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A strategy toward applying parametric vocabulary to urban spaces and their impact on design flexibility in the urban environment

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ABSTRACT:

This research deals with the integration of parametric vocabulary with external urban spaces in new cities and their forms. The research also aims to find an evaluation strategy through which the evaluation of the local identity in the open urban squares in these cities is measured or the effect of imparting parametric vocabulary to them, where the outer urban space is defined and how it is formed, and then an overview is provided for the main specific elements of the urban space. In addition to moving to the concept of the form of space, through which existence is achieved, the physical void that man perceives with his senses, affects his feelings and directs his behaviour. The research also presented the expressive value of the forms of urban spaces.

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Parametric architecture is also a generating tool in architectural and urban design for developing features and vocabulary that simulate urban spaces. The research attempts to reach quality indicators that interact with environmental life to improve Egyptian societies and then create a heritage identity adapted to the environment. The research aims to study and analyse the heritage identity in parametric terms and technological developments to change the shape of new cities in general and the formation of their urban spaces in particular and to reach the goals and standards that control the shape of urban space in a new way. Cities and their application to urban spaces in residential areas in new cities in Egypt.

KEYWORDS: Simulation of parametric urban design, aspects of generative design, parametric urban spaces, heritage identity, formation of urban spaces.

1. INTRODUCTION:

Urban spaces are among the points that have an impact on the design aspects of the new areas. They also play a major role in the urban fabric of the housing plan and always have direct and indirect effects on the efficiency of these plans because of their continuous association with different applications with unique designs in terms of design because of their influence and impact on it [1].

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It is not easy to remove the idea of creating urban spaces in the city, as it is considered for the city and its residents a lasting heritage - each formation is an addition that demonstrates the character and quality of people's movement within the city and affected by its designs. It is the identity that distinguishes them forever, affects what they do, and establishes their livelihood. In order to give distinctive characteristics and special artistic values to new cities and urban spaces, it is necessary to study urban spaces in new cities and identify the dimensions affecting their formation and placement in the appropriate and required focus [2].

2. STATEMENT OF THE PROBLEM:

The increasing incidence of encroachment on urban spaces between buildings, especially in housing projects, and their deterioration and misuse, in addition to the recurrence of this phenomenon, which is considered an infection to some residential areas in new cities, and the waste of resources and visual distortion of urbanization in those cities in addition to other negative dimensions, and with the specialists ignoring From planners and architects to designing spaces of all kinds and shapes, the problems of this phenomenon increased and began to think about the importance of having solutions with parametric designs to revive urban spaces and the appropriate environment in Egypt, especially in new cities. Therefore, a new vocabulary has been incorporated, represented in parametric designs with a clear identity in the urban domain. It allows the integration of performance analysis into the design installation of urban spaces.

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As an emerging architectural style rather than a computational style, moreover, parametric models come to recreate concepts of architecture, imposing constraints on representational flexibility and design complexity, a critical awareness of both the potential and limitations of parametric systems is crucial to their effective use during design of urban spaces. The main objective of the research is: To monitor clear and interactive vocabulary through which the design process can be combined with parametric adaptive methods to re-explore urban spaces in Egyptian societies with a heritage identity, which makes them have the ability to be flexible and adapt to changing climatic factors to improve the environmental quality of life for Egyptian societies. The research in its various stages followed several research methods: first: The theoretical Approach: Presents the mechanisms and parametric methods that refer to the vocabulary affecting architecture and urbanization, as well as the concept of urban spaces and their components, urban and architectural formations, and the personality of each of them and their impact on the urban scale, and parametric architecture and the concept of each, and extracting the stages of development of the idea of applying parametric modeling and integrating it with urban aesthetics to form and create spaces Urbanism in Egyptian societies with a local heritage identity. Second: Analytical Approach (Comparative Analytics): The analytical approach depends on the analysis of models with applications for heritage projects and the integration of parametric vocabulary to make urban spaces with formations that have a local identity represented in the new design vocabulary to monitor the study of the development and design of urban space in the city and the social and technological dimensions affecting its formation and benefit from it, as it significantly affected the process of urban formation.

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In general, and on the formation of urban spaces in particular. Then it deals with the preparation of parametric modeling of the design alternatives (applied study) for new cities. Third: Deductive Approach (Experimental): Finally, the research presents "the application of a strategy with a clear methodology that refers to designs with parametric vocabulary to generate urban spaces with a heritage identity that improves the quality of environmental life in Egyptian societies." It was dealt with in the research to determine the indicators of the urban and architectural formation to reach an identity in the new cities and how this can improve and stimulate the new societies in a way that provides the society with its needs, both material and moral, and without affecting its functional performance.

3. FIRST: THEORETICAL APPROACH

3.1 Individual Identity:

Individual identity is the expression of one's identity through features contributed to an urban environment by its inhabitants who are motivated by the need to advance and better themselves as seen from their own perspective and the desire to create or alter their mental image of the urban environment. Users' direct interactions with their urban surroundings determine how people perceive an urban place and its capacity for change. When there is enough room for movement and walking, the likelihood of such engagement rises [3].

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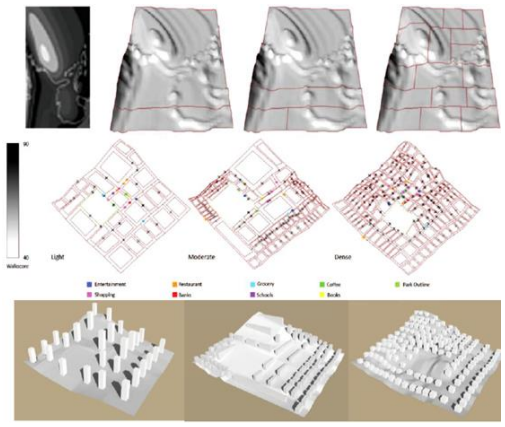

Fig. 1. Rakha's Parametric Neighborhood Formation Methodology [3].

