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TECHNOLOGY****AN APPROACH TO DESIGN DECISIONS THROUGH SITE ANALYSIS PROCESS****Tarek Abou Ouf *¹ & Abeer Makram ²**¹ Associated Professor, Department of Islamic Architecture, Umm El Qura University, KSA.² Ph.D., Department of Architecture, Delta University for Science and Technology, Gamasa, Egypt.

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ABSTRACT

The process of "Site Analysis" in the "architectural design process" methodology is considered as a categorical and critical process in many design decisions that affect the final product. This product will be completely adequate with the qualitative and quantitative surrounding, both environmental and man-made ones.

The problem is the possibility of design completion and prepare a project that will look presentable in appearance, without the evaluation of the objective criteria that related to site elements, which eventually lead to operation and interaction problems.

Therefore, it is essential to highlight on the site analysis process goals in an integrated and comprehensive method. In order to achieve the goals that reflect the architectural design decisions, the site analysis method process should be done on three stages: The first stage: Site Data Monitoring, The Second stage: Explanation Site Phenomena and The third stage: Deduction of Design Decision Directives.

This paper has provided the chance for deep understanding for the importance of site analysis in its positive, negative and neutral phenomena to make design decision.

In conclusion, the paper presents design decisions directives which coming throw site analysis and guideline that allows to more design decisions that affect the design project.

KEYWORDS:**I. INTRODUCTION**

The term site analysis frequently appears in pre design phase [1] requirements. Many architects understand its significance influence architectural work, however they sometimes deal with it as description for site data such as; determining wind direction, showing the sun virtual movement and project land with its level in relation to the surrounding roads, and other data that are usually included for what is metaphorically called site analysis process.

Perhaps this is true as a part of analyzing process, yet in order for site analysis issue to become an advantage, objective and comprehensive output on "architectural design", this concept must be complemented and studied deeply. Hence, the designer must deal with site analysis through definition which show its stages and relation to design decision.

So it is defined as:" the process of understanding, explanation of phenomena, positive, negative and neutral factors existed or noticed on project site and its natural and environmental surrounding or man-made in order to participate in taking decisions that support architectural design process.

II. Creativity culture and Design Decision Resources:

Creativity is an ability to find a new solution [2], the kind of creativity directed to improve the human life and needs i.e. building cars and aircrafts, let alone architecture and its various functions that have multi-functional systems, aimed at providing the residents with comfort and safety on the one hand, and yield profit for investors on the other hand.

At this particular point the site and its elements come to head all previous in “guiding creativity “to become the “architectural creativity culture “, which is the detections resultants of all connecting architectural work. Providing interactive work with its directives [3]. In other words, to benefit from positivities [4] , get rid of pasivities and invest neutrals.

Therefore, architectural creativity is about creating a project that fulfills its goals, takes advantage of all directives in the best way to generate new ideas. Thus, this study serves as a “monitor” on the mechanism [5] of “Site analysis” as a source of many for “Generating ideas”.

Various the creative design directives and design decisions create one context [6]with one or many functions that work together to achieve the best functional performance with an aesthetic formation. These decisions originate from a variety of resources that vary in their influence in terms of importance and severity of the influence, according to many factors, yet they barely go far from the following resources to make decisions: Architect Attitude, Architecture Theories, Concept, Architectural program, Client Requirements, Building Codes, Official Authorities, Project Nature, Society culture, Feasibility, Technological Systems and Project site.

III. SITE ANALYSIS PROCESS STAGES METHOD:

Site Analysis Process Within Design Process:

Design Process Methodology including its sub- processes and their classical logical sequence, and divided into stages according to fulfilment of each stage. Site analysis process is the first stage of” Design Process Methodology”, which is the” Preparation Stage” and after” Feasibility Study” and determining program with all its requirements and appropriate land to accomplish its nature.

In order for site analysis to achieve its goals in reflecting on the architectural design as a product appeals with its surrounding, site analysis should be done on three stages:

The first stage: Site Data Monitoring

The site is the land assigned for constructing with its environmental and urban surrounding [7]. [8] Monitoring related and affecting data on the project as a building, function, visitors and users is monitored, where such data is presented in the following three main components:

A. Land Geometrical Data

Total area, dimensions, geometrical shape, morphology, geology.

