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Influence of Landscape Elements on Visual Design Elements in Order to Enhance the Visual Quality of Urban Spaces

Mona Y. Shedid[1], Noha H. Hefnawy[2]

[1] *Associated Professor, Department of Architecture, Faculty of Engineering-Benha, Benha University – email:* monashedid@bhit.bu.edu.eg
[2] *Assistant Professor, Department of Architecture, Faculty of Engineering-Benha, Benha University* – email: nohahefnawy@bhit.bu.edu.eg

Abstract- **Visual quality of urban spaces is an important component in the process of research and development of the physical structure of the built environment. It establishes a comfortable and satisfying experience for the community. A good visual image of urban space will lead to positive perceptions and meanings stimulating the community to produce a good reaction to its urban space. The purpose of this study is to extract the most effective landscape elements that affect the visual quality which contribute designers to make better decisions for designing urban spaces. From this point of view the paper aims to identify the landscape elements and the visual design element that enhance the visual quality of urban spaces. Then the paper will rank the most effective landscape elements according to their influence on the visual design elements from the experts (urban designer and architects) point of view to reach the main objective of the paper which is to create a prospected framework for the urban designer and architects to help them in future decisions in designing landscape elements that promote the visual quality of urban spaces.**

Keywords: **Landscape elements, visual design elements, expert's perception, effective landscape elements, visual quality**

I. INTRODUCTION

Human perception appears to be critical for understanding the interactions between humans and landscapes. People affect the landscape, and in return, the landscape affects people by means of its appearance. Since landscape involves a subjective experience, it encompasses a perceptive, artistic, and existential meaning [1]. There is a mutual relationship between individual and the surrounding environment. People are intrinsically involved with their living environments to survive. They use and shape the physical environment to meet their physical and social needs. Environments are shaped by people, and reciprocally people are inspired and shaped by their environments as well. Thus, perception of the environment or the landscape has become an area of concern in order to understand and explain this interaction between people and visual elements of urban spaces [2].

Landscaping combines elements of art and science to create a functional, aesthetically pleasing extension of indoor living to the outdoors. A principal purpose of landscape design is to blend man's technology (house or building) into the natural surroundings.

II. RESEARCH METHODOLOGY

The research study composed of three phases as follows, as shown in Fig. 1:

The first phase of the introduction is based on reviewing the literature and theoretical fundamentals of the main visual design elements, followed by studying the components of landscape elements through discussing their role in enhancing elements of visual design, and design principles.

Through the outputs of the first phase the paper will identify the different landscape elements which affect the visual design elements.

The Second Phase In order to study the influence of landscape elements on the visual elements of urban spaces, two online questionnaires were conducted:

First Questionnaire: used to select the most effective landscape elements on the visual design elements of the urban spaces.

Second Questionnaire: used to rank the most effective landscape elements (elements that ranked more than 50% in each element, resulted from the first questionnaire) of each visual element.

The Third Phase In this phase the paper will introduce the prospected framework which study the influence of the heights three ranked landscape elements in each visual design element.

III. VISUAL DESIGN ELEMENTS

The ultimate visual objective in any design is to balance unity with diversity and to respect the genius loci (refers to the special, unique quality one place has over another) and the spirit of the place. The patterns and structure of a design, composition, or landscape result from the organization of the basic elements in their endless variations. Certain patterns so created seem harmonious and unified, others discordant and chaotic. It is necessary, therefore, to examine in some detail the concepts of unity, diversity, and genius loci (refers to the special, unique quality one place has over another) before looking at the various means by which elements can be organized through the design process [3].

These design principles include unity, balance, rhythm, proportion, order, scale, and contrast; all interacting to yield the intended design [3], [4], [5].

A. Unity

Unity is necessary for the parts of a design to relate to one another and to form a whole. Complementary unity involves the deliberate use of opposites or contrasts, which nevertheless relate to the whole [3].

