The role of technology in shaping the coexistence of local hospital buildings

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Abstract: Architecture is one of the reflections of the development of societies and an indication of the extent of their development from the technological aspect, as this results in products characterized by uniqueness and positivity, as the role of technology is highlighted in the occurrence of symbiotic interference on existing buildings, especially hospital buildings, because this type of building has a constant need for expansion, so the relationship between the origin and the symbiont differs. Depending on the time of addition and the subsequent technological developments that give possibilities and possibilities for coexistence, in addition to the factor of the surrounding environment, the general fabric, and the original building, the important role in determining patterns for reconfiguration of coexistence. However, the concept of technology has the fundamental role in determining the type of relationship and connection and its degree between two cities, as the research aims to clarify the perception. Knowledge about the impact of technology on existing local hospital buildings in terms of materials, structures and mechanisms used when merging old and new, and applying the theoretical framework that has been reached on two samples of existing local hospitals and showing how to achieve the coexistence formation of this type of building to arrive at the most important conclusions (developments affect Technology on hospital configurations when adding and expanding, especially at the levels (structures - materials - facades - basic composition)).

1 introduction

Reconfiguration of existing buildings is a common architectural practice because of its effects on the economic side, in addition to major technological developments in terms of materials and structures that have helped in reconfiguration in ways and mechanisms that enhance the relationship between the old and the new through symbiotic relationships, in addition to imposing contemporary technological statements in a way that does not diminish the value. Additions, and hospital buildings, are one of the types of buildings that are constantly being subjected to reconfiguration. The existing hospital buildings have recently undergone many additions, some of which were deliberate and organized, and some of which were random. This happens as a result of the increasing need to expand this type of specialized building, which is easy to operate. In parallel with the technological development in the field of medicine, which necessitates increasing the size of the block and its expansion to meet the functional requirements, and because of the importance of the economic aspect and avoiding the demolition of the original, the designers began to add to the existing hospital buildings and reshape the structure of the existing hospitals according to a design approach that preserves the original's importance and presence and gives a unique product characterized by The smile of the era. Technology and its development played a prominent role in providing solutions and adaptations to existing buildings through implementation mechanisms, materials and structures. From here came the research problem, which was represented by (the lack of clarity in specialized knowledge about the reconfiguration between new and old of existing local hospital buildings), so the goal of the research became:

- Revealing the mechanisms of coexistence between the old and the new in existing local hospital buildings.
- clarifying the role of technology in terms of materials, structures and mechanisms when the new coexists with the old.

The search steps are:

- Building a theoretical framework for coexistence in architecture.
- Application to a specific type of building, and drawing conclusions.

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2 The first axis: restructuring existing hospital buildings

2.1 *Hospital: definition and design methods*

The hospital is defined as a therapeutic, diagnostic institution with complex and purely functional systems, in which the functions overlap and coexist with each other to integrate for the functioning of the building. It is also defined architecturally as a design, medical, engineering, and social system, integrated in all aspects within the highest levels, aiming to provide the function of medical services for users (Abdullah, 2010, p. 11-14)

There are three main methods in forming departments in hospitals: (Figure 2):

First: Horizontal design style:

This type of design divides the hospital departments in adjacent horizontal formations and has advantages, including that the blocks overlap in a way that makes the departments overlap and juxtapose well, but it takes up large areas as a result of its expansion on the ground.

Second: Vertical design method: This method of hospital design divides the blocks so that we notice in the composition a high block (tower) that always represents the sections of the dream, and the floors vary according to the number of beds. One of its advantages is the economy in architectural costs. This method also provides a direct relationship between the sections.

Third: Hybrid method: flower distribution:

It is another method that combines the two previous methods, in which the masses are distributed radially, with the center of the beam being the medical services and the edges of the beam rising to form the patients' bed sections. (2010, Treat me magazine)

Fig (2) shows the configuration methods for hospitals /https://vebuka.com/print/170104152407-f310faf5dc98737fc8c67b5931f14722/__Hospital

2.2 Reconfiguration as a tool for change in existing hospital buildings

Change means changing the structure and description of a thing, and it is the process of transformation in the character of the thing or the transition from one time to another, (Hamid, 2011, p. 83). There are types of change, one at a time and some gradual. The first type includes intrinsic change and the second type includes change in the quality of the thing, which is related to external influences and factors (P.607, Ahmed, 2011)

Every design faces change during its life cycle as a result of need, and to achieve response and within the possibilities of making change, the designer turns to a balance between change and the results that result from it so that in the end they are capable of response and harmony as a result of this action. (P.10, Nouri, 2019), and that the continuity of the building or architectural formation through changing and reshaping it according to the changing requirements to enable it to meet the requirements and coexist with time (Al Shamas, 2020, P.42)

There are two levels of symbiotic change:

The first: It includes functional coexistence within the limits of functional performance without causing formal changes, that is, internal coexistence changes within the boundaries of the building and not exceeding it (Al-Muhanna, 2013, p. 621).

The second: includes physical changes in the external structure, reshaping and modifying the building through symbiotic additions (Thomas, 2013, p.6).

During their life cycle, hospital buildings are exposed to several changes, some of which are comprehensive and affect the structures. The building expands onto the surrounding spaces, if any, and includes the addition of new buildings and departments, or the expansion and development of existing ones in addition to what exists. Some of them include an internal change that includes internal departments and partitions and transforming them into more advanced facilities. This depends on the structural engineering network, or it may be a change that includes a change in the furniture or medical equipment and the finishing materials that serve it without affecting the main structure, that is, adapting the space for a new activity or the same activity but with more development (Carthey et al., 2010, p. 34- 45)

Table 1. shows the type of coexistence change and its impact on the structure (prepared / researcher)

Terms of change	Its effect on the structure	Duration	Its type	Type of change
The presence of a space with appropriate dimensions to accommodate the new event.	No structural traces	10-5Years	adaptation	Sub-change - operational
-The presence of a modular structural structure that can be changed without difficulty - The functions are similar between the original and added function.	Its effect on internal incisors	50-15year	Transformation	Secondary change - mechanisms
-The presence of spaces near the hospital * Benefit from the internal wipes and courtyards in a way that does not affect the facilities served by the yard. -Availability of interstitial spaces through which to link when adding - Functions in added blocks differ from functions in those associated with new blocks.	Its impact on the general structure of the building and facades	100-50year	expansion	Major change - strategy

2.3 levels of coexistence addition to hospitals

First: at the level of thought and design

It is important and necessary for the engineer designing such types of (specialized) buildings to place the fourth dimension within the design plan and think about its impact on future expansion, take into account the work structure to address the levels of intervention and distribution control, set readings about the inevitable effects of the dynamic of coexistence addition, and pose the design problem on the time axis. Explaining the possibilities that technology has given and linking this to the sustainability agenda and the human dimension of health care (Kendall, 2011, p. 7). However, architects designing or participating in the design of buildings often find the tendencies described above disturbing, and the prevailing belief is that expansion only succeeds if one party controls everything, but it is possible to formulate a fixed program at the beginning that can result in a high-quality design that takes into account future expansion (Kendall, 2007, p. 167).

Second: At the structural level

Adaptation schemes often entail modifications to the morphological configuration of existing buildings. In many cases these are of a structural nature or will have structural effects, in other words, affecting the load-bearing parts of the building. This means that they may involve increasing, decreasing or redirecting loads. Through the affected elements, these changes can lead to cracking, distortion or, more seriously, partial/total collapse if not properly taken into account in the design (Douglas, 2006.P.296). For the building, the construction or development of a structure depends on several factors to determine its level, divisions, and distribution, according to (Khulusi, 1999, p. 13)

Table 2. shows the considerations of choosing the structural structure in hospital buildings (prepared by the researcher)

Structural choice considerations	Specified	
The dimensions and area of the site determine the type of structural structure adopted, as it is determined whether the distribution is horizontal, vertical or hybrid	Site size and dimensions	1
Determines the type of relationship between the sections (vertical or horizontal link) within the integrated building or the style of individual sections within an integrated complex	Functional relationships	2

Geographical environment. Demographics of the site.	Site environment	3

2.4 Determinants of coexistence additions in hospital buildings

Any design requires understanding and studying future requirements, whether they are likely to occur or not, as it will facilitate the evaluation of proposals for acquiring and controlling new healthcare facilities and renovating existing buildings in line with their evolving mission (Kendall et al., 2012, p.7).