1. Total area:

One of the most important data and essential statement that allow professional architect to establish his designed product, and define the percentage of design area and available space according to conditions, client requirement or program need.

2. Dimensions:

Are the landsides lengths of a straight and curved land aspects (if any), as well as the lengths of diameters according to survey. This method allows the designer to draw the correct land shape by a scale in line with the design requirements or terms for approval, making a decision, or licensing purposes beside the project owner reviews.

3. Geometry: Is the final architectural form for the designed land formed by external definite sides according to accusation limits, eventually it becomes architectural form regular, semi regular, or organic.

4. Morphology:

Means the shape of land surface, with which it verifies topography and common attitude. Besides, it bears certain impression on land form, whether with plan or rugged terrains, as well of gentle or sharp slopes appear in a sections or levels contour maps, with calculated slops and levels fit in proportion to sea surrounding level.



5. Geology: Means soil nature, its layers composition on different depths and strengths with measuring water table and establishing proposal levels.

B. Content and surrounding of natural Data

Climate, sun path, wind condition, flora and fauna life, wildlife studies (oceans, rivers, mountains, forests and deserts) _ natural views_ natural resources (water, energy and materials).

6. Climate: It is the natural surroundings of the land presented in the following:

Maximum and minimum temperature average in summer and winter, average of relative humidity, rainfall average, sky clearness hours throughout the day, and average of atmospheric pressure.

7. Sun path: Is defined as “sun path”. The sun appears as if it moves round its center following an imaginary path with a constant inclination angle all year round. It occurs in the east then rises up in the middle of the sky (the meridian) with inclination to the south, then to the west. On the one hand, the eastern and western points approach the north; as a result, we have a long day. On the other hand, eastern and western points diverged in winter; as a result, we have a short day.

8. Wind condition: Wind condition is monitored on the site with respect to its direction, air quality, properties, and its velocity. frequently the prevailed wind is that of certain direction, as well it may be seasonal carrying dust, particles, or temperature in the other direction, or with air velocity, blowing breezily, or stormy. It may be also prevalent or sirocco or can be affected by seasonal tempest.

9. Wildlife: Means plants and animals that human activity has not reached and still maintain its natural qualities & characteristics. Some of these can be rare and turn into " natural “, or a bio reserve that forbids establishing buildings or human activities except by authorized regulations & conditions. Some others may participate in achieving ecosystem balance and adding an aesthetic and functional value to the site. On the contrary, it may be obstructive and disruptive and must be removed.

10. Natural Views and Landscapes: Some sites have natural and environmental elements that add aesthetic and visual features on various levels.

These landscapes might be ordinary, beautiful or fascinating. They exist in marine, river, desert, woods or in mountains. Land project can also be part of them and share a view. Moreover, such views maybe available inside or around the site. Such environment is maximized whenever they adopted with the nature and function of the required project on the land.

11. Natural environmental studies: every environment has features that effect the design decisions. Throughout studies on suitable environment for land project, we understand the advantages for this environment and the disadvantages that effect the building function and form. These studies var

ies depending on the qualities of natural environment for the land. Thus, the study stages vary as follows:

- Marine environment studies: in case of the land is in a location where the sea or the marine environment is an advantage for establishing designs like summer resorts or marine sports facilities. Study should be made for handling erosion and sedimentation phenomena, identifying sea level rising phenomena, the seabed typography, the annual average of sea currents movements and directions. As well as the mainstream for sea waves and their heights, the tide movement, the seashore standard, in addition to marine safety for diving and swimming.

- Desert nature studies: Many projects are established in desert environment in order to make use of calm, enjoy landscapes, or to establish study and researches’ centers, or to enjoy the simple life of Biduen that is missed in cities. Desert environment may be extended, sandy areas, with fixed, or mobile dunes, or surrounded by mountains. Desert environment might be accompanied with valleys or oases covered by plants, group of birds. water tables maybe available in the sub-soil. Desert areas enjoy a contradictory climate through day and night in respect of high temperature and humidity, with rain scarcity, change in wind directions and severity most of times. Other environmental studies such as mountain environment, woods and riverbanks.

