Liquid Architecture

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Abstract. The general intellectual positions in the architecture diversified to produce many concepts and indicators for dealing with, to present a new vision that documents the technical development and methods of adaptation within the architectural field, which is the vision of liquid architecture, which represented a new intellectual position in architecture. It must be studied and studied in relation to the architecture and indicators of its public and private construction, and the tendency was to clarify these frameworks and indicators intellectually, conceptually, technically and practically within the general architectural field. This research aims to define and study the general frameworks of the basic research concept, the liquid state and liquidity within architectural propositions in order to define their basic indicators in a specific theoretical framework that is formed for this purpose after proposing the research problem that was represented by weak clarity of cognitive perception about the concept of liquidity and the effect of that in clarifying liquid architecture, up to the application Vocabulary and indicators of the theoretical framework on the product of an elected and specific architecture, and then putting forward, analysing and discussing the results of that application and reaching the final conclusions that strongly specialized in the presence of design features within the architectural reality of liquid architecture at a detailed level more than a general level and finally recommendations.

Key words: liquid, liquidity, liquid flowing direction, liquid architecture.

Abstract. The general proposals discussed the study of various intellectual visions influencing architecture, including the vision for liquid architecture and what it can offer within its various frameworks, theories and approaches, of significant and important additions to the field of architecture. However, all previous propositions did not interest in studying that concept from an overall point of view within the architectural field to highlight the real need for studying the concepts of that vision within the architecture and other fields, and it was necessary to go towards studying the specific body of knowledge for that within the general intellectual frameworks, and then, put forward and form The basic and subsidiary indicators of the theoretical framework for the research subject, leading to the application of that framework to an elected architectural product specific for that purpose, and then putting forward, analyzing and discussing the results, to present the final conclusions and recommendations.

Accordingly, the problem of cognitive research came in its form: - (Weak clarity of the cognitive perception of the concept of liquidity and its effect on clarifying liquid architecture).

As for the aim of the research, it focused on: (Clarifying the cognitive perception of the concept of liquidity and its effect on clarifying liquid architecture).
For the purpose of solving the epistemic research problem and achieving the goal, it will be:

- Presenting the general cognitive discourse on the concept of basic research, liquidity and its reflection in the concept of liquid architecture in the field of architecture and outside it, and determining the general and detailed effects of that.
- Forming a special theoretical framework that includes two basic vocabulary, namely (general frameworks for liquid state, detailed frameworks for liquid architecture).
- Conducting the application of the previous theoretical framework on a specific architectural product carefully chosen to represent the subject of the research, its concepts and their interconnections, and presenting the results of that application and discussing them in a comprehensive and detailed manner.
- Clarify the general framework of verification levels for indicators of the basic research concept (liquidity) and its reflection in liquid architecture in order to explore the possibility of the status and levels of verification in the general conceptual frameworks of the architectural field.

Therefore, the research structure will include two parts. The first focuses on the general theoretical presentation of the concept of liquidity and its reflection in the crystallization and development of liquid architecture, while the second part includes the presentation of a theoretical framework for liquid architecture and its application on an architectural example that represents the research topic carefully to demonstrate levels of verification of the theoretical framework vocabulary, and discuss the results of the application to reach conclusions Set for liquid architecture.

1. Part one: general theoretical presentation

1.1. Liquid state

Contemporary sociologist and philosopher (Zygmunt Bauman) attempted to devise and invent a metaphorical critical approach that crystallized in what was known to him as liquid modernity, through his critical questions of modernist thought, analysis and tracing of its paths. Where he worked to explain Western modernity and its transition from the stage of solidity to the stage of liquidity, detailing the fate of modernity fluid in awareness of self and personal choices. Liquid modernism is a new concept that Bauman carved in order to be a comprehensive tool for understanding the current version of modernity in thought, daily life, literature, and in social, economic, and political relations, and this concept is derived from the times of globalization and the postmodern world. Therefore, liquid modernity is the contemporary state in which the melting of solid social structures and institutions is evident in light of the growing liquidity in everything around us, as liquidity is a model for our contemporary lifestyle [1]. What Bauman decided to clearly call [liquid modernity] is the growing belief that change is the only constancy, and that uncertainty is the only certainty, as modernity in the past hundred years means trying to reach a final state of perfection, but now modernity means a process of improvement and progress that have not An end, without a final state on the horizon and without a desire for such a state [2]. Bauman does not give us a steady snapshot of a still image but rather explains modernity in its movement, its path and its transformations, as he moves in his analysis from describing solid modernism that seeks to negate the unseen and dominate the world and define the rules and the pursuit of material certainty based on the claim to control the liquid modernity that is based On the logic of consumption in its deepest sense of place, values, things and relationships in light of globalization [3].