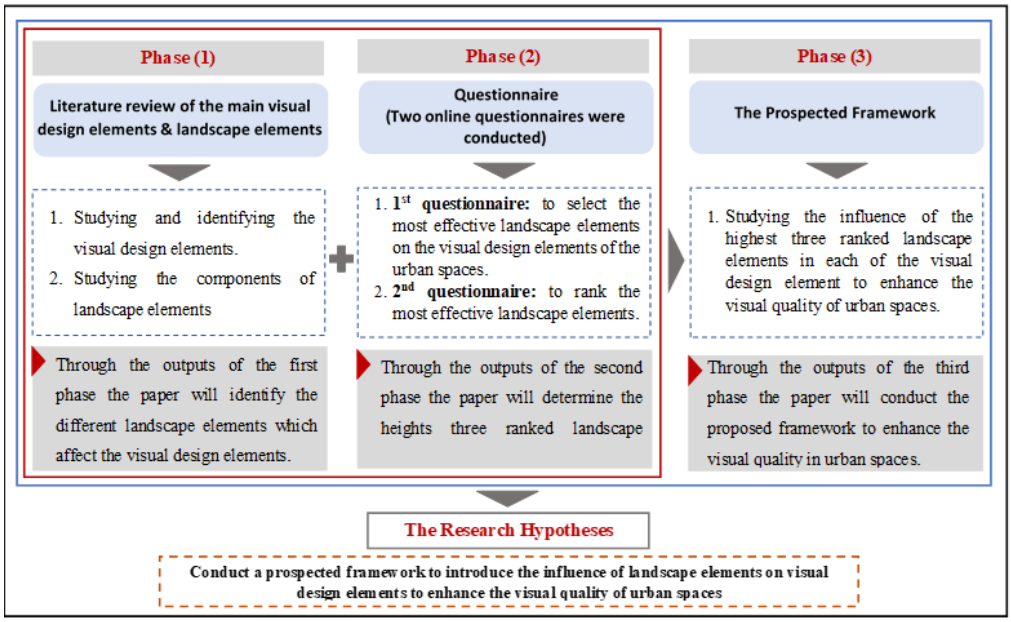

Figure 1: Formation of the research methodology. Source: Authors

Unity is obtained by the effective use of components in a design to express a main idea through consistent style. Unity is emphasized by consistency of character between units in the landscape. Use of elements to express a specific theme within units creates harmony. Unity can be achieved by using mass planting and repetition [6].

B. Balance

Balance in design refers to the equilibrium or equality of visual attraction [6]. Factors affecting visual balance include direction, size, density, solidity, color, direction of movement, and the apparent visual strength of the elements. Larger forms seem stronger than smaller ones, regular closed shapes are stronger than irregular open ones, and solid forms are stronger than diffuse ones [3].

Symmetrical balance is achieved when one side of the design is a mirror image of the other side. There is a distinct dividing line between the two sides. Equal lines, forms, textures, or colors are on each side of a symmetrical design. Asymmetrical balance uses different forms, colors, and textures to obtain balance of visual attraction. These opposing compositions on either side of the central axis create equal attraction [6].

C. Rhythm

Rhythm is achieved when the elements of a design create a feeling of motion which leads the viewer's eye through or even beyond the designed area and reduces confusion in the design. Tools like color schemes, line and form can be repeated to attain rhythm in landscape design [6].

Similar elements repeated at related regular or similar intervals create rhythms, especially when there is also a strong sense of direction involved. Since shape is one of the strongest variables, repeating similar shaped elements is one of the strongest means of producing rhythm [3].

D. Proportion

Any design or composition is made up of a number of elements or parts of elements [3]. It refers to the size of parts of the design in relation to each other and to the design as a whole [6].

E. Order

Any design requires some order in it, but the application of the principles of Axis and Symmetry can result in very formal results. Hierarchy need not be so formal and is a useful device in any design. Datum is another way of organizing elements so that we pick up a pattern and Transformation is a method of introducing order across the boundaries between different patterns [3].

F. Scale

Scale refers to the size of an object or objects in relation to the surroundings. Size refers to definite measurements while scale describes the size relationship between adjacent objects. The size of plantings and buildings compared on the human scale must be considered [3].

G. Contrast

There are multiple ways to achieve contrast. One way to make contrast is to use substantially different colors. Another way to achieve contrast is to use objects of different sizes, texture, and lines [7].