12. Natural resources: Identifying the available natural resources in the site helps in providing some of the project needs with a minimum spending, while maintaining some of the non-renewable resources as much as possible.

Therefore, it is necessary to carry out studies in the following fields; water tables, river water and rain, the level of solar purity, wind speeds. In addition to the quantities and qualities of sandy stone or rocky sand stone.

In case of analyzing natural resource data, site analysis helps in the possibility of exploiting these resources in construction, landscaping, energy production and helps providing the project requirements.

C. Content and surrounding of Man-made data

Roads, walkways, urban spaces, buildings and facilities, infrastructure, landscape

13-Transport network: Roads network for vehicles are the main and sub arteries for cities, zones, districts, sites, and supply channels to the infrastructure. Roads are classified in a hierarchical type as (highways - circular - arterial - main- sub -cul-du-sac). Each road lane is determined by a maximum speed and width.

In addition, each of which has pedestrian sidewalks, islands, and possibility of parking either parallel, perpendicular or angular, besides, designated areas for public transport stations, with lighting posts, roads signs and streetscape according to its level.

Each piece of land should overlook a road at least and maybe more. Each road has defined specification according to road hierarchy. Inside the lands, internal roads might be existed and linked to the environment, thus the decision to keep or remove them depends on the project nature and its compatibility with the proposed design.

14. Walkways: Pavements surrounding or locating in the ground are the walkways for pedestrians. They follow hierarchy system, with lighting, streetscape, slopes or declined stairs in case of they are at different levels.

15 - Urban spaces: land project is surrounded by multi-elements, besides, road spaces, pedestrian walkways and relevant spaces for the adjacent facilities. Urban spaces with certain activities are classified according to their functions as follows:

- Square: are a types of an urban space where human practice their external activities, or contribute to distinctive visual perception relying upon physical determinants, human feelings or accumulated experiences and seasonal memories. Each of them characterized by respective proportions, scale, and control level. They often have landscape elements with its determined function, as sometimes associates with one facility or more.

-Public parks join the field characteristics defined as a space: however, the space is characterized by identified recreational activity, visual prosperity with multi functions.

- Playgrounds are spaces for sports activities to release the youth energy and give fun for kids. It also serves as a natural view.

-Urban space is a set of elements and checkpoints that achieve certain geometric conditions in a spatial zone or a three-dimensional one. It is limited to certain boundaries and recognized by these limitations or feelings among visitors, or the experience of residents.

16 - Buildings and facilities: Land project is surrounded by other lands on which variety of facilities and buildings are established on in terms of size and structural proportion of the land, beside activities practiced on. As well as each of them has a certain level of noise and pollution, with a certain traffic congestion caused by the place in relation to neighboring roads or number of visitors and vehicles.

One of the main characteristics of the buildings surrounding the land of the project is the type or the architectural style, which convey its features, level of details and quality of materials within. In addition to the archaeological heritage classification, if any.

In addition, you can study places, spaces openings, their trends and relation to the land of the intended project, the quality of the accompanied spaces activities, so that you can determine the type and level of visual and auditory privacy. You also must locate primary and secondary entrances, both for pedestrians and cars.

It is likely that the same previous characteristics must be studied for a facility or a building that exist in land project, so that you determine its relations with the new project and its harmony among them in case you decide to join it to the land.

17. Infrastructure: Neither urban areas, nor architectural buildings with variety of residential, commercial,

administrative activities, public and governmental services can be established without providing such assemblies with infrastructure elements, of network services and stations, which often extended as pathways under the road ways to provide plots with main supplies on the site.

These facilities vary such as electricity supply, energy and gas, water supply lines for drinking, household chores and industrial, communications lines and sewage networks.

