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Evaluate the Performance of Service Buildings in the Operational Stage

(Case study of service buildings in the Mansheyat Nasser housing development project in Cairo governorate)

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Abstract

This subject dealt with the problem of functional change in the spaces of some service buildings during the operational phase, in the housing project for the development of Mansheyet Nasser in Cairo Governorate. Which is considered one of the economical housing projects in Egypt, and the resulting decrease in the efficiency of both the functional performance and the technical performance of those buildings and their failure, or their closure without use. Therefore, it was necessary to conduct evaluations of the efficiency of both the functional performance and the technical performance after the emerging changes, to determine the pros and cons of those service buildings. With the development of a proposed strategy to be a guide for future architectural projects, in order to avoid recurrence of their deterioration in the operational stage. And that is by following several approaches to cover all aspects of the research, starting from the inductive approach, passing through the analytical method, and then ending with the deductive approach to suggest the required strategy.

Keywords: Performance evaluation, service buildings, efficiency of functional performance, efficiency of technical performance, new changes, operation stage, pros and cons.

RESEARCH PROBLEM

In some service buildings of the Mansheyet Nasser housing development project in Egypt, many changes occurred during the operational phase, in the use of spaces forming some parts of the building than were specified for them in the architectural design phase. Or changing the use of the whole building to another use, or closing the building and not using it. For example, the function of the health unit building was changed to a nursery and it failed and was closed, and the first floor in the maternal and child care center building was used as a health unit with limited services because there was not enough space for that job with the closing of the ground floor and deteriorating condition and not being used as a nursery as was planned. for him. Which led to a severe decline in the efficiency of both the functional performance and the technical performance of those buildings and their lack of optimal use

RESEARCH OBJECTIVE

Determine how these service buildings perform by evaluating their efficiency to identify the pros and cons to arrive at a proposed strategy to raise the efficiency of both functional and technical performance in the operational phase and to be guided in future projects.

RESEARCH METHODOLOGY

The research included several approaches, including the inductive approach through conducting a theoretical study to identify the evaluation process for buildings in the operational stage, reasons for evaluating the performance of buildings in the operational stage, aspects of the methodology for evaluating the performance of buildings, including evaluation of functional performance and evaluation of technical performance, measurements of performance in buildings such as quantitative measurement and qualitative measurements, methods of measuring the performance evaluation of buildings such as observational performance evaluation, perceived performance evaluation and measurement performance evaluation. Then the analytical approach by conducting an evaluation of both the job performance and the technical performance in the service buildings Study cases after the new changes in the operational stage by using the tools of the analytical study Such as design documents such as drawings, specifications and measurements, with the researcher raising and documenting buildings without drawings, field visits to sites, research centers, similar projects, and engineering and standard reference libraries, personal interviews with users and project officials, photographs of buildings from home and abroad, and analytical models for functional evaluation and evaluation. Technician. And finally, the deductive approach to reach the proposed strategy required to be a guideline in future

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architectural projects in order to raise the efficiency of both the functional performance and the technical performance of those service buildings

1. INTRODUCTION

The process of evaluating the performance of buildings in the operational stage is considered one of the important processes, as it determines the pros and cons of the existing buildings, especially those that have many unexamined changes in the operational phase. Which leads to identifying problems and submitting remedial proposals to them, as well as creating an information base on building performance (5). This helps designers and architects to better understand the effect of spaces, voids, openings, finishing materials and climatic treatments of the building envelope on the functional aspect of the building (3,8,11,14). It also allows them to identify the links between design and functional variables (17). And the introduction and development of principles and standards of architectural design for different types of buildings. This results in many strategies that serve as a guideline for future architectural projects (13).

2. THE PROCESS OF EVALUATING THE PERFORMANCE OF BUILDINGS IN THE OPERATIONAL PHASE

It is the process of obtaining feedback on the performance of a building in use, to correct past errors in buildings and future projects (4). This is cost-effective and greatly improves workplace productivity and efficient building operation (26).