IV. VISUAL QUALITY OF URBAN SPACES

The quality of urban environment has become important for present and future design and planning practice. The establishment of high visual quality of urban spaces is aimed to raise up a good urban image. Every person possesses own

perception and association, either in the positive or negative, to the surrounding environment as well as to every element that shapes the image in the urban space. [8]

An excellent visual quality of landscape elements will give a good visual aesthetic experience and psychologically create a positive thought and action.. Designers can increase these benefits by achieving the perfect use for different functions in various places, like to orient people moving, to define the space enclosure or to provide people with the environment suitable for human activities in urban spaces. [9]

V.CLASSIFICATIONS OF LANDSCAPE ELEMENTS

Landscape features is a cultural artefact of creating interactive territories with the architectural physical artefacts. Landscape has different classifications whether according to its function or type as follows [10], [11].

Landscape Elements classification according to its type: softscape, Hardscape and Waterscape.

Landscape Elements classification as Structure Components: Floors, Walls, and Ceilings.

Landscape Element classification according to its function: Shading's elements, weatherproof elements of windbreaks and water lakes and fountains to temper degrees.

Landscape Elements classification as a Visual Image 'Kevin Lynch': Nodes, Landmark, Edges and Districts .

The aper will focus to study Components of Landscape Elements according to its type as Hardscape elements, Soft-scape elements, and Waterscape elements. Table 1 will summarize the landscape elements through discussing their role in enhancing elements of visual design, and design principles.

Table 1: The design principles of landscape elements and their role in enhancing elements of visual design.
Source: Authors based on [5], [10], [12], [13], [14].

Landscape elements		Design principles	Role in enhancing visual design elements
Hardscape Elements	Walls	Walls are the vertical planes that have the greatest impact in defining the urban area, and they can be built with partial transparency in mind. To avoid being visually annoying to space users, they are best placed near the perimeter of the space.	They can be utilized in design to 'connect' a site to its underlying geology or to integrate architecture and landscape, resulting in a regionally distinct space. Walls can be used to create sculptural and textural effects.
	Paving	Pavement is an outdoor floor or superficial surface covering used in building. Sidewalks, curb extensions, furniture zones in sidewalks, and children's playgrounds are all examples. Pattern, movement, usage, texture, drainage systems, safety, durability, maintenance, context, permeability, and flexibility should all be considered when designing.	Use of innovative floor works such as terrazzo, mosaics, modern art, or handicrafts, as well as different types of pavement and contrasting textures.
	Ramps & Stairs	Where there are level changes, ramps must be positioned parallel to or provided in conjunction with steps to make them easily accessible.	Landings and staircases are frequently used as transition zones, as well as places to relax, rest, and watch. They can also create privacy by creating a visible barrier between floors (levels). Aesthetics The purpose of stairways is to improve the aesthetic character of cities. They contribute to the urban environment by providing delight, fantasy, and user happiness. Stairways are ideal locations for taking photographs.
	Lighting	They can be found in the furniture area on the sidewalk beside the curb. Other landscape components should be harmonized with light columns.	Allow users to identify impediments and maintain their visual orientation. Lighting alters the environment and can produce a variety of effects.
	Fences	To provide people a sense of security, fences are frequently placed at the intersections of streets, at the entrance gates, and along the edges.	They demarcate the distinction between public and private spaces. The following are some suggestions for designing a creative barrier that allows people to feel unrestricted: Replace wood slats with a green wall, integrate seating or a planter with the fence, and give a low planter in place of the fence. Fencing can be used for decorative purposes in landscaping to improve the appearance of a property, garden, or any other location.
Hardscape Elements	Signs	They must be put in appropriate locations to reduce the number of signs in order to reduce their efficacy and clutter in urban spaces.	Signs make urban places more readable for all users and improve their feeling of place. There are various design elements that make signage more legible and recognizable: Be large enough to draw attention and immediately identifiable from a distance.