First: Determinants at the design level: It can be established that the design process is a sequential process and does not take place in one stage, but rather it is an evolving design solution with changes, and the design must be adaptable to temporal conditions, and this is what helps in integrating and coexisting the project in its spatial context and strengthening it and coexisting with it. The new additions are in addition to their harmony with the surrounding environment, so the design must be programmed according to mechanisms for future expansion, where the designing engineer is the first part of the process of redesign or future expansion by thinking and proposing implicit solutions in the design that help in doing so (Nouri, 2019, p. 19)(.

Second: Determinants at the cost level - economic: This means studying and determining the cost of the new addition to the existing building in all stages of the project's work, from design, implementation, and then operation (Kendall et al., 2014, p. 17).

Third: Legislative determinants: This includes all laws related to security and standards in design that relate to the hospital.

3 The second axis: Technology and restructuring / concepts and dimensions

Technology: It is defined as a thought and method of practice that is important for establishing harmony between the self and its environment, physically and psychologically. We notice that man always seeks to complete the components of himself, and this is done by producing a more comprehensive reality to meet his needs (Al-Akkam, 1991, p. 11). Zakaria defines technology as applications of scientific knowledge and that a technical method for obtaining practical purposes that are compatible with the goals of material civilization (Zechariah, 1988, p. 132). Elula defines it as "all effective rational methods in all fields of human activity," or it is the organized group of all individual techniques that are used to secure any goal. (p8, 1973 Susskind) or those methods used in producing and accomplishing certain things, whether by using a hand or a machine, which is based on knowledge of nature and the laws of natural sciences, (295, 2003 Himanen) It is also known as the group of factors and means used to connect The systems of thought and matter as an indicator of the development taking place in the use of mental abilities, skills and available means to achieve communication within the processes of transformation taking place in form and matter (Mubarak, 2017, p. 48)

Reshaping: It is giving a different shape to something, or renewing or changing the structure, style, or detail, or rebuilding something (Al-Mawrid, 2010). It has also been defined as the process of providing a balance between the past and the future. In the process of reshaping the past, it gains greater importance because In itself, it is the material that must be changed and reshaped according to what the past provides, the "existing background" in which each successive process of redesign will find its own place, where the past becomes a bundle of complex meanings that must be accepted, preserved, and transformed into a new canvas (Stone, 2005). It is also known as "the reconstruction of the original structure, either in its original location or in a new location" (P.10, Al-Khafaji and Al-Jumaili, 2013)

We conclude from the above that there is a relationship between reshaping and technology as an intellectual practice method, as it gives an indication of the possibility of reshaping the old with the new using the means and mechanisms that it allows to achieve a formation that is characterized by difference and gives the flavor of the era, in addition to its respect for the surrounding environment and the existing structure, through an intellectual coexistence approach that employs possible skills and practices. Which is available and can provide a connection between the past and the present.

3.1 Reviewing previous studies concerned with the reconfiguration of buildings due to the influence of technology

In this paragraph, we will review the most important studies that focused on reconfiguring buildings with the presence of technology. The study (Unisdr - 2017) focused on the concept of better remodeling (BBB), in recovery, rehabilitation and reconstruction in damaged buildings by taking measures to enhance the recovery capacity and the effectiveness of manufacturing. The decision

The study adopted recovery designs in identifying and meeting functional needs and resource needs, and increases the possibility of integrating risk reduction and sustainable development opportunities, as recovery results depend greatly on the presence of programs and mechanisms that support recovery, whether through the provision of human, financial, or other resources, or By promoting and communicating where necessary, and setting recovery goals that recognize the risk of structural change.

To better reconfigure during the rehabilitation and rebuilding period when actions are taken to enhance recovery capacity and effective decision-making before a disaster strikes, the implementation of four priorities focuses on building these capacities through establishing and strengthening recovery-focused relationships, establishing planning and coordination mechanisms, and introducing methods And technological procedures for reconfiguration.

As for the study (Nitin Lila Dhār Rane and others - 2023), which demonstrated the role of technology in the reshaping process in generating contemporary shapes and models by integrating the latest technologies into design methodologies and achieving innovative solutions through a variety of advanced technologies that reshape the architectural design landscape. Not only do advanced technologies amplify the efficiency of design processes, but they also contribute to the development of sustainable, adaptable and technologically advanced built environments. Technology has the potential to revolutionize construction processes and create reconfigurable structures.

While the study (Guyomard Hugo-2024 and others) focused on the importance of advanced systems for renovating building facades, the study considered that the double wall is considered the ideal solution because of its high capabilities and efficiency in reshaping buildings. Three existing buildings were analyzed and then renovated with a double-skin facade. A multi-criteria framework using a parametric model to describe existing buildings and a decision support framework was proposed. It allows modeling and running a large number of scenarios and considering several criteria such as energy, cost and carbon footprint. The geometry of each case is created using (irasshopper) and Energy Plus is used to simulate energy using its pneumatic models, in addition to the cost savings this strategy provides. and its reflection in improving The formal and functional performance of the building.

Table 3. shows previous studies concerned with the impact of technology on reconfiguration

The study	**addressed the most important aspects**
Unisdr - 2017	Reconfiguration of damaged buildings. Meeting functional needs through building remodeling The role of technology in restructuring. Reconstruction was applied to destroy buildings (post-war).
Nitin Lila Dhār Rane and others -2023	Generating shapes in architectural reconfiguration and giving new solutions. Integrating technologies with architectural methodologies in the design process. Create structures that are reconfigurable and adaptable.
Guyomard Hugo and others - 2024	The environmental impact of technology on building facades in terms of materials. Give several solutions (multiple scenarios) and choose the best one. The effect of facades developed through remodeling on the functional effectiveness of buildings.

3.2 Restructuring according to the concept of coexistence

It means the relationship between the old and the modern, as the old gains great significance from this relationship, because it is considered the physical entity that is in need of change. Therefore, every reshaping process that the old has undergone will lead to the generation of multiple layers of meanings in the new formation. When starting the design process, of course, there is a complex group. From various factors, such as site conditions, structural systems, programmatic requirements, when the building was constructed and the opinion of the individual architect. All of these elements combine to produce a building rich in complexity driven by an often simple strategy, but when redesigning according to symbiosis design, the most important and meaningful factor in the design is, of course, the original building, and how it creates a relationship between old and new (Stone, 2005, P.130)

Most architects see difficulties in dealing with existing structures, because constraints require a very different kind of creative energy. When you are not starting from scratch, you need architectural strategies that are not primarily driven by taste or stylistic preferences and give solutions and strategies that take all the energy. And coexist in an unexpected and new way (Moore and Ryan, 2000)

From the above, the determinants of symbiotic reconfiguration can be identified at three levels:

 the first level: - Total coexistence, which means reshaping the building from the inside and outside by creating new functional patterns that suit the nature of the need and according to the type of occupancy of the building. This level is approved when the security of the original building has suffered major damage or the function of the building has become no longer compatible with the requirements. the society.

 The second level - Partial coexistence: This means reshaping parts of the building to suit the development of functions or introducing modifications to suit the new function, taking into account that the partial change is appropriate with the original formation. The result is improving the building's performance and preserving its value to enhance its position in the building. Community memory.