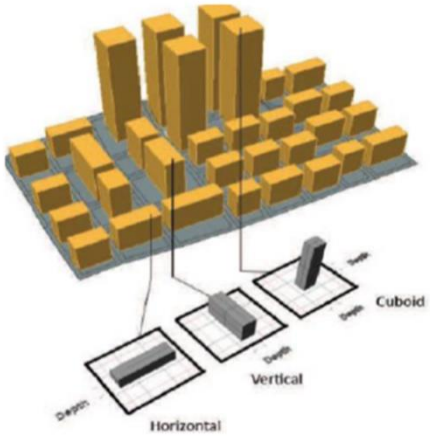

Fig. 2. Parametric Formation of a Building in an Urban Area [3].

3.1.1 Urban Identity:

The comprehensive framework of urban identity is the cities with their buildings, streets, and public spaces in them, and everything that gives the environment its distinctive character from places that have a special mental image that is entrenched in people's memory and makes them able to easily identify them [4].

3.2 The New City and the New Urban Community

It is mentioned that the new city is "a city in which all its residents, with different income levels, have all their needs so that it is not inhabited by a specific group only. It also has all services near residential areas. Educational services, for example, need to be distributed in a way that suits the walking distance. The city also consists of Residential neighborhoods and neighborhoods and services are available at all levels and stages (services at the city level, then residential neighborhoods up to the level of the residential neighborhood) [5].

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The new society is considered part of an already existing society that has its own traditions, and customs and has specific and known social and economic structures; some of its manifestations are likely to remain in the new society." An idea, a reality, and a contribution to development, and therefore the concept of "new society" is a rather broad concept that is used to refer to all types of human settlement, starting with very small sections and nucleus that no one can call "new cities" in any way, even the big new cities [6].

3.2.1 Components of urban space:

Urban spaces vary from closed interior spaces to semi-closed spaces to fully open spaces. The outer space: is an open space towards the sky where the elements of lighting, insolation and natural ventilation are provided. According to Yoshinobu (1981), "outside space" is a space created by a framework that serves to either define or omit a portion of the infinitely extended nature. The ad is fundamentally constructed by the reciprocal relationship between man and the things he senses; therefore the emptiness formed within the frame is a positive space. It is architecture without a roof. Negative space is created in the empty space.

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4. Second: The Analytical Approach (Comparative Analytical)

4.1 Application of parametric patterns in urban spaces:

A model capable of coordinating object-oriented properties through constants. Used to describe the ability of a dimension to change the shape of modeling architecture by simply adjusting the dimension value between the design rates of urban spaces, and addresses performance-oriented design applied to adaptive architecture in order to meet performance requirements for changing conditions interacting with space, the field of adaptive architecture is defined by focusing on the active architecture of modeling Parametric patterns, in which geometric changes occur as a means of adaptation during the use of urban space, by presenting a parametric design approach and related computational tools capable of supporting the early conceptual stage of the urban space design process, and then an example is presented to identify meaningful geometric properties as a means of adaptation, and configurations different within predetermined geometric properties and reconfigurable systems [6].

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4.2 Parametric design mechanisms and their ability to explore various urban spaces:

Parametric design mechanisms are considered to be in place when a design problem is defined and reliant on a particular set of variables. The designer can then alter these variables' values to produce a range of possibilities. It was addressed in order to create urban spaces in Egyptian societies with a heritage identity, and the ultimate choice is made based on a set of factors related to performance, ease of construction, user requirements, user needs, aesthetic requirements, or a combination of these requirements. As can be seen in Figs. 3, the designer is thus positioned as the ruler and controller of the output of a parametric design. These diagrams demonstrate how the parametric design system operates. [6].

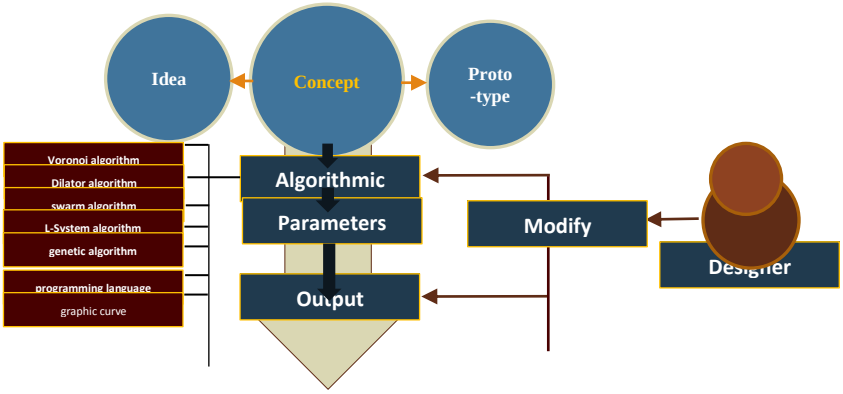

Fig. 3. the working mechanism of the parametric design for integrating the traditional vocabulary on the design. Source: Researcher

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4.3 Parametric Design in Urbanism

Parametric Urbanism utilizes the scene similarity to give a mind-boggling, variegated request to metropolitan developments. The standard-based cycles of versatile and complementary separation can keep up with neatness notwithstanding significant intricacy. The main elements that give our generally formless contemporary super urban communities a conspicuous shape and a feasible situating armature are regular scene highlights like streams, slopes, valleys, and so on. I, accordingly, appear to check out to see nature-like morphogenetic standards as models for metropolitan design Consequently. Since the emergence and spread of architectural applications and the attempts to use algorithms to introduce parametric methods and design into architecture, parametric design has grown in popularity and has a wide range of uses and advantages. These advantages are most effective when applied on a large scale, i.e. at the urban level. Among the most significant attempts in this area are those by Zaha Hadid and Patrick Schumacher [7].

