (starting from 1:500 and smaller: 1:700, 1:1000, 1:1500, 1:2000, 1:10,000, 1:20,000), representing several quarters of a city, sometimes entire cities or villages, a large resort, an industrial facility, military bases, ports, and so on. Urban layouts are a vital element for planning the development of territories.

• Engineering and structural models show a free-standing building, its internal (sometimes external) structure and the interaction of components.

Architectural layouts also differ [4; 8; 9]:

- in scale: M 1:1000; M 1:500; M 1:300; M 1:200; M 1:100; M 1:50; M 1:20

- according to the main material: paper cardboard wooden plastic metal

- by type: conceptual urban planning landscape panoramic interior, collapsible, planning, layouts of industrial facilities

- according to the degree of mechanization: without illumination, with internal illumination with external illumination, with dynamic illumination, with combined illumination without moving elements, with moving elements.

The layout is a rather fragile structure that requires careful attitude and care. Consider the main items that you should pay attention to when ordering a layout and choosing a layout workshop [4; 10; 11]:

• layout base (sub-layout);

• main volume;

• illumination and mechanization (as an option).

The base of the layout (sub-layout). Rigid base for the layout (sub-model). Should exclude the possibility of bending the surface of the layout, to prevent damage.

The base of the layout, the sub-layout, is the main part of the layout that affects many of its characteristics. The quality of the mock-up is worth paying the main attention to when choosing a mock-up workshop when placing an order for the manufacture of a mock-up. This is easy to do by evaluating the portfolio of made layouts from photographs. The layout base can be made of various materials and have different weight characteristics, but it must be rigid, i.e. do not bend or twist. If the mock-up base is made of easily bendable mock-up plastic, then it must be equipped with additional stiffening ribs. Even if the mock-up base is made of plastic 10 mm thick and not equipped with stiffeners, it will still bend very strongly, which will lead to the destruction of the mock-up.

Built-in layout lighting. Bright and effective internal lighting of the layout can significantly enhance the impression of perception of the layout by the audience.

The internal or external illumination of the layout is designed to make the layout the most effective and produce a stronger impression on the audience. Also, with the help of highlighting the layout and its luminous elements, you can more advantageously highlight and emphasize the more important nodes and details of the layout.

Materials for the manufacture of the layout and landscape base. When prototyping, various materials are used, the choice of which depends on the purpose of the layout. Wood, cardboard and paper are well processed

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

with simple tools and do not require the use of special adhesives; however, they have many negative qualities, the main of which is exposure to atmospheric influences, as a result of which the material swells or dries out, cracks, warps, etc.

New polymeric materials, plastics, have become widespread. Their high mechanical strength, weather resistance, good machinability with various tools and many other positive qualities distinguish these materials from wood, cardboard and paper [12; 13].

Wood, cardboard, paper, plastics, adhesives, finishing materials, and auxiliary materials are used to make models.

Wood, cardboard, paper. For work, wood of both coniferous and deciduous species is used. Coniferous species: pine, spruce, fir and others have straight-grained wood, are well sawn, planed and glued; are used mainly for the manufacture of mock-up bases and, in some cases, building volumes, for planning mock-ups, etc.

In addition to bars and boards, plywood with a thickness of 3 to 10 mm, hardboard, as well as knife or planed plywood of valuable species of wood with a thickness of 0.5 to 2 mm can be used. Plywood and fibreboard are mainly used for cladding underlays, as well as for making large-scale mock-ups or fragments. Knife plywood or sliced plywood is used for veneer underlayment for water surfaces, layout, etc., as well as in building models to show the interior, where the finish is made of wood [14].

Cardboard and paper are the most common and affordable materials. Cardboard can be sheet and rolled, of various thickness (from 0.2 to 3 mm) and density. It paints and sticks well. It is mainly used for making relief. If the cardboard is glued on both sides with paper, rather strong sheets-tablets are obtained that can be used in the manufacture of various layouts.

Paper is mainly used for drawing paper (drawing paper). White, dense, it cuts well and sticks together with wood and cardboard. If the paper is wetted, it stretches, and when dried, it shrinks, acquiring its former dimensions. This property is used when gluing sub-models, building volumes in planning layouts and in the manufacture of tablets.

Plastic masses. Plastics - materials, the main component of which are macromolecular compounds and which, under the influence of elevated temperature and pressure, are able to take the desired shape, keeping it under normal conditions. Only certain types of plastics are used to make models.