1.2. Liquidity

Liquidity is the flexibility that stands in the way of solidity in all fields, as liquidity is seen as the only solidity, and uncertainty is the only certainty [4]. Liquidity is a model for our contemporary lifestyle, to ask the question is ... Is the modern human situation in the liquidity stage considered portents or an automatic model or a foresight or a harbinger of what is coming ..? Or was it the opposite of that ..? A temporary, transient, imbalance, imperfection, and incomplete settlement, as if it were a time lapse between two distinct and different responses characterized by consistency, completeness and perpetuity with regard to the challenges of a common human existence [5]. In fact, these questions shed light on
what the society as a whole has reached, with all its different shades. The obsession appears evident in analysing the technology of smelting, liquefaction and dissolving, presenting the major manifestations of the rule of this technique and the factors that created and helped in the power and sovereignty of liquidity, but to transfer the ground that has grown the seeds of modernity in its soil [6]. [Baumann] originally attributed the liquidity to [systems dismantling] in the sense of separating authority [the ability to do things] from politics [the ability to determine the things to be done] and the accompanying separation of the absence of the active force or its weakness, in other words the insufficiency of the necessary tools to do the tasks ... In light of liquidity everything can happen but nothing can be done with confidence and trust. (In fact, Baumann says) “There is no mold that was destroyed except replaced by another one.” [7]. The concept of liquidity, as Baumann explains in his series, appears not only in the fluidity of movement and movement as a result of accelerated developments in the means of communication and transmission, but is the liquidity of feelings, relationships, and meanings associated with them, where in liquid modernity the shifts of the relationship of time and space to the modernist perception where places are consumed [8]. The current situation today is proceeding in terms of speed and change, or the situation which Bauman called liquidity, which today the world is living its orientations in the behaviour of human and society of consumption, as Liquid modernism rejects all that is fixed and the only constant that it believes in is change, so modern society in a time of liquidity maximizes flexibility, ephemeralisation, disposal and abandonment of things, as consumer life is a life of rapid learning and forgetfulness [9]. And the liquidity that offers the infinite options narrows us more. It enters the individual in a state of non-completion and uncertainty. There is neither tranquillity nor spiritual calm due to the mixing of everything and the absence of the clear, understandable and immutable thing. Although consumption is a world in which man follows others, although consumption is a world in which man follows others, but he remains the one who chooses what he desires and he who permits an authority to be an authority through this act. In this world of consumption where there is no deterrent authority but rather a soft authority that courts the choice holder and tries to seduce and tempt him permanently. In this world of consumption where there is no deterrent power but rather a soft power that courts the choice holder and tries to seduce and tempt him permanently [10].

1.3. Liquidity idea evolution
Liquidity was present since the birth of architecture and despite the lack of clarity of this idea, which was not sufficiently prominent, but when the first person began construct a shelter, he was able to understand this principle and this appeared in his designs that include the presence of water (first A means known to man at this time). If we look back, we find that the ancient Egyptian designers, were keen on the flow of water in the interior design, which was then used as a means of cooling the place. As time passed and architecture flourished, this principle began to evolve and began to take different forms than the use of water in its primary form, but rather extended to use forms of surface ripples resulting from the seas and oceans as one of the sources of formal inspiration as some inspiration ideas [11], figure 1. Bauman inspired the term liquidity from the literature of critical deconstruction for Derrida and his postmodernist theses, taking from the deconstruction cultural incubator, as he borrowed the term deconstruction in its industrial sense with one of the four elements of nature that the ancient natural philosophers had been busy with and tried to reveal elements of existence by returning them to the four elements, air, dust, water and fire. Bauman chose water because of its liquidity and embodiment of the effectiveness of life and then the materialism of the contemporary world, and human history is a natural history that moves materially from the state of life solidity that has the form of persistence and petrification that is represented by the pre-modern stage to a loose fluid represented by the stage of modernity in evasive and unstable forms which it will only lead to the aerodynamic-infinite gaseous, with no shape and no gelatin, which will be represented by the postmodern stage, and this formation, semi-formation and non-formation is what made Bauman's orientation, his disorganized and vibrational intention seem new, irrelevant to deconstruction. Bauman notes that in this fluid time, identity does not have a meaning that enhances the concept of uncertainty and turns identity also into its liquid form. Liquid modernity describes a difficult, strange and dispersed reality, a reality that is formed daily and
constitutes a new identity, but it is a globalized identity that is created outside the local identity fenced by the values of traditional socialization institutions. It is a liquid identity that is made there and everywhere and If we like to scrutinize in Nowhere, do not care about the diversity of values or the difference in customs and traditions aimed at engineering molded and liquid societies without origin and history. Liquid modernity is to stay in a perpetual movement with the speed of this movement, so fluidity and fragility touched everything until human relations and stability was lost [12].