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This approach also offers tremendous potential for modifying designs and producing a number of different planning solutions in any given location [3], as illustrated in fig. 4. This is done by changing the angle of rotation of certain buildings or districts. The use of bio- and geo-morphism in the metropolitan design is illustrated in Fig. 5, through the example of four metropolitan areas [8].

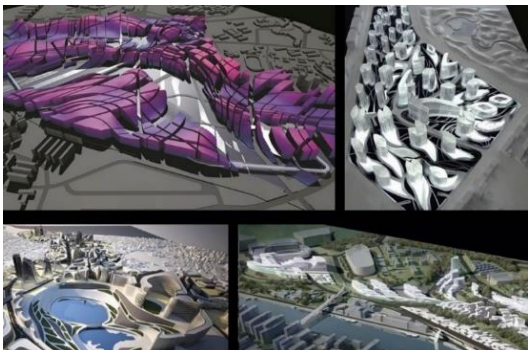

Fig. 4. Parametric Urbanism: The application of bio- and geo-morphism, to urban design, exemplified here via four urban masterplan projects by Zaha Hadid Architects: One North for Singapore 2004, Soho City for Beijing 2005, Kartal-Pendik for Instanbul 2007, Zorrozaure for Bilbao 2007.
Design as Second Nature (patrikschumacher.com)

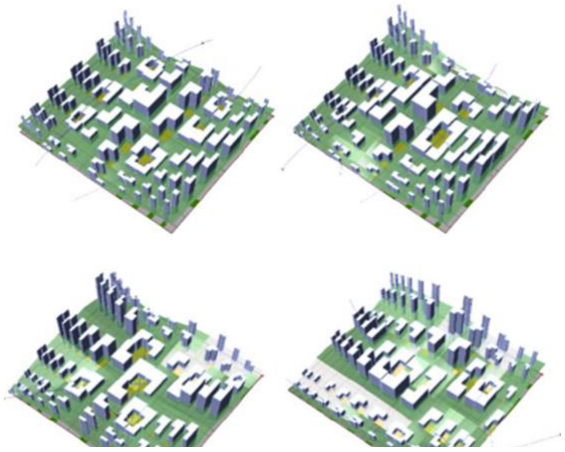

Fig. 5. Using parametric design, planning alternatives for the same design [9].

4.4 Urban Identity and Legibility

Unlike Modernist urbanism, which relies on instances being repeated again, pragmatic requests do not rely on this. Contrary to Baroque or Beaux-Arts catch-all strategies, parametricity syntheses are all by nature open-finished (fragmented) creations. Their request is not mathematical; it is social. They outline the direction of requests using the legal division of fields, change vectors, appropriate affiliations, and subsystem linkages. Contrary to Modernist masterplans, this does not call for the completion of a figure or the uniform redundancy of examples. There are typically many (on a fundamental level, countless) creative ways to alter, join, and correspond.

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Pragmaticism accomplishes a reversal of design's entropy regulation. Opportunity should be purchased by providing up request until the strategies of pragmaticism give a new, strong requesting ability to the discipline of engineering, a limit that conveys a concurrent improvement of opportunity and request. Movement of Styles: Freedom versus Order, chart by Patrik Schumacher is displayed. It is shown in Fig. 6 [10,11].

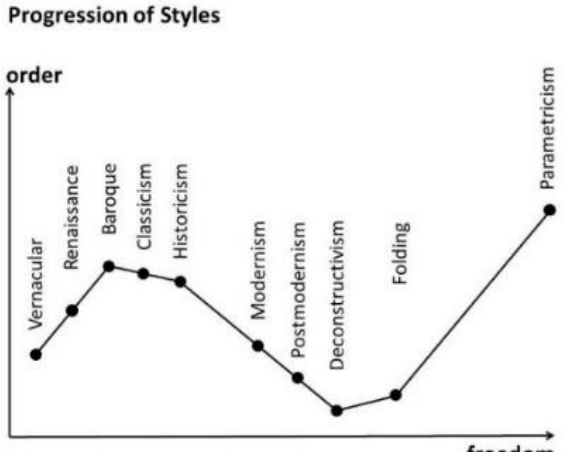

Fig. 6. Progression of Styles: Freedom vs Order, graph by Patrik Schumacher https://www.patrikschumacher.com/Texts/Hegemonic%20Parametricism.html

4.4.1 Respect for the Natural Environment

Through application of this technique curves that are not random but personalised in accordance with the determinants and elements that control building formation, urban design is accomplished utilizing parametric methods. A study conducted by “Beiro's, Nourian, and Mashhoodi” that aims to develop a method for developing multifunctional subzones in urban areas is one example [3].

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The researchers establish an interactive relationship between primary uses / functions and city structures; for instance, the height of service structures rises in direct proportion to the number of nearby residential blocks. Additionally, they establish a connection between the layout of major and minor squares, the position of land parcel boundaries, and the creation of erected structures, it is shown in Fig. 7.

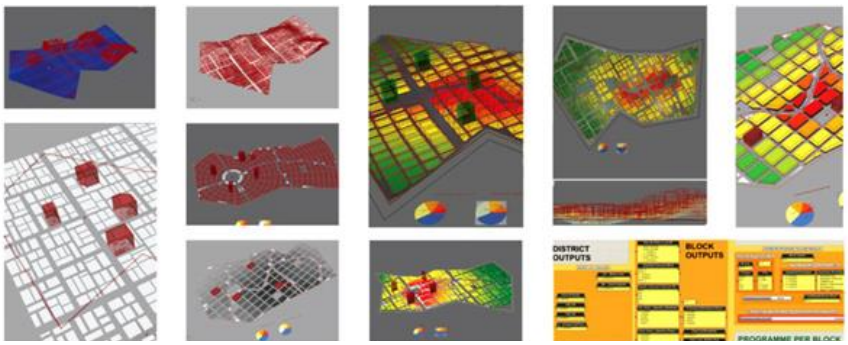

Fig. 7. Beirão's Urban Neighbourhood Parametric System [3].