3. REASONS FOR EVALUATING THE PERFORMANCE OF BUILDINGS IN THE OPERATIONAL PHASE

The principle of evaluating the performance of buildings in the operational phase constitutes a basic and important pillar in the field of architecture for several reasons, the most important of which are the unexamined new changes and the failure of the project design to accommodate the general requirements for the following reasons:

3.1. Neglecting the architectural program of user requirements and focusing on the requirements of the client, the owner, or the senior leadership (7,12).

3.2. The architectural program is limited to the client's and architectural requirements and the period of time that is determined according to the financial capabilities of the owner without allowing sufficient time for many other important consultations such as studying the obstacles that may exist at the site and near or far the means of transportation from the project site or the locations of appropriate raw materials available near the site and the infrastructure network The basic website and other consultations that may take longer and cost more (5,26).

3.3. Architectural construction of design decisions based on his previous experiences in projects with completely different circumstances from those of the project in which his decisions are required (21).

4. ASPECTS OF THE BUILDING PERFORMANCE APPRAISAL APPROCH

There are many aspects of building performance evaluation, including functional evaluation, technical evaluation, behavioral evaluation, environmental evaluation and aesthetic evaluation (1). In this research, the focus will be on functional evaluation and technical evaluation as follows:

4.1. Functional Evaluation

Functional evaluation is a standard process concerned with the efficiency and functionality of a building. The functional evaluation process includes the following elements: the general location of the building, functional spaces, service spaces, the outer envelope, natural ventilation and natural lighting (10).

4.2. Technical Evaluation

Where the technical evaluation of the building is carried out according to the advanced laboratory tests and accurate measurements, and the technical evaluation process includes the following elements: finishing materials, building materials, sanitary works, electrical works, air conditioning systems, safety systems, fire protection requirements and the building roof (20)

5. BUILDING PERFORMANCE MEASURES

Building performance measures have been classified into two types according to the following:

5.1. Quantitative Measures of Performance

Quantitative measurements can be applied to many aspects of a building's performance such as lighting, sound, temperature, humidity, construction materials, finishing materials, areas, lengths, and use (7).

5.2. Qualitative Measures of Performance

Where qualitative measurements can be applied to the psychological and behavioral dimensions of place users, as it shows the extent of individuals' understanding of the place and the extent of their satisfaction with it. In addition to the extent of the building's success in achieving the functionality for it (2).

In this research, the focus will be on quantitative measures of many aspects of performance in service buildings.

6. METHODS OF MEASURING THE PERFORMANCE EVALUATION OF BUILDINGS

The methods of measuring the performance evaluation of buildings have been classified according to the following:

6.1. Performance Evaluation by Observation

Where the measurement is done by specialized experts, and observations are recorded in the registration lists while inspecting the building (26).

6.2. Perceived Performance Evaluation

Where the measurement is carried out by the building's users through questionnaires, personal interviews and open visits

6.3. Benchmark Performance Evaluation

Where the measurement is carried out by specialized experts, using different measuring tools (such as lifting and documentation work, photography, videography, tape measure, various survey instruments, etc.) on the aspects that can be measured in buildings by quantitative methods (13).

7. CASE STUDY OF SERVICE BUILDINGS IN MANSHEYAT NASSER HOUSING PROJECT IN CAIRO GOVERNORATE

The case study is considered one of the common methods of conducting the qualitative investigation, where the design of the case study is taken into account instead of the evaluation later, and the case can be studied analytically, holistically, interpreting, culturally or in mixed ways (21).

Mansheyet Nasser is located in the east of Cairo governorate on the Autostrad Road near historic Cairo. This area is one of the most crowded slums, as it suffers from severe deterioration of public facilities and services, as well as poor environmental and living conditions (25). Therefore, the Ministry of Housing, Utilities and Urban Development prepared an integrated strategy to develop slums in the Mansheyat Nasser area, by providing new housing units as alternative to the random units, as well as establishing service buildings in the area to provide the required services to the residents and to raise the environmental level and infrastructure of this area through the Greater Cairo Reconstruction Authority (9). This case study was chosen because citizens in that area did not benefit from closed service buildings and service buildings that are not used in the required manner, which will save them a lot of time, effort and cost if they move to other service buildings outside the Manshiyat Nasser area.