1.4. Technology impact on function of liquid spaces

Contemporary technology is the main element effecting in transformations on all aspects, it has a major impact on function and space and change its nature and shape, which has affected the formation and nature of the use of this space to affect us permanently. And when the determinants of a space appear to transform it into a closed space and the elements of the form begin to organize it, the designer’s role is to create spaces through the designer’s design thought and the use of advanced technology for the manners of attraction and stimulation that are considered one of the means to implement the idea, such as those that appeared in the (Sky SOHO Leasing Showroom) project. Figure 2 advanced technology also helped to overcome the problems of drawing, manufacturing, and implementation. The emergence of the computer had a major impact on the revolutionary breakthrough in the field of creative design thought of the design process, which affected the thought and performance of the designer, which enabled him to deviate from the Euclidean forms such as the pyramid, cylinder, and cube to forms that have different characteristics called The topological shape, which are considered non-geometrical forms mathematically, allowed the designer to devise space solutions and different ideas by merging the spaces together [13]. If we look at the liquid designs, we find them complex by a large percentage and are difficult to imagine using traditional design tools, so computer programs and advanced technology played an important role in the innovation and creation of these designs. As a result of this development, advanced design systems and implementation techniques have been developed and the emergence of new materials suitable for the implementation of these designs and numerical forms. As a result of this development, advanced design systems and implementation techniques have been developed and the emergence of new materials suitable for the implementation of these designs and digital forms that studied the relationship between closed, open, upper and lower through irregular configurations such as (clouds - sand dunes - liquids ... etc.), such as the Steinhardt Water Museum in San Francisco. Among these new systems that known as (CAAD-computer aided architecture design) programs, and that is one of the most important phenomena of the reflection of the use of computers in design which strengthens the imaginative and creative ability and implementing design in three-dimensional model which enables to develop and modify the design, and provides comprehensive control over an adjustable design, one of the most important outputs of these 3D modeling software is simulation and visualization, and to present systems for preparing mini proposals[prototyping], and then display a virtual reality that enables the user to live and experience the space[14].

1.5. Liquid architecture

Liquid architecture is a new design style and direction as one of the results of the integration of architecture with technology, where this trend uses new technologies and their applications in design based on metaphors of the physical architecture that appeared at the beginning as a virtual space with
different features and characteristics and then was implemented with the use of digital techniques in
design and implementation. To produce a liquid architecture that has an unexpected geometry that is
inspired by nature and liberated from traditional design and structural restrictions using computers in
the design process in terms of coding and the use of algorithms in generating the shape and how the
design evolves in terms of creativity and innovation In addition to the use of various software such as
(Grasshopper & Rhinoceros, Autodesk 3Ds Max, Wolfram Mathematica) by investing in digital
manufacturing techniques that had not existed, we would not have been able to achieve the
implementation of these creative designs on the ground. To produce spaces, with different features and
characteristics, are implemented using digital techniques in design and implementation. And other
orientation related mainly to the use of technology, which is reflected in the interior design. And as the
computer enters its programs in the design process, it has become a mean that helps to reach an idea to
create a liquid architecture with unexpected geometry inspired by nature and liberated from traditional
design and structural constraints, in other words, it was considered a means to achieve technology.
Important concepts are presented here such as flow, fluidity and the principle of liquidity, as well as the
surface performance and the formal frequency of liquids of different types [15]. Figure 3. Marcus Novak,
a pioneer of liquid architecture and explorer of its idea, argues that electronic space is a liquid through
which it is able to challenge the limitations of material worlds and respond to the context and concept
of the virtual world for him immaterial and this is what he called “Expressional Formalism”. Liquid
architecture is an architecture of fixed parts and variable links consisting of variable relationships
between various abstract elements. It is an architecture that can breathe, thrive and jump from one shape
to the other, it is an architecture that form changes according to the interests of the beholder or the user.
Being a building without doors or corridors so that the next room is always where I want it to be [16].