Pragmaticism subsequently conveys metropolitan neg-entropy. Pragmaticism's extremist ontological and systemic development converts into a gigantic jump in the two elements of engineering progress considered here, it involves an extraordinary extension of design's compositional opportunity and an exceptional jump in design's requesting limit through the sending of calculations and cooperative rationales. Pragmaticism is the principal style that conveys further levels of opportunity and flexibility related to a synchronous expansion in its requesting limit through new compositional guidelines like affiliations, slopes, and cooperative rationales. Since all plan moves are currently rule-based on a fundamental level, there is potential to enhance the visual request and consequently decipherability of the produced climate despite increased complexity. This is shown in Table 1. [10,11].

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Table 1. Strategies of urban spaces and their integration with parametric vocabulary [12].

<table>
<tr><th>Project name</th><th colspan="2">Design Approach</th></tr>
<tr><td rowspan="2">One North Project (planning an industrial city in the east of Singapore)</td><td colspan="2">Designed using the non-uniform rational b-spline model to shape surfaces according to the numerous factors and criteria necessitate by the design that define it and complement building formation [13]. This provides the ability to handle both static and non-rigid shapes; freeform formations that can be modified at any time, opposed traditional design methodologies.</td></tr>
<tr><td>Illustration</td><td> 
. The interaction shows the parametric vocabulary on the schematic diagram of crossing different urban spaces.8Fig.
https://www.arkitera.com/proje/1-odul-kartal-ve-kucukcekmece-kentsel-tasarim-yarismasi/</td></tr>
<tr><td rowspan="3">Thames Gateway, London</td><td colspan="2">Design Approach</td></tr>
<tr><td colspan="2">A freeform design – we notice the absence of a separation axis in the urban design and the rapid response to the effect of surrounding elevations and other elements [14].</td></tr>
<tr><td>Illustration</td><td> 
. various urban locations on the schematic diagram using parametric vocabulary.9Fig.
https://www.arkitera.com/proje/1-odul-kartal-ve-kucukcekmece-kentsel-tasarim-yarismasi/</td></tr>
<tr><td rowspan="2">Kartal Pendik Masterplan,</td><td colspan="2">Design Approach</td></tr>
<tr><td colspan="2">One of the advantages of using parametric design in urban design is that it adds flexibility and more potential applications, making it possible to reproduce the design in another project by modifying it to different population densities and creating relationships between the past and the present. This project uses another type of traffic network planning and design.
product It is not a linear configuration but one that depends the place's topography. The of each street changes according to the terrain 200 other influencing factors, enhancing the effectiveness of the designed network [15].</td></tr>
</table>

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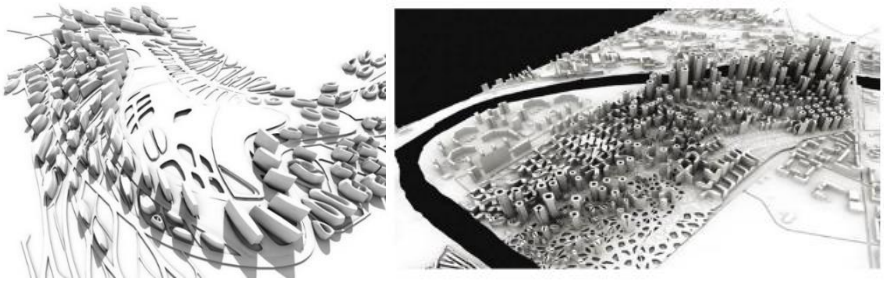
Istanbul. Turkey	Illustration	 . Parametricism: Pronounced Increase in Freedom - Sharrp Increase in Order, Zaha Hadid Architects, Masterplans for Appur. **10Fig.** Parametricism expands the repertoire and thus freedom with spline/nurb based curvelinearity as well as gradient swarm formations. Parametricism hugely expanded architecture's ordering capacity via the scripting or agent-based emergence of associative logics. http: www.Design as Second Nature (patrikschumacher.com)

5. Urbanization in new cities:

They are characterized as brand-new regions with robust economic foundations that have continuity characteristics to replicate the times and keep up with reality. The requirement to define the functional scope, which depends on both specialized sectors and building blocks for the city's future expansion, which enables its continuing growth, is one of its most crucial elements. The newly constructed cities in Egypt are a collection of cities. Over the past three decades, it has been implemented in a number of Egyptian governorates under the direction of the Urban Communities Authority. It was designed and put into action using the most up-to-date planning techniques, taking into account the distance from the Nile Valley's constrained area in order to prevent urban development from encroaching on agricultural lands.

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5.1 Reasons for the Egyptian city losing its architectural and urban character:

The Egyptian reality during the last three decades of the last century was linked to many social and cultural variables resulting from a set of political and economic events. The most influential of them was the economic openness, and the consequent foreign migrations, the returns of which contributed to a different formulation of the cultural and social structure, and that yield met with a parallel failure in the legislative bodies and executive bodies' assimilation of the evidence of these changes, to reflect overall on the individual's intellectual practices first, and behavior afterward The data of the environment around him, with a kind of indifference and regression of values. Disintegration, randomness, contrast, and contrast seemed to be the most prominent characteristics of that environment in the context of its physical construction and its complementary relationships, which embody one of the pillars of the reference climate for contemporary Egyptian architectural thought [16,17]. As an extension of the impact of population increase and unregulated immigration, which led to a distortion of the urban character of Egyptian urban cities, for several reasons:

1. Demolition of many buildings with architectural and historical values.
2. The infringement of commercial and professional activities in the residential areas, thus losing the architectural and urban balance [18].
3. Overlapping activities, random extensions, weak dominance of city administration, and absence of detailed planning, which led to a number of factors, including [19].
4. Loss of architectural character within the same neighborhood.
5. The disappearance of public and private parks.
6. Distortion of buildings erected with certain architectural styles by adding high floors.