7.1. Definition of the Project

The project is defined in terms of its type, area, cost, duration of implementation, and the official bodies responsible for it such as the owner and the authority overseeing its implementation, the general consultant, the general contractor, the funder, the start date of construction, the completion date, cost, time and other data related to the project as shown in Table 1.

Table 1. Definition of the service buildings project for housing development in Manshiyat Nasser

Project Type Service buildings with economical housing	**Construction Start Date** July 2005
Project Site East Cairo Governorate	**Project Completion Date** July 2010
Total Area of the Project 165 acres	**Planned Implementation Period** 3 years
Total Area of Service Buildings 42 acres	**Actual Implementation Period** 5 years
Contract Type limited tender	**The Total Cost of the Residential and Service Project** 1 billion, 26 million pounds
Population Using Service Buildings 52 thousand people	**The Planned Cost of the Service Buildings** 868 million pounds
The Owner of the Project Cairo Governorate.	**The Actual Cost of Service Buildings** 945 million pounds
The Project Financiers A grant from the Abu Dhabi Fund in the United Arab Emirates in the amount of $ 162 million to establish an integrated services package to make the area fully equipped.	
General Contractor for Service Buildings Abu Al Wafa Contracting and Real Estate Investment Company	
General Consultant for the Project: - The Arab Office for Engineering Consulting - The Advisory Board (Dr. Ahmed Abdel Wareth) - Arab Consulting Engineers (Muharram Bakhoum)	
The Project Supervising Authority The Executive Agency for the Construction of Greater Cairo Projects of the Ministry of Housing, Utilities and Urban Development	

7.2. Determinants of the General Location of the Project

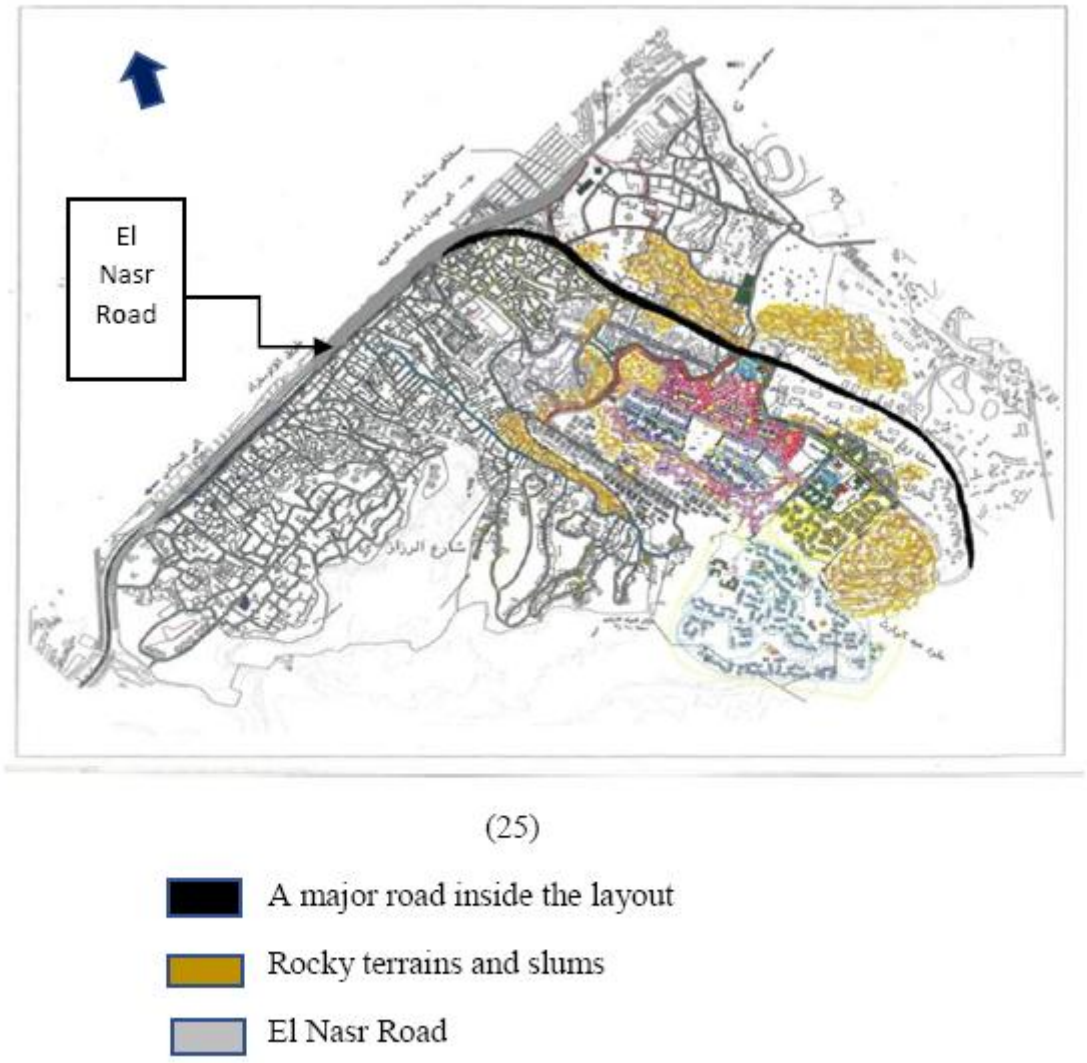
The general location of the project in the main streets and important places has been identified as distinctive signs as follows:

7.2.1. The general site is surrounded from the east and west by slums, rocky heights and steep terrain.

7.2.2. The general site is bounded to the north by Al-Nasr Road and Manshiyat Nasser General Hospital, and from the south by rocky heights.

7.2.3. There is a main street ranging in width from 25 to 40 meters branched from Al-Nasr Road that crosses the general site from the south to the north, and several secondary roads are branched from it, the width ranges between 12-20 meters (25), as shown in Figure 1.

Fig. 1. Plan showing the Layout determinants of the Nasser project



(25)

7.3. Components of the General Site of the Project

The general site of the project consists of residential buildings with a height ranging from four to five floors, and various service buildings in separate places in the general site, where the height ranges from one to two floors. Its types are classified into administrative buildings, health buildings, kindergarten buildings, cultural, sports and social buildings (youth center), commercial buildings, industrial craft buildings, religious buildings, educational buildings, police buildings, transportation centers, water tanks, a water pumping station, green areas. Central, open playgrounds, etc. (25), as shown in Figure 2.

Fig. 2. Plan showing the layout components of Manshiyat Nasser project

(25)

7.4. Determination of Service Buildings Models, Cases of Study

In this research, some models of service buildings have been identified, as study cases, on which there have been different cases of change in the operational stage as follows:

Motherhood and Childhood Care Center building

The health unit building after it was changed into a nursery

7.5. Analytical Study of Models, Case Studies

The two buildings were analyzed in the two cases of the study before and after the changes that occurred to them, and the effect of those changes was explained as follows:

7.5.1. Motherhood and Childhood Care Center Building

First: General description of the building before the change:

- The owner of this building is the Greater Cairo Authority of the Ministry of Housing and Construction.
- The building consists of a ground floor and a first floor as shown in Figures 3-5.