 The third level - implicit coexistence: implicitly introducing some plastic additions ‹This means adding some plastic additions without affecting or affecting the shape of the original building. Their purpose is to increase the efficiency of using the building ‹the additions are often technical, mechanical, or electrical.

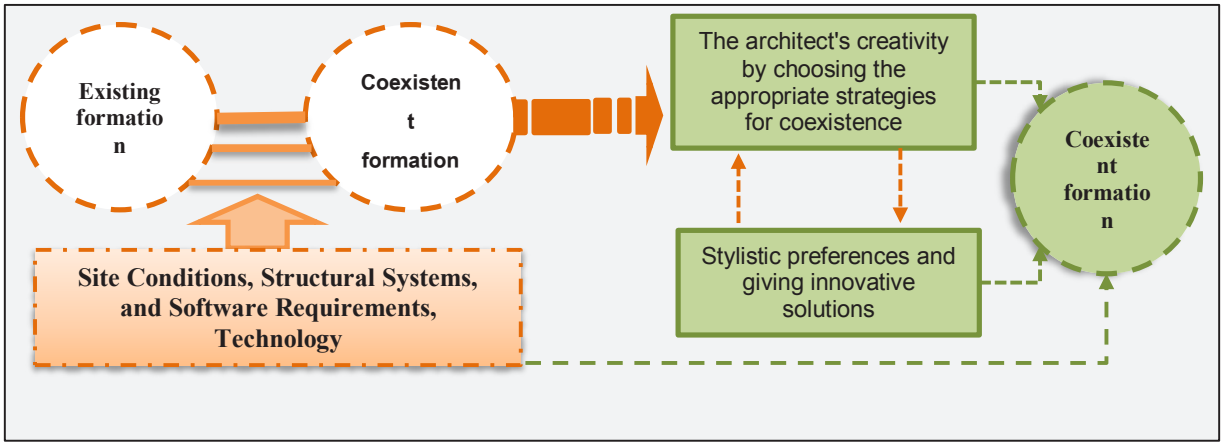


Fig 1. Shows the effects on the coexisting formation (prepared by the researcher)

3.3 Mechanisms for achieving coexistence to reconfigure existing buildings

There have been many events and technological developments in recent times that have affected all aspects of life, including architecture. We have witnessed a great cultural development that required the emergence of many new projects, buildings and architectural formations, including the addition of some new extensions to existing buildings, which had positive aspects and a visual spectacle. A special one, But it failed other times and became an architectural distortion and an unconscious concept that was limited to cutting and pasting, through random metaphors for the plastic elements without taking into account the plastic origins of the existing building (Moawd et al., 2020, P.1)

Hence, in order to give importance to adding to existing buildings, we will show the importance of adding to existing buildings and the role of technology on the designer's thought by producing contemporary mechanisms and tactics to link the two formations in terms of the formal, structural, or service system and linking them with modern technological methods. Coexistence thought heads in two directions when adding:

Either it must be compatible with the original building and connected to it with modern mechanisms to reach the point of no distinction between the two configurations.

-Or it may be different from it in design, materials used, structures, or systems, so the connection becomes clear, which gives distinction in the design, as we will show successively:

First: Compatibility with the existing building: It has several forms:

-1Compatibility through unity or similarity: This means copying or explicit simulation of the original architectural formation, as it seeks to preserve what exists (the host) at the expense of the new (the coexistent). Architectural critic Freeman said in this regard, "Imitating the past is an explicit decision that automatically excludes any the possibility of adding new elements. If the simulation is not carried out with high skill, the transferred image may become a threat to the status of the original architectural product.

-2Compatibility through relative similarity: Here there is no complete ignoring of the past. It emphasizes the continuity of integration of time periods while preserving the novelty of the new addition. It means the relative similarity between the old and the modern implicitly while maintaining its modernity. In this way, the new differs from the old in terms of detail. YELL Architectural Materials and facade engineering, and this method depends on

the correct use of technology to express the modernity of the building in a way that is appropriate to the identity of the old building (El-Ashmouni and Salama, 2020, P.10-15)

-3Compatibility through overlapping: This is a way to integrate the fabric of the old building with the modern one. This method differs from the previous one in that this intervention sometimes hides the new addition that has been introduced. The correct way for this overlapping and merging stems from adding the same formal elements such as height, color, and some size. (They, not all) Demel, 1997(

-4Harmony through camouflage: which is achieving compatibility by retaining the original architectural facade and hiding the new building behind it. This method appeared in Germany after World War II and the devastating effect it left on architectural buildings, so this method became the most appropriate for trying to celebrate. In keeping with the ancient heritage, the architects rose by keeping what remains of the formation in the old interface and trying to cover the new ones, (Richards, 2002)

Second: Contrast with the existing building: Sometimes contrast or difference is desirable, as the complete distinction between the old and the new is through scale, porosity, proportions, or other standards, and this appears in two forms:

-1Total contrast: This method is used when there is a need for difference to deal with a unique architectural design, a memorial, or a national building that highlights a specific symbol, for example. Based on this principle, many architects wanted to contrast the surrounding environment to highlight their work, regardless of whether this contrast would serve the aesthetic aspect of the existing building or not, the addition will always remain in place, declaring itself." (Moawd et al., 2020)

Partial contrast: In this, architects sought to make their works compatible with the ancient formations, even if they differed in their characteristics from the ancient, but were implicitly similar to its features. (archive.architecturaldigest, 2005)

3.4 Data on coexistent restructuring under the influence of technology

The architect can dialogue with the existing buildings (the original) according to one of the factors of the surrounding environment, in four basic directions (Ghonimi and Saleh, 2017):

-The first trend: Technology and history: When communication with place is limited to the intersection between technology and history, and communication with human and natural geography is neglected, this results in architecture that is half modern and the other half is historical, then the resulting form is purely historical, and these data apply to historical trends in their sub-trends. Different.

-The second trend: History and geography: Communication with place is limited to the intersection between history and geography, neglecting the advanced technological reality, to produce architecture that revives traditional methods by communicating with geography, and these data apply to local trends in their various orientations.

-The third trend: Geography and technology: When communication with the place results through the intersection between geography and technology, and neglecting the history of the place, resulting in architecture that uses all technological methods to communicate with the natural geography, and these data apply to regional trends.

The fourth trend: geography, technology, and history: When communication with place is limited to technology, history, and geography, this intersection results in a consensual architecture that includes the intersection between the universality of technological communication and the spatial relationship to communication with geography and history, and these data apply to regional trends.

The coexistence with the surrounding environment, which is worked with great skill and great mastery with the neighboring environmental vocabulary, is characterized by distinctive and creative products. This coexistence may be enhanced by a group of treatments on both the formative and material levels, as the coexistence between the building and the surrounding nature forms one integrated unit (P.144 Al-Sultani, 2015).

Through the various previous methods of dialogue with the original, it is possible to present the possibilities presented to the architect in his communication with the place:

The first trend: communicating with form and neglecting formal performance to produce a dialogue that is often at the level of form and provides material values. This trend lacks creativity and innovation - resulting in a reformative dialogue of form with place.

The second trend: Communicating with the form and neglecting the original content of the form by producing continuity in the appearance and stimulating the formulation of the form and thus strengthening creativity and innovation - resulting in a stimulating communicative dialogue in the place.

The third direction: Communication with form and performative content, thus strengthening creativity and innovation - resulting in a stimulating communicative dialogue with the place.