Sites might have electricity converters and natural gas stations, water pumps or pumping stations and sewage treatment. Sometimes sites have electricity cables towers with high and medium tension. In addition to phone booths distributed on the sidewalks. Water tables tower or tanks can be established on the site, as well as introducing new renewable energy sources available as solar and wind sources.

The availability of these facilities, all or some of them, must be recognized when analyzing the site. As well as their touchstone and ability to fulfill the needs of the proposed activities. In addition to the possibility of their establishment to serve objectives of the proposed project, in case they were not available or have weakness in their competence.

18. Landscape elements: landscape elements are available to play many roles in leveraging aesthetical and functional aspect site performance as they are classified into the following:

On the one hand, natural constructed element is considered not classified under natural environmental elements, but as a constructed element. such element is established deliberately such as tress, bushes, water ponds, palms, flowers, and green areas, according to a deliberate clarified, coordinated system or organic one achieving a certain task, or covering a functional, aesthetical or social role. On the other hand, landscape elements include man-made objects such as road lighting posts, gardens, parasols, benches, water fountains, traffic signs, advertisements, and variety of finishing elements like floors, walls and mural paintings, meanwhile some are fixed e.g. stairs, curb stones, aesthetic forms, and landmarks.

Table 1. The first stage: Site Data Monitoring

Stages	Sub stages	Attributes
The first Stage Site Data Monitoring	A. Land Geometric al Data	1. Total area 2. Dimensions 3. Geometry 4. Morphology 5. Geology - Floor area ratio - The landsides lengths, straight and curved land -The land form, regular, semi regular, or organic. -Topography, Land contour (Slope, plain, valley) - Soil report, Landforms, Depth to bedrock,...
	B. Content and surrounding of natural Data	6. Climate 7. Sun path 8. Wind condition 9. Wildlife 10. Natural Views and Landscapes 11. Natural environmental studies: Marine environment studies, Desert nature studies, Other environmental studies. 12. Natural resources -Four Seasons, temperature, Humidity Rain, Draught - Solar access inclination angle all year round. - Direction, air quality, properties, and velocity. - Birds, mammals Habitats, -Wetlands, Ponds, Rivers, Forest, mountains - Erosion and sedimentation, sea level rising, safety for diving and swimming. sandy areas, with fixed, or mobile dunes, valleys or oases covered by plants, group of birds, contradictory climate - River water and rain, the level of solar purity, wind speeds, raw material(stone, clay, minerals)
	C. Content and Surrounding Man-made Data	13. Transport network 14. Walkways 15. Urban spaces: 16. Buildings and facilities 17. Infrastructure: 18. Landscape elements - Highways, rail, airport, river boat, fiber optic. -Network of footpaths pavements surrounding - Squares, Public parks, Playgrounds - Building heights and uses, the archaeological heritage classification, bridges, ... - Network services (electricity, gas, sewer, water,) - Hard scape and soft scape.



The Second stage: Explanation Site Phenomena

Each specific element which data has been monitored is considered to have a positive, neutral, or negative impact on the design going to be produced by the architect. On the contrary, the design may have the same impact on such elements. Accordingly, the designer in the next stage intends to analyze the site to highlight the explanation with what is expected of existed factors on the site, where the architect establishes his building design in one of its lands.

The number of available effecting factors in land site where architectural design is based on is more than fifty sub-effecting factors and ten major impacts. These factors are classified as potential or manifested within geometrical, natural and man-made elements.

Site Effectors Classification:

1.Climatic: Temperature, humidity, atmospheric pressure, level of rainfall, wind movement, and the sun path throughout the day and the year, all influence on the design decisions related to building protection, spaces, adapting the indoor environment and promoting the residents comfort and security.

2.Sound: linked to the measurement of noise level arising from activities in the neighborhood, and its various sources such as vehicles, human gatherings, business and industrial potential crowds, daily variations around the clock. All these effects on the taken decisions which prevent the transmission of undesirable sound, and reduce the level of noise according to type of activity practiced inside the building required to be designed and the permitted levels of sound.

3.Visual: Often mean what the building residents watch through the views such as landscapes, the style image and green areas "natural environments" and landscape elements, which makes the designer directs the openings and determines their area and solid proportions with walls to ease or prevent the sight according to the study results of these effectors.