Organic glass is a polymer of methacrylic acid methyl ester - polymethyl methacrylate (acrylate, plexiglass or safety glass). In appearance, it resembles ordinary silicate glass, but it has many advantages over the latter. Organic glass is not sensitive to shocks and shocks, does not produce dangerous fragments, is easily turned, bent, polished, engraved, stamped, glued, and most importantly, it is not exposed to atmospheric influences, which is of great importance for the quality of the layout.

Sheet organic glass can be transparent colorless, transparent colored and opaque with filler.

SNP plastic, which has become widespread in the manufacture of models for various purposes, has valuable properties: it is well processed, glued, stamped, pressed, and successfully replaces flammable celluloid. Plastic can be any color with all sorts of shades. It has good light fastness, however, during long-term operation under adverse conditions, the mechanical properties of the material are somewhat reduced.

For the manufacture of layouts, sheet plastic of grades 2, 3 and 4 is used, which is sheets with a thickness of 1 to 4 mm, a width of 1100-1200 mm and a length of 1000 mm or more.

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

Foam plastics are ultralight plastics. A specific feature of these materials obtained on the basis of synthetic polymers lies in their heterogeneity and peculiarity of the structure, reminiscent of the structure of a frozen foam.

Foam plastics differ not only in structure, but also in elastic characteristics: rigid, semi-rigid, elastic.

In the manufacture of volumetric greenery, elastic polyurethane foam (foam rubber) is used.

Having a peculiar and pleasant-looking structure, as well as other positive qualities, foam plastics are widely used in the manufacture of a wide variety of architectural models.

Adhesives. For gluing parts made of wood, cardboard and paper, various adhesives of plant and animal origin are used.

If the materials are synthetic, such as organic glass celluloid, polystyrene and others, it is necessary to use special synthetic adhesives and solvents. When gluing products, you need to know the properties of not only adhesives, but also the properties of the materials being glued, which are porous and non-porous (organic and silicate glass, celluloid, cellon, SNP plastic, metals, etc.).

When working, it becomes necessary to glue various materials - porous to porous, porous to non-porous and non-porous - in any case, you need to know which glue to use, how to glue parts, and what should be the exposure after gluing before processing.

For gluing wood, cardboard and paper, wood glue or PVA emulsion is mainly used.

Synthetic adhesives are successfully used for bonding various materials, including polymers. All of them, depending on the starting material, can be divided into four main groups: adhesives based on condensation resins, adhesives based on polymerization resins, adhesives based on cellulose ethers and rubber adhesives.

According to their appearance, synthetic adhesives are solid, liquid, film and paste. In relation to solvents, adhesives are divided into alcohol-soluble, water-soluble and insoluble.

In cases where it is necessary to make only temporary gluing, a water-soluble adhesive is used, which makes it possible to separate the parts without damaging them.

Alcoholic solutions of phenol-formaldehyde resin and polyvinyl butyral are known as BF-type adhesives.

Landscape layout. Trees and shrubs for architectural and landscape models can be made in different ways using:

1. Vegetable raw materials, namely, twigs, roots, moss, various plants with dense stems, foliage, needles.

2. Artificial raw materials - wire for the barrel, a variety of powders for the crown of various textures and fractions, cardboard, paper, mock-up plastic, sponge, foam rubber.

To connect and give color to green spaces in layouts, you can use glues, varnishes and paints specially selected for this.

Trees for layouts are assembled manually. Creativity in the layout of trees, shrubs, hedges and other green spaces is simply necessary, because each plant is unique in its own way in its original beauty.

Trees and shrubs made from natural plant materials for mock-ups should not be subjected to frequent transportation, in order to ensure the safety of the mock-up, they are exhibited most of the time under a protective glass dome. Such mock-up trees are more fragile, subject to temperature fluctuations and are less amenable to reconstruction in case of breakage. Sometimes it is easier to remove a tree from a layout and

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

replace it with a new one than to fix a broken one. Trees and shrubs for models made of artificial raw materials are more durable, they are well used when the model is often transported to exhibitions. Such trees adhere well to mock-up plastic and visually it is very difficult to distinguish them from trees made from vegetable raw materials. But their manufacture is a longer and more painstaking work, since the tree trunk has to be created manually in accordance with the scale of the layout.

In the manufacture of trees and shrubs for models, increased quality and accuracy are required, their production is very laborious and time consuming.