1.6. The interior space in liquid architecture
The space shape nature in the light of liquid architecture has evolved in a revolutionary way such as the
implications of the impact of contemporary technology and the use of new methods and was able to
express the design philosophy in a more innovative and profound way, resulting in spaces of complex
and unexpected geometry that achieve double pleasure for its residents. The determinants of space,
which were separated by walls, floors, and ceilings, have overlapped and have become more streamlined
and connected to each other, thus creating a new spatial experience for space users, which is considered
as an application to the flow and communication of space in light of liquid architecture. [17]. Figure 4

1.7. Virtual reality and liquid architecture
It has been called flowing, flexible, or liquid architecture, as it transcends the determinants of the
physical world and responds to the virtual field, which relied on the computer as a main formation tool
within these accelerating and competing trends in development. Flowing architecture is described as a
symphony in space but a symphony of continuous development. And that architecture is the extension
of our bodies and shelter, and it is changing, as Marcus Novak defines the flowing architecture is the
architecture that it forms depends on the interests of the viewer, which opens to welcome you and closes
to defend you and can become calm or irritating [18]. Figure 5.
1.8. The concept of the flowing fluid
It is the trend that gives a state of continuity movement in a space, which suggests the flow of blocks and lines inside the space, achieving the principle of flow in design, in which one of the fluid design that are designed according to this principle and which is characterized by flexibility appears where the borders between the inside and outside can be faded and the possibility of creating unexpected compositions as a result, due to the difficulty of designing and implementing them in traditional ways, it became possible to realize the imagination with sensory perceptions, and this is evident in ...

- Flexibility of space design.
- Freedom of internal and external formation of the spaces and the merging them.
- Freedom from place and time determinants of space [19].

1.9. Liquidity as a scientific term & design
The word "liquid" literally means that it is an amorphous substance, i.e. things that have the ability to flow and can accommodate the difference between liquids and solid things, which is due to the reason that solid materials cannot flow like liquids, since the strong interconnectivity between the particles in solid materials is strong, which maintains its fixed form, in the case of liquids, these forces of bonding between the molecules are weak, which allows the material to flow. The movement of these molecules that occur in different shapes and ways can be seen as diverse and unexpected, whose movement cannot be predicted, so we cannot predict how the particles will move. But the mathematicians and physicists were able to predict this movement of the molecules through several changes and compositions. Liquidity is the behavior of liquids or any substance that has the same image as a liquid. This behavior can be different and distinct in several different ways. We find that the vortex in the water has a concentric movement of the water molecules while the sand dunes have an abstract linear movement of the sand particles but both of them can be called a fluid movement and this behavior describes the flow behavior within the void with liquidity The sense of flowing or Streaming comes through the shapes of curved and flexible lines that fluid or other materials carry with the same properties. Therefore, we can say that the principle of liquidity in design is not limited to the formal inspiration of liquids or materials that have the same image only, but it extends to include all that has flow characteristics, fluidity and flexibility in movement such as sand dunes, just by looking at the movement of fluid flow, a dynamic movement resulting from its liquidity, flow and vitality involved in this movement, so the method of liquidity developed in the architecture [20].

1.10. Liquidity in design of architecture
As this concept began to evolve, designers thought, where could it be used out of shape? So far, only the external appearance of the building, whose shape is inspired by the forms of water liquidity or any of the other liquids, has not responded to this. It should be noted how the liquidity aspect is included in these designs, as the various elements that make up each design are related to each other, merged, be scaled and ultimately integrated To combine with the concept of liquidity. Therefore, the designers searched for other fields trying to incorporate this concept into different design approaches. Figure 6, as follows ...