4.Quantity: Represent the effecting factors that can be counted, measured, measured or linked in its evaluation with quantitative criteria to become appropriate or inappropriate, positive or negative, higher or lower in required average and so on. Such factors are represented in surrounding construction density, and traffic crowd, extent of server and connecting roads to the project land, and population size on the site within the framework of spatial impact. As well as the land area, as engineering entity where all such factors influence the process of making decision compatible with the project feasibility, with its relation with the spatial conditions such as vehicles movement, population crowd, and land adequacy in relation to the imposed program. Accordingly, cancelling, amendment, or adding decisions to the project and adherent elements are issued to be listed within the project program, in agreeable extent for its visitors and users.

5.Kinetics: The studies of motion and traffic for all kinds of vehicles and transportation levels, sizes and their varied speeds, conducting ways such as major or minor roads, walkways, pavements continue to be potential factor when preparing a blue print study for project. The thing that requires further analysis, clarification and explication, so that the designs being produced rely on correct decisions like the entrances, accessibility, spatial and zoning distribution, level of privacy and pollution protection, building allocation on land, selecting and distributing some of landscape elements.

6.Impressionism: Impressionism effectors are different from the visual ones as they leave indirect effects on feeling and they move the visual perception. The thing that drives the designer to put touches and different vocabulary that influence those emotions and remains active in conscience which gives a sensory impression [4] difficult to describe. The designer has to study such potential or apparent influence on the surface of surrounding buildings in the style, traditional background arising from urban or architectural origin or the design modernity with its advanced structure. The thing that motivates the designer to extend the project adaptation with the surroundings, which reflects on the outer envelope, or deliberately he shows its variation and contrast. The designer also tries to show neutrality that appears in the level of details, type of finishing and colors on the one hand and effects on the architectural and design trend on the other.

7.Biological: Include every living thing or a dynamic interaction exist within the project site and has a positive or negative effect. Besides, contaminated or contribute to remove pollutants as a source or a source for diseases, or improving life conditions surrounding the building and residents, therefore it can give safety or cause a threat such

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as parasites, germs and insects, plants and wild animals. It is recommended to take procedures against it or keep it: you can remove it to maintain the safety of the building and the residents.

8.Economic: Many designers consider it the most important thing to analyze on the site. Represented in analyzing the land price and availability of construction materials locally and internationally with their prices and usage of surrounding land, and their relationship with project activity. This analysis affects the program, the total area and activity distribution in ground level and the general building. It also affects the systems level extent of details density, considering running costs and searching for resources covering its expenses.











9.Social: The residents in site, their cultures and features of urbanization; including their education, activities, services, and the extent of their privacy concept, their interaction with the society, their interaction with new technology, concepts and values - no doubt – effect on the architect design decisions so that according to the analysis, the harmony among the population of new facilities and the existing residents happens or does not happen. This harmony effects on the society extrovert and introvert to create more social areas, and insert spaces with activities that suit their traditions and customs. It also helps in achieving and isolation the society of the new project. Eventually, the street, squares and services becomes an extension to the project, or the project becomes completely independent form the surrounding

10.Technological: Technological systems and their various levels starting from the available systems for the building of sewage and nutrition systems and electro mechanic, air conditioning supply and the various structural systems depending on size and function of the building. As well as the level of stations and general networks that are available in site. Besides, the availability of the soil technology mechanic and reporting systems, accurate spatial surveying determining the set out and field survey, and even systems for account systems registered in the calculations sheets for air conditionings, electrical work and construction.

All that mentioned above effect design decisions. In other words, the more they are available to the designer, his staff and consultants, the more accurate the results are, and the more creative thinking move to new horizons and scopes.

On the one hand, while the shortness make the designer significantly limited in creative thoughts and spatial distribution. On the other hand, the designer remains overloaded with ideas to compensate the shortfall in the supportive systems to the building vitality such as water tanks, or generator space to meet the problem of low efficiency of energy supply, or return to traditional ideas and set up interior environment.