The landscape on the layout can be very diverse and unique - consisting of rocks, green spaces, winding ribbons of rivers, or floodplain lakes, or simply stretching like a green carpet over the surface of the layout. All this can be displayed in different proportions and different options, taking into account the scale planned in the layout.

Creating realistic landscapes in the layout is possible in several ways:

- the first way - let's call it "need for invention is cunning." The layout landscape, in this design, is made from dried vegetable raw materials for grass cover, dough and cardboard for creating mountainous terrain, watercolor for simulating water, and other household substitutes for professional mock-up imitation materials. Such technologies are applicable only in educational prototyping;

- the second way is to create a model landscape with the help of the complex use of various imitating materials - special model artificial materials. When making a layout, such materials most realistically imitate real earth materials: earth, grass cover, loam, sand, rock. To imitate landscape materials, only the best professional imitating mock-up materials are used - specialized powders of various fractions, gels that imitate the water surface, etc.

Creating mountainous surfaces on a layout is the most time-consuming process. Especially if the landscape must accurately convey elevation marks and relief individuality. Each hill or mountain on the layout is typed in layers, taking into account the size and the selected scale.

The use of two-component putty mixtures for the formation of low landscape drops. After the main constructive volume has been collected in the form of a layered mathematical frame of the landscape design, all its irregularities are leveled with special putty compounds. Then, taking into account all the features of green spaces and grass cover, the final imitation finish takes place on the created layout volume.

Various materials and technologies are used to simulate the water surface in layouts. In simplified and schematic layouts, these are usually textured vinyl films or films combined with glass. In a better performance of layouts, special imitating gels are used to simulate the water surface. But if necessary, it is possible to make models equipped with pumps and reservoirs for real liquid, as well as to create an artificial flow of water.

Conclusion

An analysis of the world experience in the use of architectural prototyping technologies and technical means of rapid prototyping in the professional activities of architects and urban planners indicates the expediency of this direction of improving the design process. At present, the shaping layout is used at the stage preceding digital design in world practice, but is practically not used in the curricula of specialized universities in Uzbekistan.

In the conditions of the domestic architectural and design organization, the author proposes to automate the prototyping of spatially developed objects based on compact engineering solutions that combine a sufficient level of functionality.

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

References

1. Белов, Е.В. Комплекс компьютерной поддержки формотворчества / Е.В. Белов, Т.А. Свирская, Д.Н. Свирский // Сб. науч. тр. ВГТУ. – Витебск: ВГТУ, 1998. – С. 225 – 227.
2. Свирская Т.А. Компьютерные средства макетирования в архитектурном проектировании пространственно-развитых объектов/ Вестник Полоцкого государственного университета. Серия В: Прикладные науки. Строительство. 2007. № 6. С. 17-22.
3. Антонова, Н. Н. Архитектурные макеты [Электронный ресурс]: методические указания к практическим занятиям / Волгоград: ВолгГАСУ, 2015. 33 стр.
4. Пономарева А.Е., Наволоцкая А.В. Актуальные функции архитектурного макетирования. / Труды Новосибирского государственного архитектурно-строительного университета (Сибстрин). 2021. Т. 24. № 3/4 (81/82). С. 73-85.
5. Adilov Z., Matniyozov Z., "The Proposals Of Landscape Solutions For Highways Environment." International Journal Of Scientific & Technology Research (IJSTR) ISSN (2020): 2277-8616.
6. Adilov, Z., Matniyazov, Z., Tojiboev, J., Daminova, U., Saidkhonova U., (2020) Improvement of the environmental situation of the aral region through landscape design / International Journal of Scientific and Technology Researchthis 9 (4), 3450–3455
7. Matniyazov, Z.E., Farxatova, Z.X. (2021). The Principles of Formation of a GYM in Modern Multi-Storey Residential Buildings. International Journal of Innovative Analyses and Emerging Technology, 1(7), 115–119.
8. Elmurodov, S.S., Matniyazov, Z.E., Rasul- Zade, L.U., Tajibaev, J.Kh. (2021). Development trends of non-stationary trade facilities. / ACADEMICIA: An International Multidisciplinary Research Journal 11 (12), pp. 495-503.
9. Matniyazov, Z.E., Eshnazarova, S.Z. (2021). Hagia sophia as a synthesis of the types of Byzantine temple architecture and an example of the Byzantine building culture of the IV-VI centuries. Asian Journal of Multidimensional Research, 10 (8), pp. 294 – 297.
10. Fankhänel, T. The Architectural Models of Theodore Conrad. The "miniature boom" of mid-century modernism. - London; New-York; Oxford; Sydney: Bloomsbury visual arts, 2021. - 224 p.
11. Shell, W. S., Duckett, E. A., Fujikawa, J. Y. Impressions of Mies: a in interview on Mies Van Der Rohe, his early Chicago years 1938-1958. - [n. p.], 1988. - 36 p.
12. Matniyazov, Zafarbek Erkinovich. (2020). "Invitation projects for architectural routes architectural environment", PalArch's Journal of Archaeology of Egypt / Egyptology, 17(6), pp. 8154 - 8164.
13. Matniyazov, Zafarbek Erkinovich. (2020). "CULTURAL AND COGNITIVE ASPECT AND FACTORS INFLUENCING THE ORGANIZATION OF THE ARCHITECTURAL ENVIRONMENT OF THE ARALSEA REGION TOURIST ROUTES", PalArch's Journal of Archaeology of Egypt / Egyptology, 17(6), pp. 8139 - 8153.
14. Reyimbaev Shukhrat, Adilov Zarif, Matniyozov Zafar. (2021). Role of the design code in improving the quality of the urban environment. ACADEMICIA: An International Multidisciplinary Research Journal, 11 (1), pp. 1805 - 1812
15. Tajibaev, J. K. (2022). Use of Small Architectural Forms in Greening Public Places of Historical Cities (On the Example of Khiva). Eurasian Journal of Engineering and Technology, 4, 107-114.
16. Isroilova, N. F., Matniyazov, Z. E., & Mansurov, Y. M. (2022). Modern Trends in Interior Design of Hotel Premises. Eurasian Journal of Engineering and Technology, 5, 55-59.