1. The frame and the architectural form of the building.
2. Urban design and planning.
3. Interior design.
4. Interior Landscaping design.
5. The art of installation, furniture design, fashion and fashion design [21].
1.11. Computer Aided Design [CAAD / CATIA]
Where it was possible to deviate from the Euclidean forms such as a pyramid, a cylinder, and a cube into forms that have different characteristics called topological shapes, in stages to reach a complete design by feeding the computer with the information necessary for the design process in all its design, functional and structural dimensions, and others. The computer, through specialized programs, develops a design that dominates functional and space interconnection, so the surfaces resulting from this design thought are called Non-Uniform Rational B-Splines (NURBS). Special programs have been made for this type of surface to facilitate dealing with these free surfaces and facilitate controlling it, changing and transforming its form from one to another, by controlling the components that make up these surfaces, which are control points that enable to control and give the possibility of changing the form of the design and thus the form of the space [22].

1.12. Tools used in the liquid design process
Which plays an important role in supporting the design process, it is represented in:

A. **Transfer tools from physical image to digital image and vice versa.**
   Which relies on computers and programs, to convert the physical image into a digital image by using devices such as the digital cameras - 3D Scanner, But when converting from the digital image to the physical image, devices such as Prototyping devices that convert the designed design to a three-dimensional mini-model are used accurately to test and analyze it, and when it is confirmed, the project is implemented by CNC and 3D Printers technologies and others by developing a plan that the design will go through. Figure 8.

B. **Tools for visualizing forms constitute the models.**
   The plan that the design follows, after the final visualization of the design is done in the form of a mini-model, then the design is analyzed and experienced, if it is appropriate or not, when it is confirmed, it is implemented in reality [23].

1.13. Programs used to create liquid designs

A. **Designs use [Rhinoceros & Grasshopper] programs.**
   It is a 3D design program that helps making curved and semi-curved surfaces, it is sometimes difficult to modify them, which necessitated to use of the auxiliary program “Grasshopper”, which allows modifications to the surfaces drawn by the Rhinoceros program using Algorithms and works on a divided network (Canvas).
B. Designs with [Autodesk, 3ds Max] programs.
   It is a 3D modeling program that helps in clarifying and making the required details as curves and others.

C. Designs with [Wolfram Mathematica] programs.
   The idea of its work is based on mathematical equations to arrive at the required design and the calculations for the curves resulting from the liquid design thought [24].

1.14. General discussion

There is a shift in western modernity from the stage of solidity to the stage of liquidity to form the contemporary state of the melting of social structures and institutions and the formation of contemporary lifestyle by adopting the consumption logic of place, values and relationships in its deepest sense, to describe it as flexibility in the face of solidity, the Technique of melting, diluting and dissolving is proposed by transferring to rapid developments and offering infinite options, and contemporary technology has had a major role in effecting transformations affecting the space transformed to a closed space, parts of which merge with each other, and this in turn affected the liquid designs that appeared as a new design method and direction created and described as a result of the integration of architecture with technology using modern technologies, including digital to produce a liquid architecture, and to develop the shape of space in the light of liquid architecture in a revolutionary way, as reflection of modern technologies and complex and unexpected geometry to overlap the determinants of space such as walls, floors, and ceilings, and become more streamlined and connected to each other. The principles of liquidity, in the design, offer to link the different elements together, to have extensions that integrate and merge within different design fields using many computer programs.

2. Part two: the general application framework.

Here, the conceptual framework for the research concept will be initiated and formulated after the general knowledge was presented and by adopting what was determined in order to present the elected applied model and then put forward, analyse and discuss the ratios of the indicators verified in the theoretical framework and then conduct the application and go to put forward, analyse and discuss the results to reach the presentation of the final conclusions and recommendations.

2.1. Theoretical framework configuration

Here, the theoretical framework for the subject and vision of the research will be configured according to the two main vocabulary that it was decided to present to the framework, namely (general frameworks for the liquid state, detailed frameworks for liquid architecture) to be subsequently proposed to present secondary vocabulary, sub-indicators and possible values within them.