The fourth trend: communicating form and content, understanding social and environmental specificity, and coming up with solutions appropriate to the era - resulting in a formal and performative stimulating dialogue. (Ghonimi, 2013, p.6)

Table (4) shows the possibilities of coexistence production resulting from differences in time and space					
Possibilities presented to the designer for dialogue	**The nature of the product**	**The surrounding environment**	**history**	**Technology**	
This trend lacks creativity, as the product was created through a reformative dialogue between form and place	It results in an architecture that is half modern and the other half is historical research, to which historical trends apply.		●	●	Technology coexisting with history
There is renewal and motivation to produce a new formulation of the form, thus creating a stimulating dialogue with the place	It results in architecture that revives traditional styles by communicating with the surroundings and adopting local trends	●	●		Coexistence of history with the surrounding environment
Communication is with the performative form and content, as it strengthens creativity and innovation and results in a stimulating dialogue with the place	It results in an architecture that uses technological methods to communicate with the surroundings and nature and has a regional orientation	●		●	Technology coexistence with the surrounding environment
Communication is about form, content, and performance, and understanding social and environmental specificity and keeping pace with the times, so it is a formal and performative motivational dialogue.	It results in a consensual architecture in which universality intersects with spatial relativity and a regional orientation applies	●	●	●	Technology coexists with history and the surrounding environment

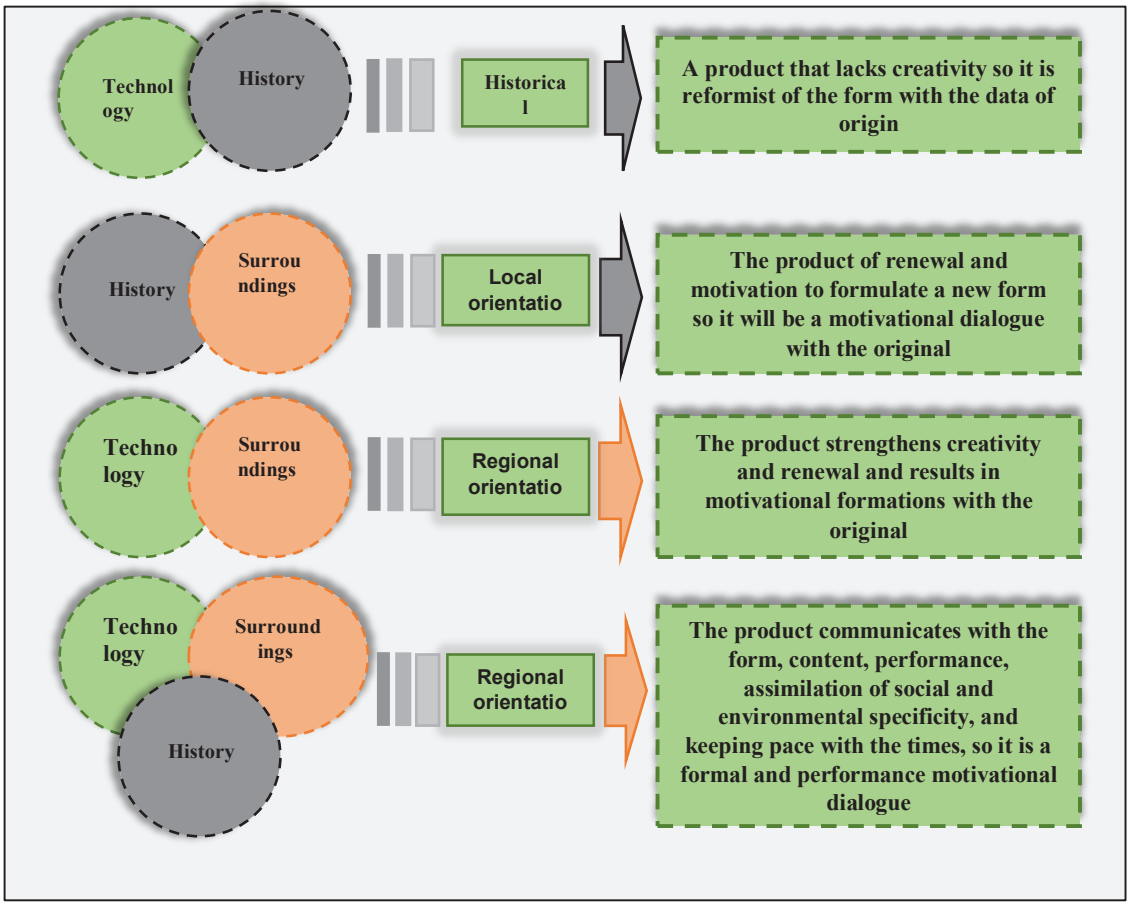


Fig 2. Shows the effects of origin and technology on the symbiotic formation (prepared by the researcher)

3.5 Stages of applying symbiotic reconfiguration

The symbiotic design is very common on existing buildings, and it is also considered a good approach to avoid demolition and create symbiotic relationships between the new and old building. Such a design gives designers a great challenge in integrating the environments and their coexistence and arriving at the best solutions. The symbiotic approach will inevitably be in stages, and these three stages include a stage. Analysis, strategies definition stage, and tactics definition stage (Stone, 2005, P.125-126):

First: The analysis stage: Analysis of the parent building is considered one of the basic principles of the coexistence approach to design, as understanding and analyzing the building will give the designer images and vision for determining strategies for coexistence. The parent building can be studied and analyzed from several aspects:

-1Analysis of the building in terms of the surrounding environment: The external addition is often related to the increasing demand for additional space or for functional change, especially for public and specialized buildings in cities, including hospitals. Due to their strong architectural features or their special location, these buildings have influenced the formation of the general character of their surroundings. Therefore, the challenge facing the architect is to create and develop an approach that does not harm or detract from the general character of the building for both the existing structure and its surroundings during construction. (Yüceer and İpekoğlu, 2012, p.50)

-2Analysis of the building in terms of location: Study of the building's perimeter and the space surrounding it. Horizontal additions to buildings affect the relationship of space to mass in particular, as well as the arrangement of the building, the location of the building on the boundaries of the plot of land, and the specific direction and location for constructing an additional building, (Stone, 2005,P.127)

-3Mass analysis: taking into account the configurations of the established site, the relationship of the building to the site boundaries, its prevailing orientation, and its location in relation to the streets in the area, and integrating this site within the new coexistence addition, as well as determining the general rhythm of the mass and its size to add a mass that is harmonious with the original or different from it (Stone, 2005, p. 128)

-4Facade analysis: The building's facades are considered one of the most important basic elements in the external analysis. The facade is not just a representation of the interior, but it also reflects the cultural characteristics of the period in which the building was built (Highfields, 1991, P.3). The components of the facade can be analyzed by referring to its rhythm and orientation. Its shape, proportions, sections, units, type, materials, external cladding and decoration materials (Meiss, 1990), and the material of the external surface (finishes) are the final touch in facade design. The selection of cladding materials for coexisting additions is an important matter (Weeks, 1986, p. 74).

Second: The stage of defining strategies: After studying and analyzing the site, results are reached that impose the strategies used for coexistence design, including (site conditions, structural systems, programmatic requirements, and the time during which the design was completed, in addition to the opinion of the individual architect), but it remains the most important and meaningful factor. In symbiotic design, the original building, and establishing a relationship between the old and the new, is the most influential tool in symbiotic design, as there is no symbiotic design without the presence of the original. It is also necessary for the shape of the host building to be strong enough to accommodate the symbiotic addition, and for it to be in a way that it is not bypassed. It is often necessary for the engineer to address structural issues when designing a coexistence. Although sometimes complete dominance of the original building may be required, recognizing the distinction between the original building and the coexistence is important. Likewise, the coexistence must be strong enough. And to achieve a point that meets or balances with the original, in order to establish a successful dialogue, as the two coexisting people must speak a similar language (Stone, 2005, p. 129-131)

Third: The stage of defining tactics: Tactics can be expressed as manipulating elements or details to support the strategy, and they differ depending on the place. They are what give identity and distinction to the buildings, and they are what give the coexisting building a distinct and individual shape. The entire shape can also be read through its details. Tactics or details can be divided in a different way. It shows each element in the coexisting formation and its relationship to the original building. The material is considered one of the important details in the coexistent design because of the integration it gives to the coexistent design. The details give the potential for innovation and invention, and through these, architects can provide harmony to the most unfamiliar, difficult, or turbulent environments that culture generates. . (Frascari, 1984)