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7. Visual pollution resulting from the construction of each building without taking into account the neighboring buildings.
8. Focusing on the investment component of the building without regard to the aesthetic aspects. This led to the Egyptian buildings losing the beauty and psychological comfort of the residents, so cultural identity was one of the most important things that were lost.

5.2 Determinants that affect the contemporary urban and architectural environment:

Time determinants affect the urban and architectural determinants, creating an architectural environment with a distinctive community character and identity that meets the needs of the user. Spatial determinants, reflect what happened, as they are affected by it, and time is the period that affects the place to change and affects the urban and architectural determinants, which creates an architectural environment with a distinctive community character and identity that meets the needs of the user [20,21].

6. Third: DEDUCTIVE APPROACH

The theoretical and analytical component revealed that parametric approaches actively contribute to the creation of a strategy that integrates parametric vocabulary to produce urban places in Egyptian cultures with a heritage character. In addition to this, case studies are evaluated through a strategy that includes indicators and aspects to achieve the integration of each of the parametric vocabulary with the urban spaces in order to create an environment with a heritage identity. The use of parametric methods and their application to urban spaces helps in achieving the aesthetic and visual aspects, as one of the most important elements that work to raise the quality and efficiency of urban planning [15,16].

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Analyzing and evaluating new cities using the Local Identity Assessment Framework and developing a strategy for integrating parametric vocabulary and heritage identity to achieve unique architectural spaces, moreover, the relationship of criteria and elements of local identity to each other has the greatest impact on identity. Validation of the assessment conducted by the Local Identity Assessment Framework by comparing the results of the framework and the proposed strategy for the assessment process and clarifying the results and information on the extent to which hybrid tools can be used with parametric methods for comprehensive assessment and analysis of local identity. The experimental method will be dealt with according to the following scheme [17].

Inside this part, we'll use the metrics by which the cultural identity of the past is assessed in terms of standards and its influence on urban areas in the phases constructed in both the new Mansoura and the new Alameen.

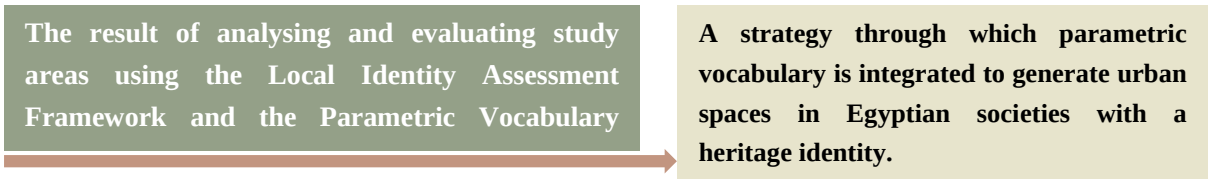

Fig .11. The proposed structure to reach the final evaluation stages and develop a future plan for integrating parametric vocabulary with urban spaces. Source: researcher

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6.1 Local Identity Assessment Strategy Using Hybrid "Parametric" Tools

Table. 2. shows the criteria and indicators by which the heritage identity is measured in parametric terms and its impact on urban spaces [18].

Standards for measuring heritage identity in parametric terms					
1. Assessment of physical aspect				Proportion	Total
Elements	Urban form		Location	5	4.17
			City Style	33.3	
	Clarity		parametric style	2.25	3.08
			Special Marks	3.5	
			Tasks and services	3.49	
2. Assessment of social aspect				Total proportions	
Elements	Diversity	vitality	Accessibility	4.5	3.67
Proportion	4.5	4.05	2.47	4.05	
3. Assessment of sensory aspect					
Elements	Clarity	Distinction	Comforts	security safety	Total proportions
Proportion	5	3.5	2	4	3.62
4. Assessment of memory aspect					
Elements	Historical events		Historical monuments	Total proportions	
Proportion	4		3.5	3.75	

The evaluation points table. 3 highlights the factors that influence learning to integrate parametric vocabulary to observe various cities that replicate the identities to which each of them is attributed. It also demonstrates the process by which the new cities are evaluated.

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Table. 3. shows the points which the heritage identity is measured in parametric terms and its impact on urban spaces Source: researcher.

Indicators for measuring the heritage architectural identity of urban spaces			Very good 10% ●	Good 7.5% ◒	Low 5% ◉	Unavailable 0% ○
Social values	Social and privacy values of urban spaces	performance metrics of case studies		◒		
	Religious values with traditional vocabulary				◉	○
	The social and human dimension					
Functional and aesthetic values	Aesthetic values "parametric proportions"		●			
	Functional and Environmental Values "Parametric Modeling"					
	Visual Architectural Elements (Local Identity)		●	◒		
Future values nature simulation	Extension and future expansion "Parametric Vocabulary"		●			
	After the development of Environmental Processing Systems "Simulation Analysis"			◒		
	Public awareness of the concepts of heritage, authenticity and contemporary		●			
Future values "parametric"	Urban Space Design "Optimization Algorithm"		●			
	Coherent configuration (parametric)		●			
Total			100%			

The analytical study aims to shed light on the role of the proposed strategy for integrating parametric vocabulary to generate urban spaces in Egyptian societies with a heritage identity. Therefore, two new cities were selected (New Mansoura and New Alamein), where the purpose of applying parametric patterns to each of them is to study un spaces and the heritage identity they contain. In addition, the two cities will be evaluated by the proposed assessment points, along with how responsive and interactive they are to the parametric vocabulary. And also, to what extent do the rating points affect each of them.