| Table 1. clarifies the theoretical framework for the research (Prepared by the two researchers). |
|---------------------------------------------------------------|---------------|-----------------|-----------------|
| The main vocabulary | The secondary vocabulary | The possible values | The verification |
| general frameworks for the liquid state | The general characteristic of the liquid state 2-4 | Melting solid social structures and institutions | O |
| | | The process of endless improvement and progress | |
| | | The belief that change is constancy | O |
| | | Logic of consumption in its deepest sense of place and values | |
| | | Flexibility in the face of hardness | O |
| The general vision of the concept of liquidity 3-5 | A time interval between two distinct and different responses Smelting, liquefaction and dissolution techniques Movement and mobility Liquidity and consumption of places Soft authorities and choice |
| Evolutionary state of the liquidity concept 7-13 | The flow in the interior design Forms of surface ripples Liquidity and endless options The four elements and the essence of beings Liquidity and embodiment of the effectiveness of life Shaky and unstable forms The infinite - Aerobic Gaseous characteristic formation, semi-formation and non-formation Pickled and vibratory feature Liquid time Liquid identity Engineering of molded and liquid societies Fluidity and fragility |
| The technical state of liquid space 4-6 | Closed space determinants Transforming of nature and form of closed space Topological figures The relationship between closed, open, upper and lower Comprehensive control in adjustable design 3D simulation of nature |
| Detailed frameworks for liquid architecture 24-35 | Liquidity and architecture 6-9 | Merge of architecture with technology Metaphor and spatial entities Architecture characterized with liquidity Unexpected geometry and inspiration from nature Freedom from traditional design and construction restrictions Coding and use of algorithms to generate the form Liquid electronic space Fixed parts architecture and variable links Architecture that beats and jumps from one form to another |
| Topic                                      | Description                                                                 | Reference |
|-------------------------------------------|-----------------------------------------------------------------------------|-----------|
| the virtual characteristic of liquid architecture | Separation of determinants of internal space  
Transcending the determinants of the physical factor  
Response to the virtual reality  
Describing flowing architecture as a symphony in space  
Architecture as an extension of objects  
The form of the architecture changed according to the interests of the viewer | 4-6       |
| Liquid state flowing  | Continuity movement in a vacuum (space)  
The masses and lines flow inside the void  
achieving the principle of flow in design  
Faded out the boundary between the inside and the outside  
Flexibility of vacuum design  
The movement of internal and external formation of the vacuum and the merging between them  
Freedom from place and time determinants of space | 4-7       |
| Fluidity in Architectural Design  | The frame and the architectural appearance of the building  
Urban design and planning  
Interior design  
Interior Landscaping design  
The art of installation, furniture design, fashion design and fashion | 3-5       |
| Computer aided design in liquid architecture  | Functional and spatial interconnectedness  
Control points  
Non Nurbs surfaces | 2-3       |
| Tools used in the liquid design process  | Transfer tools from the physical image to digital image  
Tools visualizing the forms that make up the models | 2-2       |
| Programs used in liquid design process  | Designed by Rhinoceros & Grasshopper  
Designed by Autodesk 3ds Max  
Designed by Wolfram Mathematica | 3-3       |
| total summation  |                                                                 | 63-40     |
2.2. The sample for the application

Here, general knowledge will be presented about the applied model, which represents an architectural project for the purpose of application to it, and in a manner that suits most of the criteria of the basic concept of research as follows:

2.2.1. The "Cultural Square" project in a district of Seoul, Korea.

A strange building with unique design and endless curves sitting near the Gate of Dongdaemun Disen Plaza Building (DDP) is the first Zaha Hadid project in Korea. Hadid's designs were chosen for the DDP in an international competition organized by Seoul city in 2007. Seoul wanted to build a cultural centre in the heart of one of its oldest and busiest districts, in order to provide joy and hope for its residents. Design ideas were based on blending architecture with surrounding landscape and the builders faithfully implemented this idea, which led to the emergence a huge, unfamiliar structure. The biggest advantage of the DDP project is that different forms appear in front of you, whatever the directions you are looking at. However, this sophisticated technical design also includes a simple surface covered with thousands of aluminium panels of the same colour. Patrick Schumacher, a partner at the Zaha Hadid Architects Foundation, said that the DDP project is one building but (the idea was to create unfamiliar forms that allow movement easily through the building. And the image is constantly changing where to open new views and forms, and this is what one also sees during moving through the unfamiliar and unknown landscape, the important thing is the skin, the harmonious appearance and the smooth structure). It is characterized by a coherent design that combines the site coordination and the project buildings in harmonious formations with each other linked in its spaces through soft liquid relations between its components despite the diversity of the shape of each component. The buildings were also covered with free curved formations made of metal cover units, some of which are solid and others with holes that provide natural lighting within the project and behind them are glass windows. Cover units are not recurring units but follow a network consisting of separator lines between units and follow the free curved shape of the cover. The network represents the interconnectedness of the units of various sizes according to their location in the network [25].