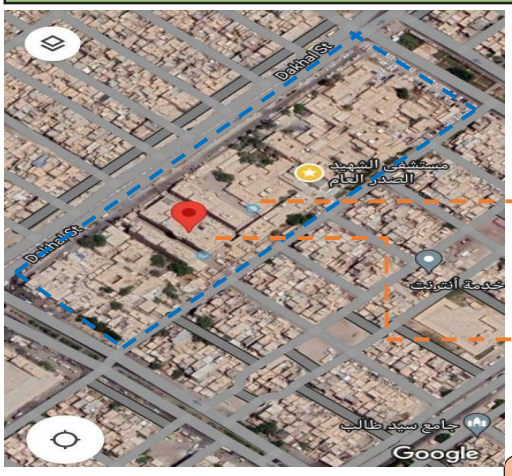
We conclude from the previous proposition that the coexistence design between two buildings depends largely on complete knowledge of the original building in terms of studying and analyzing it in a comprehensive and accurate manner and anticipating what might happen from the coexistence. By working on the coexistence approach and dealing with it, the building can be given a new formation with different characteristics according to what can be benefited from. From the origin and technology and how to exploit it with the available capabilities in addition to the skills of the designer engineer.

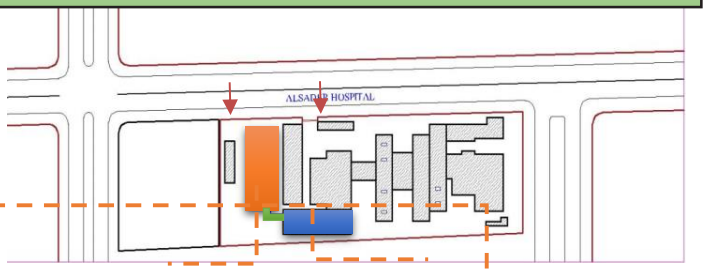
4 Application

This research will explain the role of technology on hospital buildings when they are expanded. Hospitals were chosen within the coexistence addition and the mechanisms for their application. Two existing local hospitals in the city of Baghdad were chosen. The most important criteria for selecting samples were (that the hospital had been subjected to expansion and addition for varying periods, and that the addition and Origin with a structural structural system) to apply the vocabulary of the theoretical framework.

Sample No. (1) Al-Shaheed Al-Sadr Hospital

Researcher Description and Analysis of the Project(1)





Fi (1) shows the site plan of the origin and coexistence, the source / projects and engineering services

Fig(2) shows the site plan consistent with the surrounding environment and composed with it, source/https://maps.app.goo.gl/ePkhTTc

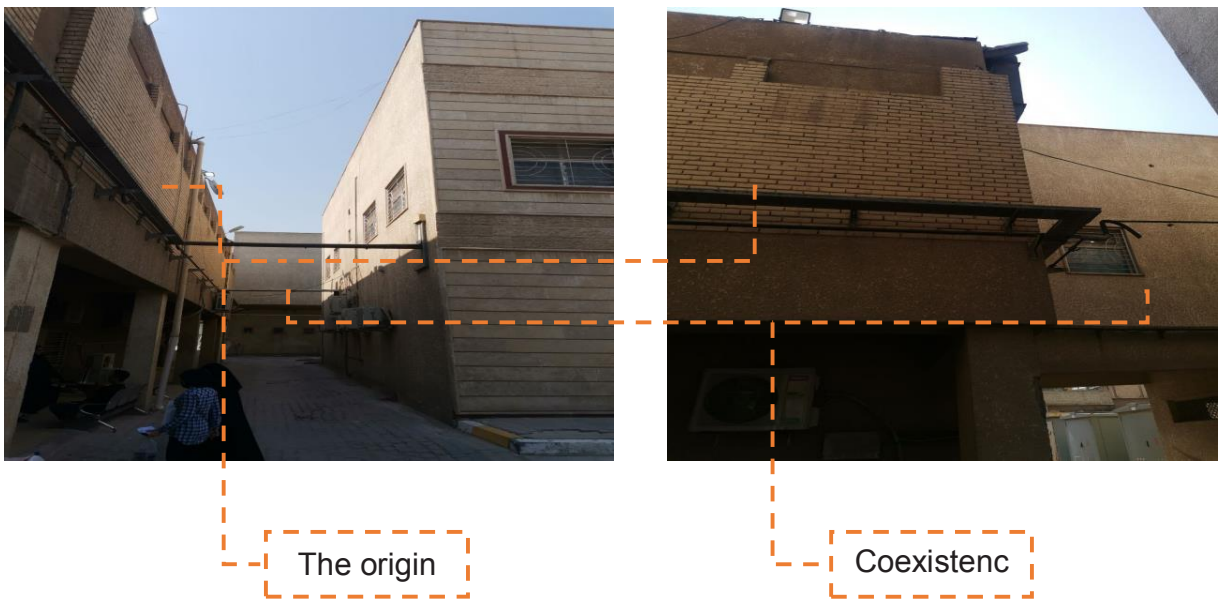
1 Analysis with the surrounding environment

The addition is integrated with the surrounding environment and the surrounding fabric in terms of height, scale, external appearance and accessibility of the coexisting building from inside and outside the parent hospital, meaning that the physical composition of the building corresponds to its external surroundings

2 Site analysis

The site will be analyzed in terms of the relationship of the parent building to the coexisting building at the level of the site plan: where it is found that:

* The addition was at a horizontal level on a plot of land adjacent to the original building and within the boundaries of the hospital.
* The entrance to the symbiotic addition is perpendicular to the entrance to the original hospital and close to it



3 Interface analysis

* Shapes of elements: The sizes and shapes of the openings are similar in origin and coexistence. * Height of floors: The height of the floors varies, in the original floor height (3.4 meters), but in the coexistence up to (4.3 meters) * Decoration and materials: The decoration in the facades of the cohabitant differs from the original in terms of shape, color and material, in the original use of Al-Jifqim, either in the coexistence used stone .

Fig 5. Coexisting building facades

Achieving the mechanism of repetition using the same design style of the original building, also due to the similarity in the functions of both buildings with an attempt to merge the two buildings together in a way that can no longer be independent and a complete intertwining between them in terms of form and function.