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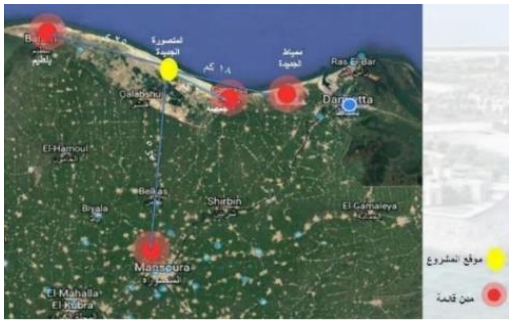
6.2 Study of the urban and architectural situation of the city of New Mansoura:

The establishment of new cities that are affiliated with the main city is one of the most important existing projects, as it will include a number of users and will also contribute to providing for their needs, and this will lead to alleviating the population density in the old areas and taking into account the reconstruction of new areas. In different ways, technologies refer to a heritage identity and this is what is referred to in the analytical study. Hence, it was necessary to simulate the urban character in parametric terms, as well as the architecture of the new city Mansoura [22,23].

Table. 4. shows the new city of Mansoura.

The location of the new city El Mansoura	The new city El Mansoura is located in Al-Daqahlya Governorate, Egypt, and is one of the fourth-generation cities in 2017. The city overlooks the Mediterranean Sea with a length of 15 km. The area of the first phase of the city is 2,063 acres, and the first phase is 45 billion pounds. The New city Mansoura is also in the middle of the governorates of Daqahlya and Kafr El-Sheikh in Damietta [22].	 Fig. 12. The location of the new city El Mansoura
	▪ The city was built on an area of 4000 acres with investments of more than 60 billion pounds. ▪ The city plan accommodates more than one and a half million populations. ▪ The first phase of the city represents 40% of the total area of 25,000 housing units. ▪ The city includes different types of housing, including tourist housing, villas, medium housing, and social housing. ▪ The city is distinguished by a special character, as it is unique in heights, designs, colors, roads, and infrastructure at the highest level, in addition to tourist hotels that serve visitors to the city for the purpose of medical tourism [23].	

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The city contains all the necessary services and facilities that will provide comfort to its residents, including:

- Logistics and service area.
- Regional university
  - A private university affiliated with Mansoura University.
  - Scientific research centers.
  - Medical City.
  - Technology zones.
  - Corniche on the road with a width of 56 meters.
  - A group of public beaches.
  - Sewage and drinking water networks.

Fig. 13. The general plan of the new city El Mansoura

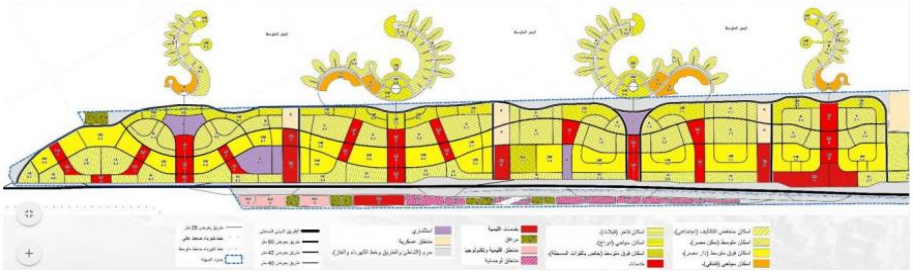

Fig. 14. The different uses of the new city El Mansoura

Fig. 15. shows the plans of the four sectors in New El Mansoura

The research deals with focusing on the distinctive signs and their ability to interact with nature with the development of a strategy for parametric vocabulary that works on the visual upgrading of neighborhoods with a visual outlook and other buildings, the residential neighborhoods in the new city of El Mansoura varied according to the type of user, including the housing of 6-story buildings, including 5 floors, and other two-story separate villas, including modern and classic. This is shown fig. 16 and 17 [22].

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Fig. 16. shows the form of housing (villas - distinctive - social) in New El Mansoura

Fig. 17. shows the beach towers, showing the area of the villas in Marina, where they are directed to the most powerful element, the Mediterranean Sea

6.2.1 Indicators to measure the architectural, urban, and environmental identity of the city of Mansoura:

The indicators for measuring urban identity and integrating it with parametric vocabulary to fill spaces with a heritage identity is an assessment of the existing situation in the new El Mansoura, through which (deficiencies) and the advantages that were available will be known [22].

Table. 5. Standards for measuring heritage identity in parametric terms in the new city of El Mansoura

Standards for measuring heritage identity in parametric terms						
1. ASSESSMENT OF PHYSICAL ASPECT				Proportion	Total	
Elements	Urban form		Location	4	3.67	
			City style	3.33		
	Clarity		parametric style	2	2.5	
			Special Marks	3		
			Tasks and services	2.5		
2. ASSESSMENT OF SOCIAL ASPECT				Total proportions		
Elements	Diversity	vitality	Accessibility	4.5	3.875	
Proportion	4.5	4.05	2.47	3.75		
3. ASSESSMENT OF SENSORY ASPECT						
Elements	Clarity	Distinction	Comforts	security safety	Total proportions	
Proportion	5	3.5	1.75	3.5	3.44	
4. ASSESSMENT OF MEMORY ASPECT						
Elements		Historical events	Historical monuments	Total proportions		
Proportion		2	2.25	2.125		
Indicators for measuring the heritage architectural identity				Verygood	Good	Low	Unavailable

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of urban spaces Source: researcher.			10% ●	7.5 ◒	5% ◉	0% ○
Social values	Social and privacy values of urban spaces	**performance metrics of case studies**		◒		
	Religious values with traditional vocabulary		●			
	The social and human dimension			◒		
Functional and aesthetic values	Aesthetic values "parametric proportions"			◒		
	Functional and Environmental Values "Parametric Modeling"		●			
	Visual Architectural Elements (Local Identity)			◒		
Future values nature simulation	Extension and future expansion of "Parametric Vocabulary"					○
	After the development of Environmental Processing Systems "Simulation Analysis"			◒		
	Public awareness of the concepts of heritage, authenticity, and contemporary		●			
Future values "parametric"	Urban Space Design "Optimization Algorithm"		●		◉	
	Coherent configuration (parametric)		●			
Total		**92.5%**				

It must be taken into account that it is also not possible to judge identity and character by indicators only, as the human (community) dimension also has a role in changing the identity of its customs and traditions, which is one of the most important levels of identity "community identity".