2.2.2. The advanced technic technology used to build the DDP project.

The building has three underground floors and four above the ground, and its area covers 85320 m$^2$, and it contains conference halls, exhibition spaces, studios, business centres and other facilities. The building does not have columns inside, it consists of infinite curves. In order to implement the idea of technical design, it was necessary to use a virtual computer simulation program, the Building Information Modelling Program (BIM) - the use of this program included the generation and management of digital representation, the physical and functional characteristics of the proposed building, and it transforms the two-dimensional design into three-dimensional design by New technologies, among which are the Mega Traces, which have been developed for applications that require endurance capabilities, space frames, and lightweight rigid structures built of monolithic units in a regular engineering image, used to implement structures without the use of columns inside, the DDP project is also impressive, and there are spaces within the spaces themselves, and it is difficult to know what spaces are in None of the floors. There is a large exhibition hall in the form of a large cylinder with interlocking corridors, and there is the Art Gallery used as a conference centre covering an area of 2992 square meters, and from the top there is a ceiling of nine meters, which provides a huge open space. The fourth floor is connected to the ground floor through a long spiral staircase. The outer surface is covered with 45,000 aluminium plates, and each one differs from the other. Most of the projects are linked to the sites, but the ideas are mobile, and the geographical features of the building design must be studied, and it is always difficult, for this project uniquely blends the landscape with the building, and by studying the geographical element, the historical background and the harmony between the building and the landscape, the original idea is generated, and Hadid indicated that each city differs from the other in terms of artistic design and Seoul is heading in this direction. [26]. Figure 9.
2.3. Practical application
Here, the application of the theoretical framework derived on the applied application model will be conducted in a way that indicates the verification cases for the possible values and thus for the secondary and main vocabulary for the purpose of determining the overall verification status and discussing it within the results. See Table 1.

3. Present, analyze and discuss the results
Here, after conducting the required application, we will go to presenting, analyzing, and discussing the verification results for the possible values and the secondary and main vocabulary and at the detailed and total levels of the basic concept of the research ... as follows ...

3.1. Detailed analysis
1. Results for the first main vocabulary (general frameworks for liquid state).
   A. Results for the first secondary vocabulary (general characteristic of the liquid state).
      Results verified 2 cases out of a total of 4 cases of possible values (melting of solid social structures and institutions, belief that change is constancy).
   B. Results for the second secondary vocabulary (general vision of the concept of liquidity).
The results verified 3 cases were achieved out of a total of 5 cases of possible values (flexibility in the face of hardness, smelting; liquefaction and dissolution technique, soft authorities and choice).

C. Results for the third secondary vocabulary (Evolutionary state of the concept of liquidity).
   The results verified 7 cases out of a total of 13 cases of possible values (Forms of surface ripples, The four elements and the essence of beings, Shaky and unstable forms, formation, semi-formation and non-formation, Pickled and vibratory feature, liquid time, fluidity, and fragility).

D. The results of the fourth secondary vocabulary (the technical state of liquid space).
   Results verified 4 cases out of a total of 6 cases of possible values (Closed space determinants, Transforming of nature and form of closed space, relationship between closed, open, upper and lower, 3D simulation of nature).

2. Results for the second main vocabulary (detailed frameworks for liquid architecture).
   A. Results for the first secondary vocabulary (liquidity and architecture).
      The results verified 6 cases out of a total of 9 cases of possible values (metaphor and spatial entities Architecture characterized with liquidity, Unexpected geometry and inspiration from nature, Coding and use of algorithms to generate the form, liquid electronic space, fixed part architecture and variable links).
   B. Results for the second secondary vocabulary (the virtual characteristic of liquid architecture).
      The results verified 4 cases out of a total of 6 cases of possible values (separation of determinants of internal space, Response to the virtual reality, Describing flowing architecture as a symphony in space, architecture as an extension of objects).
   C. Results for the third secondary vocabulary (Liquid state flowing).
      The results verified 4 cases out of a total of 7 cases of possible values (The masses and lines flow inside the void, achieving the principle of flow in design, Faded out the boundary between the inside and the outside, the movement of internal and external formation of the space and the merging between them).
   D. Results for the fourth secondary vocabulary (liquidity in architectural design).
      Results verified 3 cases out of a total of 5 cases of possible values (frame and exterior architectural form of the building, interior design, installation art, furniture design, fashion design and fashion).
   E. Results for the fifth secondary vocabulary (computer aided design in liquid architecture).
      The results verified 2 cases out of a total of 3 cases of possible values (control points, Non Nurbs surfaces).
   F. Results for the sixth secondary vocabulary (tools used in the liquid design process).
      Results verified 2 two cases out of a total of 2 two possible values (transfer tools from the physical image of the digital image, tools visualizing the forms consisting of the models).
   G. Results for the seventh secondary vocabulary (programs used in liquid design process).
      The results verified 3 cases out of a total of 3 cases of possible values (Designed by Rhinoceros & Grasshopper, design in Autodesk 3ds Max, Designed by Wolfram Mathematica).