Fig. 3. The Motherhood and childhood care center building from the main front façade

(15)

Fig. 4. The building of the Motherhood and Childhood Care Center from both sides of the back facade and the side façade

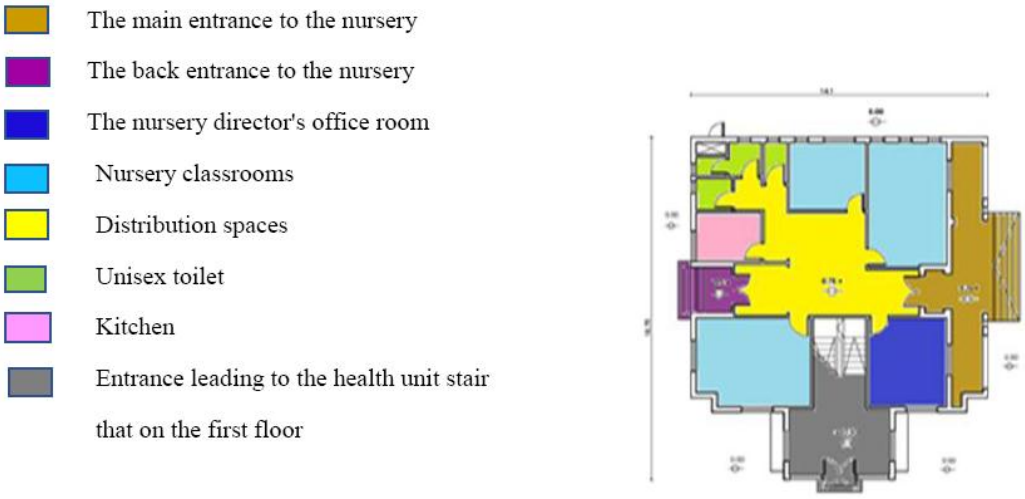
(15)

Fig. 5. The building of the Motherhood and Childhood care center from the side façade

(15)

- The National Council for Motherhood and Childhood rented the ground floor from the Greater Cairo Authority of the Ministry of Housing and Construction and was used as a nursery, while the left side is used as an entrance to the first floor.
- There was a back entrance in the back facade of the nursery on the ground floor on the side opposite the main entrance in the front facade of the nursery as shown in Figure 6.

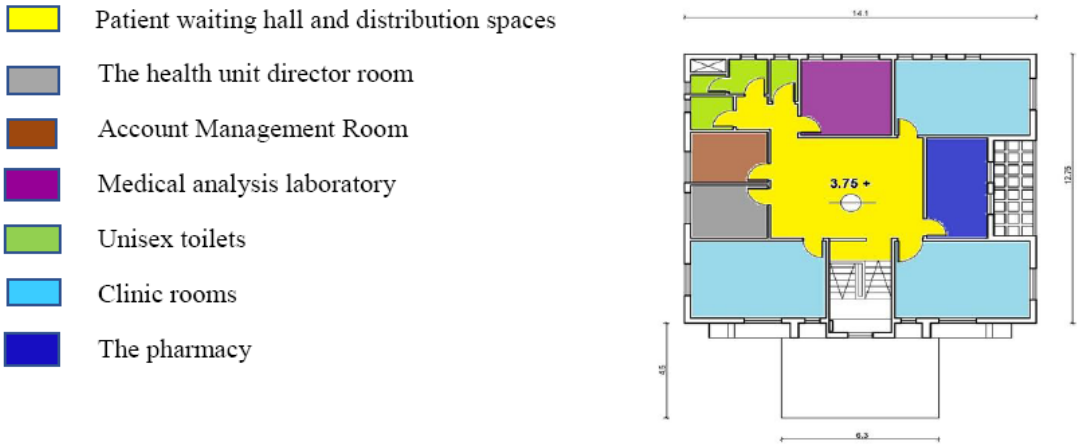
Fig. 6. Ground floor plan of the nursery in the Motherhood and Childhood care center building before the changes



(9, 15)

- As for the first floor, the Health Directorate rented it from the Greater Cairo Authority to be used as a health unit with some clinics to take care of the health of the mother, child and the people of the region as shown in Figure 7.