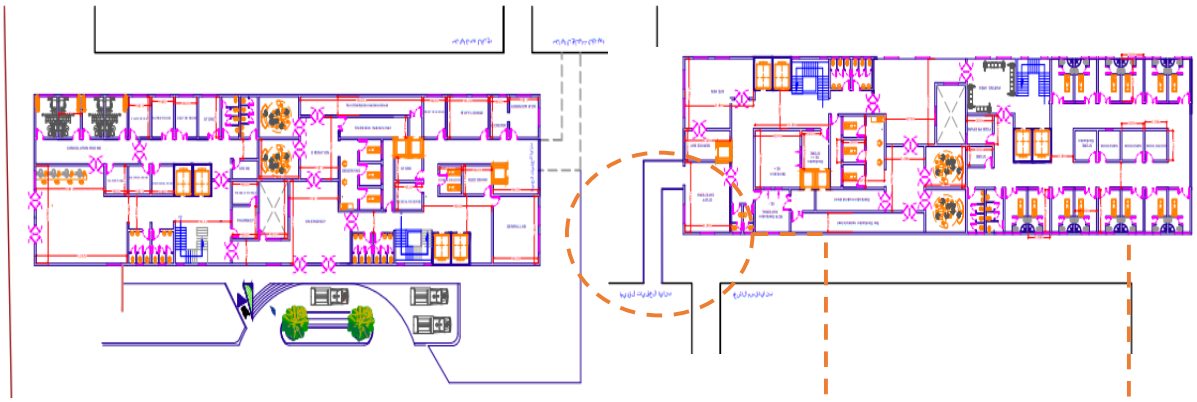


Fig 6. Coexisting Building Plans

The connecting area is a bridge on the first floor

Coexistence

4 Cluster analysis

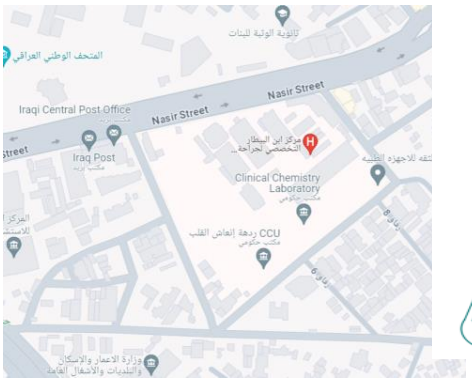
The mass will be analyzed according to the common definition of the mass "determining the general external shape, height, width and depth": * the shape of the symbiotic mass is rectangular and thus is similar to the original composition with the rotation of the symbiotic mass on the axis of (Y) 90 degrees, so it becomes perpendicular to the original mass. * The physically coexisting block is connected to the original block by a bridge from the first floor in the shape of the letter (L) with a length of approximately 9 meters and a width of 2.8 meters. * Harmony and clear coordination in the site plan between the coexisting mass and the origin in terms of the shape of the block, its height and orientation

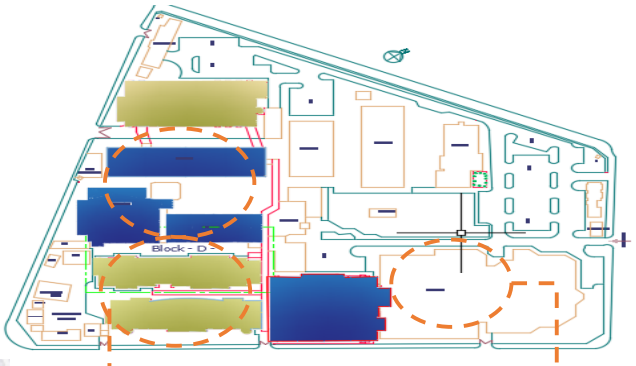
Fig (7) shows the area of linking between the origin and the cohabitant

Linkage area

Sample No. (2) Ibn Al-Bitar Hospital

Researcher Description and Analysis of the Project(2)





Coexistenc

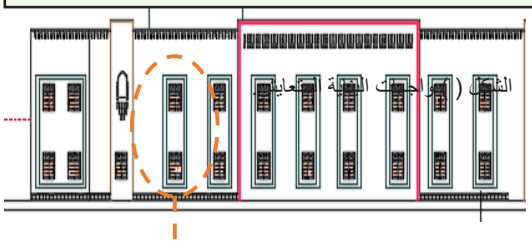
The origin

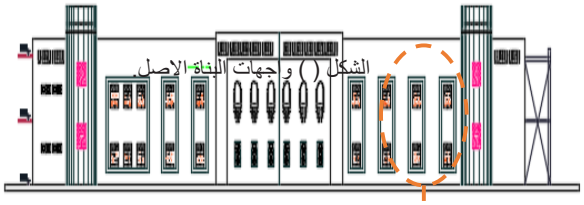
1 Analysis with the surrounding environment

The addition is integrated with the surrounding environment and the surrounding fabric in terms of height and scale and the composition of the building corresponds to its external surroundings.

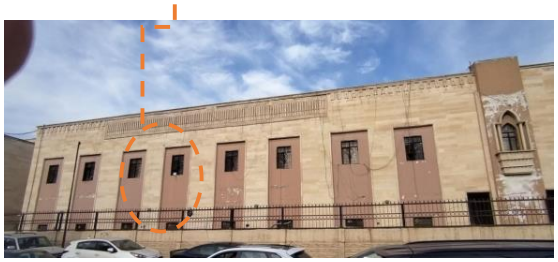
2 Site analysis

*The addition was on a horizontal level on a piece of land adjacent to the original building and within the boundaries of the hospital, and the original and the cohabitant were connected through a covered corridor, which enhanced coexistence and cohesion between the blocks and gave strength to the connection in the final formation. * The addition was on a horizontal level on a piece of land adjacent to the original building and within the boundaries of the hospital. Connecting the original and





Similarity of façade details and elements in origin and coexistence and similarity in finishing materials

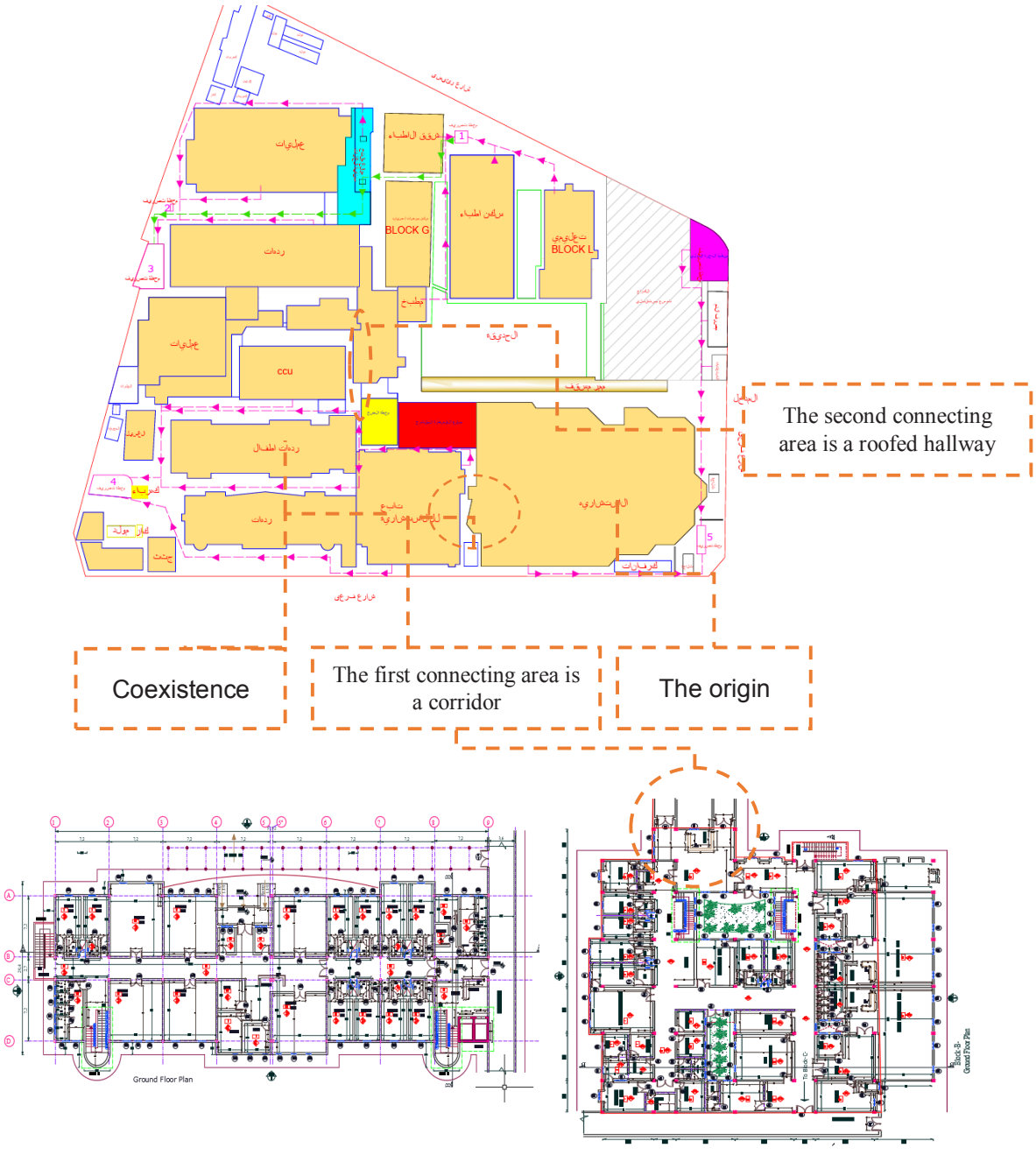


3 Interface analysis

The sizes and shapes of the openings are similar in origin and symbiosis, in addition to the total similarity between the original and the coexistence in terms of materials, details and height of floors.