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 5 |May 2022

17. qizi Tajibayeva, D. M. (2022). Importance and Relevance of Focusing and Improving Sidewalk Design. Eurasian Journal of Engineering and Technology, 5, 13-16.
18. Fomenko, N.N., Dobronravova, E.A., Vetlugina, A.V. (2021). Problem education is a way to activate educational activity. ACADEMICIA: An International Multidisciplinary Research Journal 11 (12), 557-562.
19. Khasanov, Azamat. "Organizing Eco Tourism Along With Uzbek National Automagistrale Way." Solid State Technology 63.6 (2020): 12674-12678.
20. Saidkhonova, Umida Ziyodullayevna, et al. "Problems in tourism in uzbekistan." ACADEMICIA: An International Multidisciplinary Research Journal 11.11 (2021): 256-258.
21. Vetlugina, A.V., Dobronravova, E.A., Fomenko, N.N. (2021). Environmental trends in modern architectural design. ACADEMICIA: An International Multidisciplinary Research Journal 11 (12), 487-491.
22. Mannopova N.R., Kamolkhodjaeva M.B. Features of designing interiors of restaurant establishments //Asian journal of multidimensional research. - 2021. - T. 10. - №. 4. - C. 711-715.
23. Amriddinovich, A. D., Ziyodullayevna, S. U., Bahromovna, G. S., & Abduhabirovna, S. D. (2021). Architecture of historical cities of Uzbekistan. ACADEMICIA: An International Multidisciplinary Research Journal, 11(12), 443-445.
24. Sultanova, Muhayyo. "Use of Cultural Plants in Desert Cities in Creating the Landscape of Recreation Zones in Uzbekistan." International Journal on Orange Technologies, vol. 2, no. 10, 20 Oct. 2020, pp. 102-104, doi: 10.31149 / ijot.v2i10.738.
25. Adilov Z.H., Mirjalolov D.T., Komiljonov M.S., Mirjalolov N.T., Tadjibaev J.H. // Effective Organization Of Landscaping In The Republic Of Karakalpakstan. Volume 6, ISSUE 11, November 2019. pp.
26. Yaxyayev A.A. The Architecture of Towers in Uzbekistan Heritage // International Journal of Scientific & Technology Research, France/India, Volume-5, Issue 12, December 2016, Edition ISSN 2277-8616. 226-231 p.
27. Saidov, Abdumalik. "Features of landscape design for 9-floor residential buildings." ACADEMICIA: An International Multidisciplinary Research Journal 11.11 (2021): 268-272.