Fig. 7. First floor plan of the health unit in the Motherhood and Childhood Care Center building before the changes

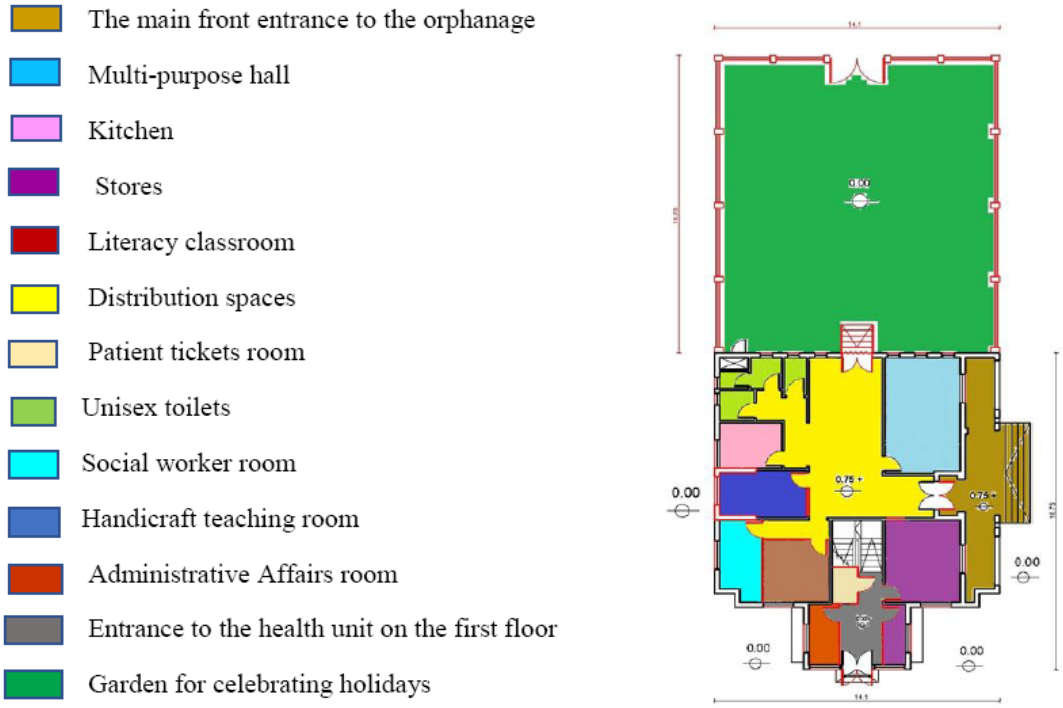


(9, 15)

Second: Actions of new changes to the building:

- The back entrance of the nursery on the ground floor has been converted into an office room, and the entrance door has been transformed into two windows. A garden for celebrations has also been added with a private entrance located next to the right-side facade of the nursery.
- The function of the ground floor has been changed to a house for taking care of street children in the morning period only, providing them with meals and making celebrations for childhood holidays after converting one of the nursery classrooms into a multi-purpose hall. Then the nursery's office was converted into a kitchen equipped to provide daily meals. Some of the nursery's rooms have also been converted into a center to teach sewing and embroidery activities and a literacy center, and it has been closed due to the lack of space and the lack of a fit between the place after the changes and the new job for it as a care home instead of a nursery.
- Three rooms were added at the entrance to the health unit staircase on the ground floor with aluminum partitions, and a room from the nursery was added to the entrance to the health unit and the door slot allocated to it was changed to be used as a drug store belonging to the health unit as shown in Figure 8.

Fig. 8. Ground floor plan of the Motherhood and Childhood Care Center building, after the changes



(9, 15)

- A change was made in the first floor of the health unit by opening windows in the pharmacy to deal with patients, and one of the toilets on the first floor was transferred to an office. Wrought protection iron was also installed as protection on all window openings to prevent thefts, looting and thuggery as shown in Figure 9. Also, a door and fixed partitions made of Wrought protection iron were installed next to it to protect the entrance of the health unit on the first floor as shown in Figure 10.