	Artwork	Different shaped art works (sculptures and urns) can accentuate the sense of space that draws the user's attention. They could be placed on the street's focal axis to provide visual attraction to users as they stroll down the walkway.	They provide an aesthetic look instead of a disorganized look and provide a focal point and placed in selected positions can add that element of surprise with expression. Localization, form, and function as well as transfer of contents of artworks play an important role in the process of raising the attractiveness of public spaces and making townscape more individual.
	Light	They are light furniture elements (swings, shades, pergolas, gazebo, and arches).	Used to evocate the user feelings by surprising them at the end of the path. They should be with suitable height and allow people to feel comfortable when using it to enhance people's social interaction.
	Seats	Seats should be made of durable and high-quality materials. The street should have different types of seats whether fixed or movable.	Sitting in the landscape enables more intimate contact with a place, especially through texture. Sitting units which are designed, by considering their aesthetic properties like the natural or artificial materials used and their color and shape
Softscape Elements	Trees &	There are various kinds of trees and palms, and choosing the right one for the job depends on the design goal. Each specie differs in size, form, color, and texture.	Vertical elements catch the eye more than horizontal elements because they are more visually appealing. They are utilized to improve utility and placemaking by highlighting user pathways, and their height lends a sense of place to the urban environment.
	Shrubs	Herbaceous plants, grasses, and bulbs are frequently (though not always, as in the case of tall grasses) employed in ground planes and for lower enclosure, with shrubs playing a key part.	People can sit among the aroma, color, and texture of plants by massing shrubs within indentation boundaries. Shrubs are employed in urban environments to add volume, as filler, and as a dividing, framing, or uniting element. Human-scale edge structures are provided by shrubs.

Table 2: Descriptive background parameters of the first questionnaire. Source: Authors

No. of Participants	Gender		Years of Experience					Specialization	
	Male	Female	0 –5 years	5 – 10 years	10 – 15 years	15– 20 years	More than 20 years	Architect	Urban Designer
57	28.1%	71.9%	10.5%	22.8%	12%	31.6%	22.8%	71.9%	28.1%

VI. QUESTIONNAIRE ANALYSIS AND EVALUATION

This part composed of two sections, as follows:

A. *First Questionnaire:*

In this phase the landscape elements are evaluated and selected according to their influence on each visual element through an online questionnaire based on Probability sampling methods; which distributes to a group of experts (architects & urban designers) to figure out the most effective landscape elements on visual elements of the urban spaces.

The population sample maintained under the analysis should be chosen to infer statistically relevant generalizations about a specific feature of this population to preserve the research sample's representativeness. The questionnaire has been conducted for one month period to a group of 57 participants with different characteristics.

1. Stimuli

The questionnaire composed of two parts, where: The first part was about the participants' gender, years of experience, and specialization; while the second one composed of multiple choice questions were used to select the different landscape elements that mostly affect the visual elements of urban spaces.

2. Procedures

The required data was collected using an online questionnaire method. The questionnaire form had two part as following:

The first one asked participants to provide basic details (experience, gender, and specialization) in response to multiple choice (single answer) questions, which enable respondents to choose only one answer from a list using circular radio buttons. While the second part used to select the most effective landscape elements through multiple choice questions.

The Results of the First Questionnaire:

The results and findings of the first questionnaire will be discussed as the following:

First Part: Table 2 shows the results of participants' basic information. According to the results shown in figure 2, the most effective landscape elements were determined by landscape elements exceeding 50% that affect visual design elements in urban spaces as shown in figure 3.

According to figure 3 the following results were concluded:

The visual design elements corresponding to the landscape elements were determined through vertical analysis of the table.