4 Cluster analysis

The blocks were added in two stages, in the first phase two blocks of two floors were added and in the second three blocks in a parallel direction to the original blocks and at the same rhythm, which gives a harmonious view of the site station, the coexisting blocks are connected to each other and with the original block by a roofed portico.



5 Analyze and discuss the results

After the selected samples have been described, the vocabulary of the theoretical framework will be verified by applying it to them based on the comparative descriptive analysis method between the samples, where the values range from (0 to 1) were determined to measure the variables, where (1 = achieved value, 0 = unachieved value), which leads to a presentation The results are as shown in Table (4) and the conclusions are reached.

Table No. (5) Application of the theoretical framework on the selected samples (prepared by the researcher)

Percentages of vocabulary achievement in the samples			عدد مرات التكرار	Sample indicators 1-0		Symbols	Possible values	Sub-vocabulary	Secondary singular	The main singular
				2	1					
Secondary singular	Sub-vocabulary	Possible values								
%75	%100	%100	2	1	1	X1-1	Reproduce the original building and make the original building a background for addition	coincidence	**Addition**	Coexistence mechanisms (X)
	%50	%50	1	0	1	X1-2	Achieving homogeneous contrast between the coexistence and the origin	opposition		
				%50	100 %	**Percentage of achievement of singleness in each sample**				
% 72	%50	%50	1	1	0	X2-1	Taking forms from the elements of the past and adding and rebuilding them	selectivity	**Hybridization**	
	%100	%100	2	1	1	X2-2	Displacement, reflection and rotation of a geometry،	adaptation		
	%66.66	%50	1	1	0	X2-3-1	Merge part and whole	Merge		
		%100	2	1	1	X2-3-2	Merge relationships			
		%50	1	1	0	X2-3-3	Merge elements			
				100 %	%40	**Percentage of achievement of singleness in each sample**				
%75	%50	%50	1	1	0	X3-1	Explicit copying or simulation of the elements in the original	Unity and symmetry	**Compatibility**	
	%100	%100	2	1	1	X3-2	Continuity in integration with the past and preservation of modernity	Relative similarity		
	%100	%100	2	1	1	X3-3	The fusion of the fabric of the old building with the modern	overlap		
	%50	%50	2	1	0	X3-4	Keeping the original façade and hiding the new building behind it	Camouflage		
				100 %	%50	**Percentage of achievement of singleness in each sample**				
%62	%100	%100	2	1	1	X4-1	From the original	Benefit	**Barter**	
	%0	%0	0	0	0	X4-2	About the original	release		
	%50	%50	1	1	0	X4-3	Binaries between origin and symbiont	Bilateral relations		
	%100	%100	2	1	1	X4-4	In blocks	Continuity		
		%100	2	1	1	X4-5	In interface elements			

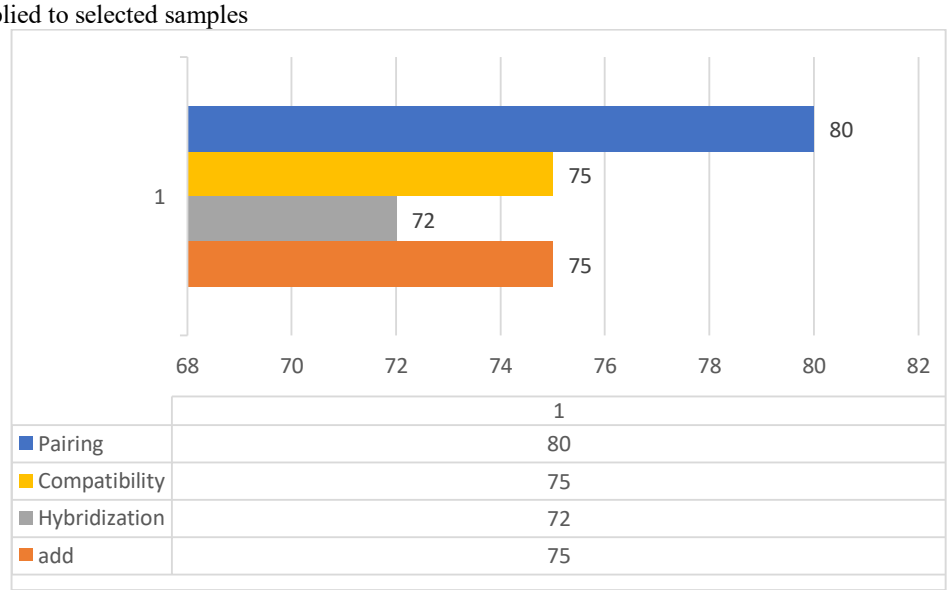
			%100	2	1	1	X4-6	Visual			
					%83	%66	**Percentage of achievement of singleness in each sample**				
%80		%50	%50	1	0	1	X5-1	تشابك كتلتين ذات نسيجين مختلفين	متباين	**coupling**	
		%50	%50	1	0	1	X5-2	تشابك كتلتين باختلاف الملمس واللون مع تشابه القياس	باختلاف اللون والملمس		
		%100	%100	2	1	1	X5-3	تداخل الاصل مع المتعايش بما يضمن الوحده الواحده	بالتداخل		
		%100	%100	2	1	1	X5-4	اختراق احد العناصر للاخر بالاعتماد على حجم الفراغات	عبر النفاذية		
		%100	%100	2	1	1	X5-5		حتّي		
					%60	100 %	**Percentage of achievement of singleness in each sample**				
%56	%83.3		%50	1	1	0	Y1-1	With context		**communication**	**Characteristics of symbiosis (Y)**
			%100	2	1	1	Y1-2	Communicate cohabitant with the asset by size			
			%100	2	1	1	Y1-3	Visual contact with the surrounding environment			
	%50		%50	1	1	0	Y2-1	Continuity of elements in coexistence and origin		**Continuity**	
			%50	1	1	0	Y2-2	Continuity of color and material			
			%50	1	1	0	Y2-3	Design continuity			
	%75		%50	1	0	1	Y3-1	Structural		**Partnership**	
			%100	2	1	1	Y3-2	Formative			
	%25		%0	0	0	0	Y4-1	Different in interface elements		**Heterosexuality**	
			%0	0	0	0	Y4-2	Structural heterogeneity			
			%50	1	0	1	Y4-3	Material contrast			
			%50	1	0	1	Y4-4	Different design			
	%50		%50	1	0	1	Y5-1	Partial symmetry		**Symmetry**	
			%50	1	1	0	Y5-2	Total symmetry			
					%57	50 %	**Percentage of achievement of singleness in each sample**				
58%	75%		50%	1	1	0	X1-1	Technical support	to support	**With thought and design**	**Levels of technological coexistence (z)**
			100%	2	1	1	X1-2	Financial support			
	75%		50%	1	0	1	X1-3	Overlapping blocks	expansion		
			100%	2	1	1	X1-4	Filling empty spaces			
	50%		50%	1	0	1	X1-5	Identical elements with advanced materials	cloning		
	50%		50%	1	0	1	X1-6	Integrating existing coexistence with new mechanisms and technologies	Fusion		
	50%		50%	1	0	1	X1-7	Different from the original materials	Materials technology	**With structures and materials**	
			50%	1	1	0	X1-8	Similar to the original materials			
			50%	1	0	1	X1-9	Structure			

	50%						s that support the original and are connected with it	Structures technology	
		50%	1	1	0	X1-10	Non-physically connected structures		
				50%	70 %	**Percentage of achievement of singleness in each sample**			

6 Results

In this paragraph, the results reached when applying the theoretical framework to the elected samples will be discussed and compared with the propositions presented in previous studies.