Table 2- The Second stage: Explanation Site Phenomena

Phenomena Classification	The Effectors						
Climate 	Thermal comfort	Humidity	Atmospheric pressure	Rainful	Wind direction	Sun path	
Sound 	Noise level	Activity type	Sound sources				
Visual 	View	Image	Landscape	Green areas			
Kinetics 	Accessability & distances	Road levels	Road speed	Pedestrian walkway	Road coordination	Transportation	
Quantity 	Densities	Crowding	Area	Dimensions	Distances		
Biological 	Pollution	Pollution source	Endemic diseases	Safety level	Wildlife		
Impressionism 	style	Heritage	Contemporaneity	Perception	Enclosure		
Social 	Culture	Education	Activities	Habits & traditions	Services availability	Privacy	
Economic 	Land price	Resources availability	Land use	Employment			
Technological 	Stations ability	Network efficiency	Maintenance level	Supplies	Land grology	Construction services availability	

The third stage: Deduction of Design Decision Directives

This stage is the most important in the process of site analysis, because it achieves the desirable objective so that the architect has a set of design directives. [9] At the same time these directives, are considered as logical justifications for his design decisions [4], sometimes they assist in the design process from the site itself. In addition, they make the proposed design consistent and compatible with its position largely, to become a desirable entity interacts with its surroundings in functional and aesthetical aspects as well.

1. PROGRAM

Most design decisions depend on applying what is contained in the "design reference". It is a project data report prepared to determine the spatial project requirements, and its desired specifications. In addition, some of the special conditions for the project or the client, and this so-called "architectural program". Some phenomena, that were monitored and analyzed effect on the program.

The phenomena that can effect on the program preparation are as follow:

Site elements	Program affect aspects
1. Land area:	Review architectural program requirements and survey
2. Geological report:	Determine the maximum height according to soil strength
3. Surrounding activities:	Determine the building activity, level of privacy and the need for calmness

2. 2D PLAN

One of the most important and clear stages in the design process is 2D geometrical plan formation, which is often the first in creativity stage after reviewing "relations diagram" and putting the idea or the design concept. Thus, the plan becomes in the form of a geometrical rectangular, square or circle, or in an articulation form in an endless solution with relationships to geometrical shapes. The following site phenomena plays a role in this decision as the following examples show:

Site elements	Plan affect aspects
1. Land shape:	The plan relatively agreement with the land geometrical shape.
2. Land sides' proportion	Determining the facades length proportion in the plan.
3. Topography:	Compatibility of plan levels with a slope or rough land.
4. Surrounding activities	Variation of the plan components relation according to the kind of surrounding.

3. 3D FORM

The geometrical articulation of the plan often follows a similar or different volumetric articulation. It might vary by subtraction or addition, emersion or recession, and the formal transformation in 3D according to the program spatial requirements and building codes, the designer attitude and so on, however site factors play many roles in the volumetric formation, some of which are:

Site elements	Building affect aspects
Climatic	forming a composition that prevent sun heat and dispose of rain
Geological	Height diversity and blocks division according to the soil strength report.
Accessibility	locating masses on the major and minor entrances according to accessibility.
Surrounding relationship	Sites diversification and masses location according to views and privacy.

4. Zonal and spatial distribution:

Zoning distribution, which is (a set of blanks linked together because the similarity of environmental and technical or functional conditions) within plans and volumetric contribution, as well as individual spatial relations inside or outside, depends on the architectural theories, or sometimes on the client requirements, however site conditions almost always influence on those distributions as follow:

Site elements	Zoning and spatial affect aspects
Roads and Squares	They affect sites decision of accessibility, locations entrances and services.
Views quality	Locating vision spaces and views in relation diagram.
Surrounding relationship	Organizing the relation between the neighboring zone function.
Climatic	Spaces distribution according to their relationship with daylight, ventilation and heat.