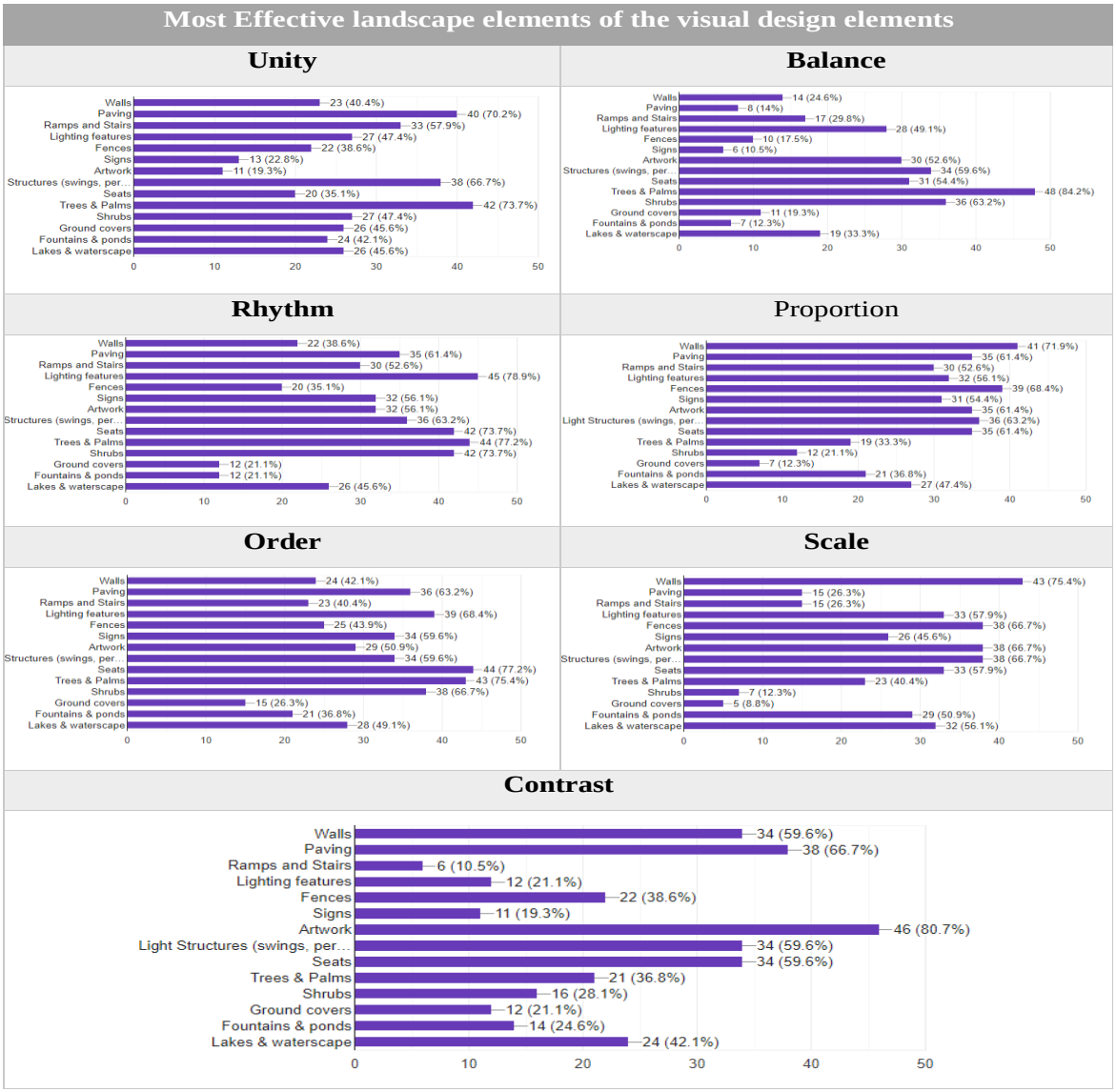

Figure 2. The results of the second phase of the first questionnaire. Source: Authors

The results were as following:

1. Light structures corresponded to all visual design elements
2. Seats and artwork corresponded to all visual design elements except for unity
3. Paving corresponded to unity, rhythm, proportion, order and contrast

The landscape elements corresponding to the visual design elements were determined through horizontal analysis of the table.

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The visual design elements corresponding to the landscape elements were determined through vertical analysis of the table. The results were as following:

4. Light structures corresponded to all visual design elements
5. Seats and artwork corresponded to all visual design elements except for unity
6. Paving corresponded to unity, rhythm, proportion, order and contrast

The landscape elements corresponding to the visual design elements were determined through horizontal analysis of the table.

The results were as following:

1. Rhythm corresponded nine landscape element (paving, ramps & stairs, lighting features, signs, artworks, light structures, seats, trees & palms, and shrubs).