3.2. Overall analysis
   1. Results for the first main vocabulary (general frameworks for liquid state).
   2. The results verified 16 cases out of a total of 28 cases.
   3. Results for the second main vocabulary (detailed frameworks for liquid architecture).
   4. The results verified 24 of a totals of 35 cases.
   5. The results for the overall situation.
   6. The results verified 40 cases out of a total of 63 cases.
3.3. Discussion.
Believing that change is the only constant, the results of the application confirm the shift towards liquid structures, and the adoption of flexibility through the techniques of smelting and liquefaction and dissolution, which leads to the production of surface ripples Forms, Shaky and unstable shapes, characterized by loose and vibrating, fluidity and fragility, liquid time And the shift towards flexible and continuous fluid spaces open in all directions and moving away from their solid determinants that lead to closure, that gives fluidity in the architectural design at the level of the external form or interior design, and all of these may lead to the 3D simulation of nature and its flexibility through formation, semi-formation and non-formation by investing The mechanisms of metaphor, fluidity and unexpected geometry, inspiring from nature, coding, and using algorithms in generating forms and liquid electronic space and investing the potential of virtual space to produce a flowing architecture like a symphony in space, through the flow of forms and lines in space to achieve the principle of fluidity in design to fade out the boundaries between inside and outside and to merge them, with investment Contemporary technology, especially computer software (Designed by Rhinoceros & Grasshoppper, design in Autodesk 3ds Max, Designed by Wolfram Mathematica) and its capabilities to control (control points, Non Nurbs surfaces) and production (transfer tools from the physical image of the digital image, tools visualizing the forms consisting of the models).

4. Conclusions
1. Western modernity has moved from the stage of solidity to the stage of liquidity to constitute the contemporary state of the melting of social structures and institutions to constitute a contemporary lifestyle by adopting the logic of consumption of place, values and relationships in its deepest sense.
2. Liquidity is described as flexibility in the face of solidity, and the technique of melting, diluting and dissolving is proposed by transferring to rapid developments and offering infinite options. the principle of liquidity is present since the birth of architecture, and its sources include the use of forms of surface ripples and the presentation of elusive and discontinuous forms in a disruptive and shaky manner so that the fluid time does not keep the identity any meaning, but it poses the liquid identity.
3. Contemporary technology has a major role in the transformations that affect the space transformed into a closed space, parts of which merge with each other, and this in turn influenced the fluid designs by studying the relationship between closed, open, upper and lower through irregular configurations.
4. Liquid architecture is a contemporary design style and direction that is described as a result of the integration of architecture with technology using contemporary technologies, including digital to produce a liquid architecture, and an unexpected geometry to reveal its idea that the electronic vacuum is a liquid with fixed parts and variable links.
5. The form of space evolves under the liquid architecture in a revolutionary way, as a reflection of contemporary technologies by the complex and unpredictable engineering of space determinants such as walls, floors, and ceilings. In the void, to become more streamlined and connected to each other to form a new spatial experience called flowing, flexible or liquid architecture within a trend that gives a state of continuity movement in a vacuum.
6. The principles of liquidity are proposed in the design linking the different elements together so that they have extensions that are merged and integrated within different design fields and with the help of computers and tools for converting a physical image into digital or visualizing the forms that make up the models using several programs to make liquid architecture designs.
7. The power impact is generally demonstrated by the indicators of general frameworks for the liquid state versus the effect of the strongest detailed frameworks for liquid architecture, which confirms
the strength of the presence of design features within the architectural reality of liquid architecture at the detailed level more than a general level.

5. Recommendations
1. The research recommends the necessity of expanding the study of general indicators and concepts that can contribute to highlighting the general theoretical role of the liquid architecture vision
2. The research recommends the necessity to study the possibility of adopting various multiple formulas for the design frameworks for liquid architecture and to employ that in the general architectural design.

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