5. Orientation

The decision to change the direction of the whole building or some of its spaces or zones from the direction of the land sides often gives the building a beautiful and wonderful diversity while looking around it and watching it. However, it is better for this change to be justified such as mass or functional distinction, or achieving the foundations of design principles such as the site phenomena effect on the orientation process in all its forms, such as:

Site elements	Orientation affect aspects
the sun and wind movement	Masses direction and their openings according to the relation with the sun and the wind.
Climate	Orientation use as a passive design to face climatic pressures.
Views	Directing spaces toward distinctive views

6. Recession and Heights:

it is common while designing a building that the design decision related to heights and reccession is often subject to laws and Terms of the building codes. However, some projects allow the architect to choose floors number, height and to apply more reccession especially in large lands and high value buildings; formal functions such as museums, cultural centers, governmental offices and public libraries. These buildings are effected not only by conditions of their heights and reccession but also by site factors such as:

Site elements	Reccession and heights affect aspects
Surrounding activities	Determining the height and reccession according to the level of privacy with the neighbor.
Geological report	Determines the maximum height in accordance with soil strength and foundation type.
Land area:	The need for vertical expansion or the possibility for reccession from land edges.

7. Module

The design decision related to the module shape and dimensions has many factors such as, the nature of project activity, the method of furniture distribution, the spaces spatial analysis listed in the architectural program, the structural span, and the space, if any. However, the module dimension and shape are affected by site factors such as:

Site elements	Module affect aspects
Existing Building:	The probability of conclusion a project Module from a neighboring Module.
Sides' proportions and dimensions	Land sides dimensions impacts on the module multiplication
Land geometrical shape	Concluding the module shape from the land geometrical shape
Morphological configuration	Reflection of contour lines unit on the module unit

8. Accessibility and entrances

Accessibility decision and locating major, minor and services entrances of the site by movement mediums and elements such as roads, paths and squares surrounding the land. This decision is one of the most important decisions that increase or reduce the building performance, this is influenced by many important factors, one of them occurred during site analysis, including the traffic study such as traffic intensity, roads speed, and vehicles type that pass or inter the land or the building. factors that influence decision-making are as follow:

Site elements	Accessibility and entrances affect aspects
Roads studies	Entrances diversity according to classification the surrounding roads hierarchy.
Surrounding relationship	Locating entrances in accordance with the neighboring land
Surrounding activities	Locating site entrance in accordance with the neighboring building function.
Land area and dimensions	The possibility to locate multiple entrances according to the land circumstances and dimensions

9. Privacy level

Built up density in the cities locations, especially the CBD near civic center has significantly contributed in reducing privacy. This issue has pushed the designer to achieve privacy and to raise its level by a passive design to avoid eavesdropping and the moral safety penetrating for the building, according to the need for privacy. "Site study" helps in making decisions to achieve this privacy as follow:

Site elements	Privacy affect aspects
Neighbor relationship	Raising privacy level with exposure to surrounding activities
Landscape elements	Using the appropriate landscape elements to achieve privacy
Roads hierarchy	Distributing building spaces according to roads privacy level
Nature of outdoor spaces	Distributing building spaces according to the nature of outdoor spaces activities

10. Landscape Elements

Landscape elements are hard or soft scope, natural or man-made, they form an indispensable decision due to many reasons and factors such as adding beauty, achieving privacy, protection from the environment, direction and others. Some of which the designer will discover in the site such as:

Site elements	Landscape affect aspects
Climate studies	Using the existing landscape elements for protection from climate harshness.
Sun and wind movement	Using trees for shading and a buffer for protection from dusty winds
Views level	Directing building spaces towards aesthetical views.
Surrounding activities	Using landscape elements for visual coverage and orientation

11. Style and details

Many designers make their design decisions about style and fronts details from their point of view and architectural attitude, or influenced by client requests and tend. Regardless of the site influence and micro vision of this decision, yet it is normal for the site to have the greatest impact on these decisions, such as:

Site elements	Style and details affect aspects
Building style	Determining the size, level, and pattern of details with <u>the surrounding</u> building style
Local materials availability	Using these materials in construction to raise the building harmony with the location
Climate	Reflected on the openings rates, colors and the passive design elements.