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7. A study of the urban and architectural situation of the new city of El Alamein:

Table. 6. shows the new city El Alamein [22].

<table>
<tr><td rowspan="3">The Location of the new city El Alamein</td><td colspan="2">The New City El Alamein is an integrated city in the heart of the North West Coast. It is being implemented on an area of 48,000 acres, with the participation of 15,000 workers and 21 contracting companies, with investments amounting to 40 billion pounds, under the supervision of the New El Alamein City Authority. The city serves as a message to the whole world that war places have become development areas in Egypt. This is shown in fig .18 and 19 [23,24].</td></tr>
<tr><td> 

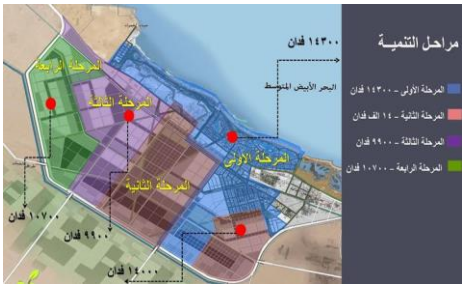
Fig. 18. Plan of the new city El Alamein</td><td> 

Fig. 19. a scheme showing the developmental stages of the new city El Alamein</td></tr>
<tr><td>The city is divided into two areas: the coastal area, which includes the archaeological sector in the village of hill El-Eis, which witnessed the Battle of El Alamein during World War II and is adjacent to the Mediterranean Sea, and the new El Alamein area, which Located before the coastal road The city is being implemented in several stages, the first includes an area of 12,000 acres for the beach area, the distinguished housing area, the cultural city, and the historical area. Work is currently underway in the urgent stage of the first stage, which includes the Corniche of the new city El Alamein with a length of 14 km, 700 meters of which will be completed when the city is inaugurated. 1920 distinctive housing units have been implemented, and the units were offered to citizens through the New Urban Communities Authority at the beginning of 2018.</td><td> 

Fig. 20. shows the main determinants and locations in the city plan</td></tr>
</table>

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. shows the non-simulation of buildings and the homogeneity of urban spaces21Fig.

The urban character of the new city El Alamein

The implementation of 1120 housing units in the beach area "Down Town", as well as buildings and villas in the tourist beach area, in copartnership with the National Service Authority, has begun on an area of 300 acres next to the Lake District. These units and villas were put for sale in 2018. The construction of the towers area, which includes 15 towers 100 meters above sea level at a cost of 28 billion pounds, has been started. Divided into phases, 700 meters have been completed, and it includes yards for gatherings and a playground area, and the rest of the urgent stage of the walkway was completed in April 2018, with a length of 7 km, and includes a lane for wheels with special concrete, the largest garage in the city, a waiting place and a beach landing for people with special needs.

Despite the creation of designs for towers using advanced methods and modern technologies, taking into account the imposition of new parametric vocabulary on the outer casings, all this was directed to the vertical level of the towers, and not think about creating parametric vocabulary in the urban spaces to interact with the surrounding determinants, and thus the generation of urban spaces in Egyptian societies with a traditional identity.This is shown in fig. 22 [22].



. shows the Towers used for the parametric vocabulary in the outer casings and the homogeneity 22Fig.
between each of them.

General scheme	New El Alamein is a city that includes all residential activities and has cultural, tourist, industrial, and research areas, a private university, and international hotels. The headquarters of the presidency and the Council of Ministers. An alternative road to the coast has been established with a length of 38 km. a tourist walkway with a length of 14 km and a beach open to all Egyptians without entry fees or barriers. Between it and the presidential headquarters [22].	 Fig. 23. illustrates the three sectors and the emergence of the process of interaction with the surrounding environment without developing new concepts and vocabulary.

It deals with focusing on the distinctive signs and their ability to interact with nature with the development of a strategy for parametric vocabulary that works on the visual upgrading of neighbourhoods and urban spaces with a visual view and other buildings, the residential neighbourhoods in the New El Alamein City varied according to the type of user, including housing buildings of different heights and colours and the lack of homogeneity between them and the urban spaces [23].

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7.1. Enforcement for indicators of the architectural, urban, and environmental identity of the new city of El Alamein

The indicators for measuring urban identity and integrating them with parametric vocabulary to fill spaces with a heritage identity is an assessment of the existing situation in the new El Alamein through which (deficiencies) and the advantages that are available will be known. This is indicated by the table. 7 .

Table. 7. Standards for measuring heritage identity in parametric vocabulary in the New Alamein City.