2. Proportion corresponded also nine landscape element (walls, ramps & stairs, lighting features, fences, light structures, and seats).
3. Order corresponded eight landscape element (paving, lighting features, signs, artworks, light structures, seats, trees & palms, and shrubs).
   Order corresponded eight landscape element (walls, lighting features, fences, artworks, light structures, seats, Fountains & Ponds, and Lakes & Waterscape).
4. Balance corresponded five landscape element (artworks, light structures, seats, trees & palms, and shrubs).
5. Balance corresponded five landscape element (walls, paving, artworks, light structures, and seats).

B. Second Questionnaire

In this phase the most effective landscape elements are ranked to each other according to their influence on each visual element through an online questionnaire based on Probability sampling methods; which distributes to a group of experts (architects & urban designers) to figure out the most effective landscape elements on visual elements of the urban spaces.

The population sample maintained under the analysis should be chosen to infer statistically relevant generalizations about a specific feature of this population to preserve the research sample's representativeness. The questionnaire has been conducted for two weeks period to a group of 28 participants with different characteristics.

1. Stimuli

The second questionnaire consists of two parts, where: The first one was about the participants' gender, years of experience, and specialization. The second part used a ranking scale to rank the most effective landscape elements according to each other.

2. Procedures

An online questionnaire was used to collect the necessary data. The questionnaire form was divided into two sections, as shown below:

The first section: Participants were asked to provide basic details (experience, gender, and specialization) in response to multiple choice (single answer) questions, which enable respondents to choose only one answer from a list using circular radio buttons.

The second section: the participants were asked to rank the most effective landscape elements to each other according to their effect on visual design elements through a ranking scale.

The Results of the Second Questionnaire

The results and findings of the second questionnaire will be illustrated through charts and tables to determine how experts rank the most effective landscape elements according to their point of views.

First Section: Table 3 shows the results of participants' basic information.

Second Section: figure 4 shows the mean of landscape elements of the visual design elements to determine 3 highest landscape elements.

From figure 4 the following results were concluded:

1. Trees & palms ranked the most effective landscape elements in unity, balance, and rhythm; while it ranked the second place in order principle.

Most Effective Landscape Elements															
Color	Rank	Hardscape Elements									Softscape Elements			Water features	
	1	Walls	Paving	Ramps & Stairs	Lighting features	Fences	Signs	Artworks	Light Structures	Seats	Trees & Palms	Shrubs	Ground Covers	Fountains & Ponds	Lakes & Waterscape
	2														
	3														
Unity			●	●					●		●				
Balance								●	●	●	●	●			
Rhythm			●	●	●		●	●	●	●	●	●			
Proportion		●	●	●	●	●	●	●	●	●					
Order			●		●		●	●	●	●	●	●			
Scale		●			●	●		●	●	●				●	●
Contrast		●	●					●	●	●					

Figure 3. The most effective landscape elements of the visual design elements, Source: Authors

Table 3. Descriptive background parameters of the second questionnaire. Source: Authors

No. of Participants	Gender		Years of Experience					Specialization	
	Male	Female	0 –5 years	5 – 10 years	10 – 15 years	15– 20 years	More than 20 years	Architect	Urban Designer
28	21.4%	78.6%	28.6%	3.6%	21.4%	10.7%	30.7%	85.7%	17.9%

Mean of Landscape Elements														
Color	Rank	Hardscape Elements									Softscape Elements			Water features	
	1	Walls	Paving	Ramps & Stairs	Lighting features	Fences	Signs	Artworks	Light Structures	Seats	Trees & Palms	Shrubs	Ground Covers	Fountains & Ponds	Lakes & Waterscape
	2														
	3														
Unity			1.96	2.61					2.5		2.93				
Balance								2.14	2.43	2.5	4.36	3.75			
Rhythm			3.89	4.75	5.53		5.07	3.93	5.39	4.93	6.29	5.18			
Proportion	4.18	4.21	4.89	4.18	4.71	3.75	6.29	6.56	6.21						
Order		3.68		3.82		4.07	3.71	5.14	4.39	5.54	5.64				
Scale	4			3.18	4.07		4.71	5	3.82					5.5	5.71
Contrast	2.43	3.14					3.68	2.43	3.32						