12. Location allocation

The problem of locating the building in the land happens when the flat building footprint is smaller than the land. This problem confuses the designer and it increases with the obvious difference between the two areas. Thus, the decision becomes of multi-alternatives; should it be land depth or close to the road? Should it be the outer or in the inner corner? What are the recessions and its dimensions that control that position? For Sometimes, the site contributes in making that decision through:

Site elements	location allocation affect aspects
Area and land dimensions	Alternatives variation for choosing the building location in the land
The nature of surrounding activities	Range distance of recession and avoidance from adjacent buildings
Views	The building need for privacy, buffering or openness
Roads studies	The building need for introduction or direct connection with surrounding roads.

13. Technological systems

It is normal when designing a building to consider the availability of infrastructure in the location. Consequently, this will allow all the electro mechanical technological systems to supply the project with power, water and providing accommodation and conditioning indoor environment, lighting, facilitating waste disposal, secure against fire and transgressions. The designer takes decisions after determining the availability of these elements, their fulfillment and efficiency, so that the site study plays a supporting role for the technical systems by means of the following elements:

Site elements	Technological affect aspects
Networks and stations	The design need for networks or alternative stations inside the building and its location
Infrastructure	Locating spaces associated with infrastructure
Renewable resources	Determining the building responds for sustainable design.

14. Solid and void Proportions

Decisions forms in 3D form are linked to the building function including; the plan geometrical formation, skyline shape, finishing materials and their colors, and entrances location. On the one hand, these decisions are linked to what we call” the openings proportion the solid and void proportion in the total of formation”. They are linked as well to each facade of the building facades on the other hand. The site plays a prominent role in influencing design decisions to determine the proportions of soiled and void of the different buildings facades as the following:

Site elements	Solid and void affect aspects
Sun and wind movement	Determining glasses and masses in each facade
Surrounding views	Locating the openings and their orientation style
Outdoor spaces activities	Determining the diversity of methods to prevent or allow sight
Viewing angles	Studying the building watch style from external sites at different angles.

IV. RESULTS AND CONCLUSION

This study is a theoretical research to deep understand the importance of site analysis in its positive, negative and neutral phenomena to make design decision. Reviewing the main stimulus coming from the site and their sub influences that are over fifty quantative and qualitative stimulus, social or economic, natural or manmade, vital or technical, motion or visual we find that all of them influence in one way or another on design decision-making. This influence on design decision making can be increased or decreased, maximized or minimized, clear or hidden. Of course, there are further design decisions, which effect the design factors and elements, has not been mentioned in this study. This leaves the door open to discuss them and connect them.

In this paper, a site analysis process method is proposed has a tremendous effect on characteristics of designed product, the thing that make the designer more insistent to achieve it in a correct way, intense in data and clear in features.



REFERENCES

- [1] J. Doblin, "A short, Grandiose Theory of Design," STA Design, 1987.
- [2] M. Mahdavinejad, "The role of site analysis in creativity of students of bachelor of architecture, case: design studio III," in *Procedia - Social and Behavioral Sciences*, 2012.
- [3] P. G. Rowe, *Design Thinking*, MIT Press, 1987.
- [4] E. T. White, *Site Analysis: Diagramming Information For Architectural Design*, Architectural Media Ltd., 1983.
- [5] M. Parsaee and M. Parva, "Space and place concepts analysis based on semiology approach in residential architecture: The case study of traditional city of Bushehr, Iran," *HBRC*, vol. 11, no. 3, pp. 368-383, 2015.
- [6] B. Lawson, *How Designers Think, The Design Process Demystified*, Fourth Edition, London: Architectural press, 2005.
- [7] J. James A. LaGro, *Site Analysis: Linking Program and Concept in Land Planning and Design*, Canada: John Willey&Sons, Inc., 2001.
- [8] J. A. L. Jr, *Site Analysis: A Contextual Approach to Sustainable Land Planning and Site Design*, Second Edition, John Wiley & Sons, 2011.
- [9] A. P. Fawcett, *ARCHITECTURE: DESIGN NOTEBOOK*, Oxford: Architectural Press, 2003.

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