Standards for measuring heritage identity in parametric terms							
1. ASSESSMENT OF PHYSICAL ASPECT				Proportion	Total		
Elements	Urban form	Location		5	4.33		
		city style		3.65			
	Clarity	parametric style		2.75	3.166		
		Special Marks		4			
		Tasks and services		4.75			
2. ASSESSMENT OF SOCIAL ASPECT				Total proportions			
Elements	Diversity	vitality	Accessibility	4	3.95		
Proportion	4.5	4.02	3.2	3.90			
3. ASSESSMENT OF SENSORY ASPECT							
Elements	Clarity	Distinction	Comforts	security safety	Total proportions		
Proportion	5	3.5	2.15	3.65	3.575		
4.ASSESSMENT OF MEMORY ASPECT							
Elements		Historical events	Historical monuments	Total proportions			
Proportion		1.5	2	1.75			
Indicators for measuring the heritage architectural identity of urban spaces Source: researcher.				Very good 10%	Good 7.5	Low 5%	Unavailable 0%
Social values	Social and privacy values of urban spaces		performance metrics of case studies	●			
	Religious values with traditional vocabulary				◒		
	The social and human dimension				◒		
Functional and aesthetic values	Aesthetic values "parametric proportions"			●			
	Functional and Environmental Values "Parametric Modeling"				◒		
	Visual Architectural Elements (Local Identity)			●			
Future values nature simulation	Extension and future expansion "Parametric Vocabulary"				◒		○
	After the development of Environmental Processing Systems "Simulation Analysis"						
	Public awareness of the concepts of heritage, authenticity and contemporary				◒		

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Future values "parametric"	Urban Space Design "Optimization Algorithm"		●			
	Coherent configuration (parametric)		●			
Total			**95%**			

Based on the above observations, we discovered that parametric methods of urban space generation improve the exterior locations of buildings. As the parametric patterns and modern materials used have special characteristics, they tend to change the general perception of local identity. It is clear that the urban and architectural situation as well as creativity for each cannot be of the same type and will remain different, and they do not have a specific mind and thinking because architecture is subject to many factors (environmental, technological, and cultural) and has many criteria.

Parametric modeling relies on specific algorithmic factors for explicit functions and independent variables in addition to applying it with a heritage identity to adapt and interact with the surrounding reality, thus enabling architects to create an infinite number of design solutions for imaginable urban spaces that can be evaluated to determine the best solutions. Moreover, the generative designs of urban spaces of various shapes (Various urban) are done with a high level of detail that raises the efficiency and quality of urban spaces in Egyptian societies with a heritage identity.

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It also enables modifications to be made during the design and thinking process and simulates the effective and accurate nature of the operation of factors and controls Multiple algorithms. It became clear to us from the evaluation points and criteria for measuring the heritage identity in parametric terms to generate urban spaces in the Egyptian societies with a heritage identity in the New City Al- Alamein that it is characterized by the parametric concepts and vocabulary in the buildings, and the designer was trying to apply elements that simulate the era and advanced events in the design of urban spaces, the evaluation of the two cities was made and it became clear The city Al-Alamein receives the largest percentage of the evaluation points by 95%, while the new city Al- Mansoura is 92.5%. the application of the strategy that refers to the application of parametric vocabulary to generate urban spaces in Egyptian societies with a heritage identity.

8. CONCLUSIONS:

Simulating the urban character of the region by applying some of the tools used from the advanced engineering programs "rhino & grasshopper", and creating a parametric vocabulary that simulates the architectural spaces imprinted on it both the heritage and the local identity in the surrounding reality, as it is a reference symbol (architectural character) that can be deduced for any design of the urban spaces of cities.

Create a plan using the aforementioned details, which speak to the routes, distinguishing signage, and other aspects of the urban environments of the chosen cities, to pick vocabulary that aids in the exploration of a distinctive design that serves as an effective architectural icon. Buildings with historical significance were demolished due to the loss of legacy, urban identity, and architectural identity because they did not use their lexicon, cite them, or use new technologies that have an impact on the world now and in the future.

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There are spatial and temporal determinants. Places determine identity through time, in addition to developing a vocabulary that simulates reality and refers to the future, and thus urban and architectural determinants are made for each city in a unique way.

The architectural character of any city is the linguistic formulation of special expressions that simulate nature. Each city has its own architectural features and urban vocabulary, which can appear in the following:

1- The technique for selecting a genetic parametric vocabulary that simulates the past is set by the old cities. The idea of incorporating parametric vocabulary that has an impact on urban spaces of cities is necessary to advocate for the idea of simulating the past, adding to the future, and preserving this heritage for future generations. It is not possible to create a new society that talks about the future and did not mention its past, and this helps users to feel a sense of belonging.

2- The new cities play a variety of roles. Two new cities were presented to raise all the elements that were employed and evaluate each of them since the study of new cities is the topic of the research. As a result, it was necessary to design and simulate a special parametric vocabulary characteristic to identify each from the other.

3- Putting into prepare a plan on how to combine parametric patterns with urban spaces to forge a unique local identity and develop generative methods that could shift from a technology-based, accelerated approach to one that mimics standard practice. This allows the designer to work on the size of data connected with different types and levels of rendering by gathering arrays of texts, measurements, patterns, and strategies for concept transformation that can take into consideration the limits of structure and materials.

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Additionally, the use of parametric vocabulary to create urban areas in Egyptian communities that interact with their surroundings while maintaining a sense of their cultural history.

4- Since the establishment of new cities was only taking into account the establishment of a new society, and do not take into account the existence of a creation that contains (architectural identity - environmental - technological - parametric genetic vocabulary), the process of evaluating cities was carried out through a strategy that includes indicators and standards that contain.
5- Architectural formation and design systems have evolved technologically thanks to parametric design.
6- Mathematicians were pioneers in the development of the parametric approach, which originated in traditional Islamic architecture, so vocabulary of value and heritage reference was touched upon.
7- Parametric design contributed to the growth, and increased the speed of production and the diversification of available solutions on both the urban and architectural levels.
8- Through utilizing the adaptable solutions made accessible by parametric design at all levels of urban design, urban planning may successfully meet numerous human requirements.
9- One aspect of comprehensive urban development that uses its elements to conserve local culture and history is parametric design.
10- Computational design opens up new, limitless prospects for urban and architectural heritage preservation, particularly Arab Islamic urban and architectural elements.

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