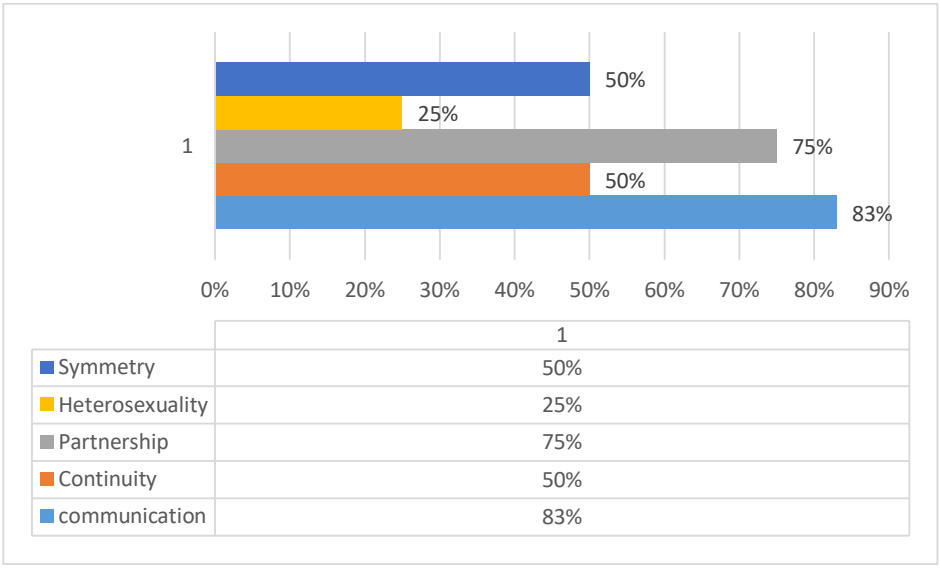
The secondary singular of the mechanisms (addition) achieved a percentage of (75%), while the mechanism (hybridization) achieved a percentage of (72%), the mechanism of (compatibility) a percentage of (75%), the mechanism of (exchange) a percentage of (62%), and finally the mechanism of (conjugation). Rate (80%) when applied to selected samples



	1
Pairing	80
Compatibility	75
Hybridization	72
add	75

This is relatively consistent with the results of previous studies in terms of compatibility and hybridization when remodeling existing buildings.

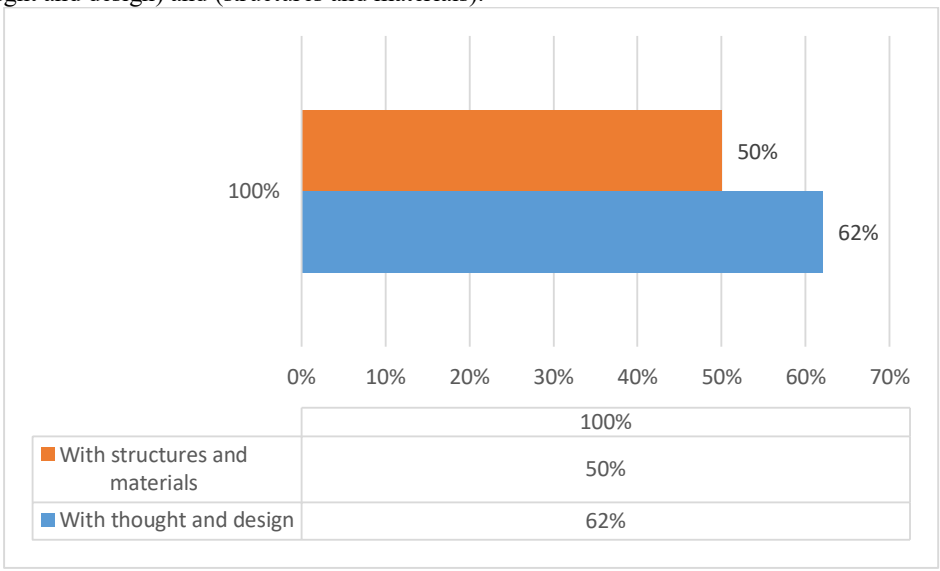
The results of the application to the vocabulary showed the characteristics of coexistent production in its secondary vocabulary in varying proportions according to the use of the technological aspect adopted in the application.



	1
Symmetry	50%
Heterosexuality	25%
Partnership	75%
Continuity	50%
communication	83%

This is consistent with the results in the study of Nitin Lila Dhār Rane and others by generating shapes through new technological methods that give contemporary characteristics to the product.

The results of the application on samples with levels of technological coexistence showed similar percentages in (thought and design) and (structures and materials).



	100%
With structures and materials	50%
With thought and design	62%

This is consistent with the study of (Nitin Lila Dhār Rane and others) by integrating techniques with design methodology to produce a distinguished product.

Conclusions

1. Technological developments affect hospital configurations at the addition and levels (structures - materials - facades - basic composition)، this is consistent with what was mentioned in the study by **(Nitin Lila Dhār Rane and others)** in terms of following flexibility in structures when designing.
2. Coexistence is a flexible approach that does not call for freezing the original, but rather seeks to maximize and beautify it by exploiting technological developments, and applying them to materials and structures, or to equipment, or to the process of producing coexistent formations using advanced programs. This is consistent with the proposals of (**Nitin Lila Dhār Rane and others**) in generating new shapes through Technological programs.
3. Technology has a major role in determining the relationships between the origin and the cohabitant, and according to the processes that will be carried out and choosing possible strategies to reach the optimal alternative, here, the research is consistent with the proposals of (**Guyomard Hugo and others**) by giving multiple scenarios and choosing the optimal one.

4. The more materials used in building the host are available locally, the easier the process of adding the added building and thus achieving a coexistence formation.
5. Relying on flexibility in the first stage by adopting a decision-making model using advanced and sequential technological programs. Adopting this model will enable greater transparency, a corrective policy, and more effective acquisition measures. This model is based on the principle of separating parts of the facility that have long-term benefit from parts that have short-term benefit. .
6. The concept of coexistence is inherent and accompanies the process of technological development. Scientific and cosmic theories have become part of the process of producing formation through the coexistence of architectural thought with those theories and systems. This is consistent with Unisdr's proposals regarding the process of reconstructing destroyed buildings with the same original materials
7. The symbiotic addition can either be additions that are compatible with the original or additions that differ from it, giving importance to the technological factor and the development of materials, and thinking about the impact of this important factor on the one hand, and on the other hand, respecting the place and its own identity and not distorting the existing buildings.
8. The concept of coexistence and the impact of technology on it is considered one of the important concepts that is concerned with addition and the degree of acceptance of the original for these additions. Thinking about the coexistence approach when adding to specialized buildings in general and hospitals in particular is necessary because of the positive results it gives that meet the requirements of modern addition.
9. Technologies, processes and policies that enable multiple stakeholders to design, construct and operate a facility have become symbiotic in virtual space. This symbiotic process of building information and its representation results in a coexistent digital representation of a built asset to facilitate the design, construction and operation processes to form a reliable basis for decisions, as technology has become a supportive Fundamental to the decision-making process in coexistence intervention.
10. The coexistence approach, an intellectual approach applied from the first stages of the project, based on possibilities, deciding on the right and most appropriate thing, and coming up with new solutions that are consistent with development and meet the requirements of the times.
11. From the application to the samples, we conclude that the origin is highly affected when coexisting.
12. Technological factors, keeping pace with developments, and the need for expansion are considered the most important factors that lead to the formation of symbiosis.

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