Figure 4. Mean of landscape elements. Source: Authors

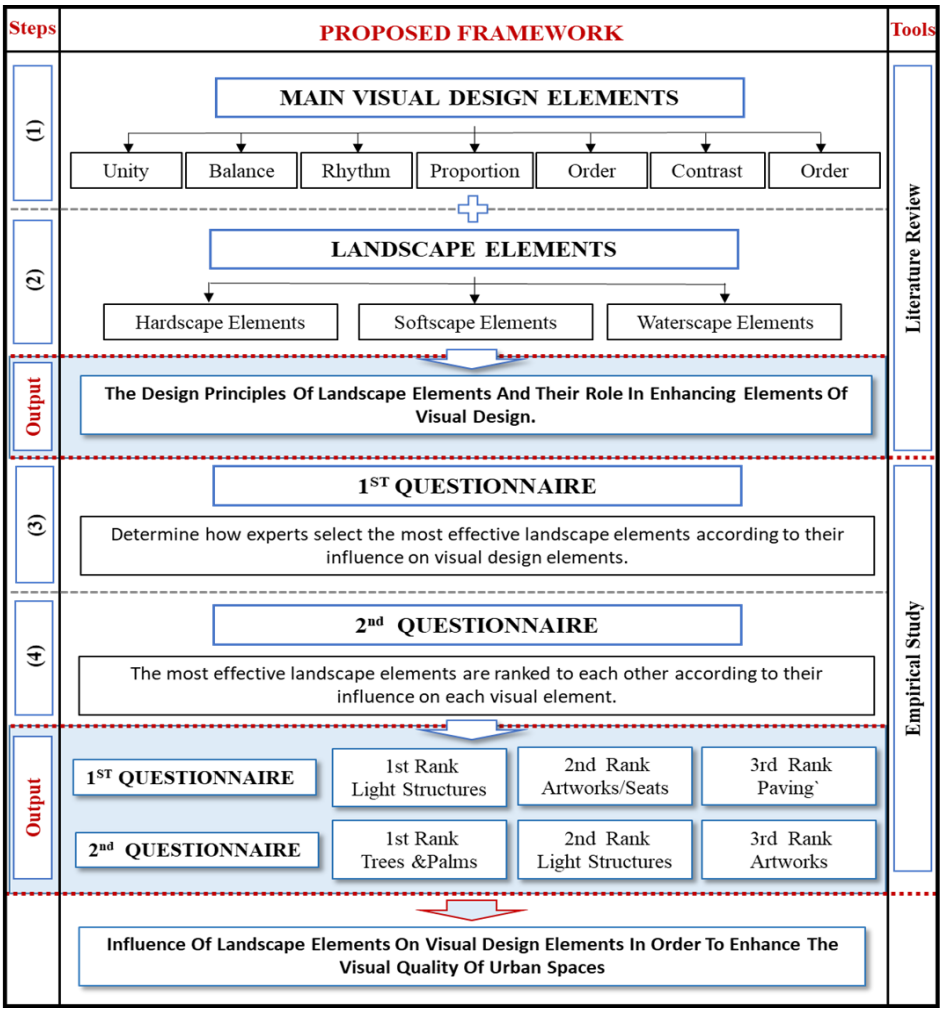

Figure 5. The prospected Framework. Source: Authors

2. Light structures ranked the most effective landscape elements in proportion; while it ranked the third place in unity, balance, and rhythm.

3. Artwork ranked the most effective landscape elements in contrast; second place in proportion, while it ranked the third place in scale.

VII. THE PROSPECTED FRAMEWORK

The prospected framework will discuss how the landscape elements can affect the visual design elements in urban spaces, as shown in Figure 5.

VIII. CONCLUSION

The paper highlights the significant role of landscape elements in enhancing the elements of visual design in urban spaces through identifying the most effective landscape elements and their role in promoting the visual quality in urban spaces.

Through two online questionnaires the most effective landscape elements were ranked through a group of experts and they agreed on giving: trees & palms, light structures, and artworks were the most effective landscape elements on the majority of visual design elements.

Next, a proposed framework was created based on the theoretical and the two phases of the empirical study of the paper.

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