Fig. 9. First floor plan of the Motherhood and Childhood Care Center building, after the changes

Patient waiting area with a door to the entrance and a window by wrought iron

Pharmacy, two windows were opened in its inner wall overlooking the patient waiting area, and a protective wrought iron was installed

Medical analysis laboratory

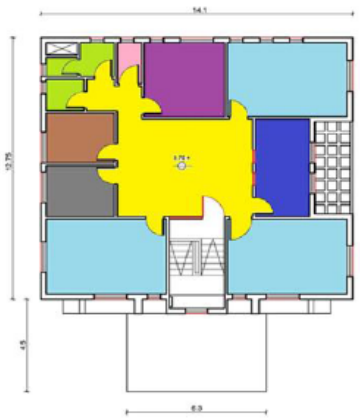
Unisex toilets

Account management room

The health unit director room

Clinic rooms

Kitchenette



(9,15)

Protective wrought iron on all exterior windows, pharmacy interior windows, health unit entrance door and window

Fig. 10. Installing wrought iron for protection at the entrance to the health unit on the first floor

(15)

Third: the effect of changes on the building:

- The ground floor has failed to be used as a nursery and as a home to take care of street children, and it has been closed and is currently abandoned.
- The small area of the entrance that leads to the stairs of the health unit on the ground floor as shown in Figure 11.

Fig. 11. The entrance to the health unit stairs on the ground floor, after the changes

(15)

- The absence of a radiology center in the health unit in the first floor, with the absence of many other specialties due to the small area of the first floor as shown in Figure 12.

Fig. 12. The small area of the health unit in the first floor

(15)

8. FUNCTIONAL ELALUATION AND TECHNICAL EVALUATION OF THE PERFOMANCE OF SERVICE BUILDINGS, IN THE TWO CASE STUDIES AFTER THE CHANGES

An evaluation of the functional performance and technical performance of the two service buildings was conducted in the two study cases after the new changes, according to the evaluation elements and their details. A general evaluation is made for each component based on the majority of the evaluation for its details. Then a grouping of assessment points is made for all the elements in the building to determine the evaluation status in which the building is classified, as there are three classifications for evaluating the building which are inappropriate, appropriate, and distinguished.

The total number of evaluation points is 26, as there are 13 evaluation elements, and assuming that the distinguished classification takes two symbols ** and is calculated by two points, and the classification is appropriate takes a symbol * and is calculated with one point and the classification is inappropriate and does not take any symbol or points. The total number of evaluation points shall be on the basis that each element received two symbols and counts with two points and is distinguished.

The scope of the performance evaluation of the building was determined by the point system according to the following:

- If the total evaluation score is from 26-20 points, then the performance evaluation of the building is distinguished.
- If the total assessment score is less than 20-14 points, the building's performance evaluation is appropriate.
- If the total assessment score is less than 14 points, the building's performance evaluation is inappropriate (15,18).

The elements are evaluated through the following details for each element according to the following:

8.1. Building Layout

- Layout selection (inappropriate/ appropriate/ distinguished)
- Layout design (inappropriate/ appropriate/ distinguished)
- Services surrounding the layout (inappropriate/ appropriate/ distinguished)
- Mass and orientation (inappropriate/ appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.2. Functional Spaces

- Entrances (inappropriate/ appropriate/ distinguished)
- Architectural spaces (inappropriate/ appropriate/ distinguished)
- Indoor and outdoor open squares

  (inappropriate/ appropriate/ distinguished)
- Designated areas (inappropriate/ appropriate/ distinguished)
- The general shape of the building (inappropriate/ appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.3. Service Spaces

- Bathrooms (inappropriate/ appropriate/ distinguished)
- Kitchenette (inappropriate/ appropriate/ distinguished)
- Horizontal transition elements (inappropriate/ appropriate/ distinguished)
- Vertical transition elements (inappropriate/ appropriate/ distinguished)
- Stores (inappropriate/ appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.4. The Outer Envelope of the Building

- Architectural formation of external facades

  (inappropriate /appropriate/ distinguished)
- Climate treatments for floors (inappropriate /appropriate/ distinguished)
- Climate treatments for exterior walls

  (inappropriate /appropriate/ distinguished)
- Climate treatments for roofs (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/

appropriate/ distinguished)

8.5. Natural Ventilation

- External wall openings (inappropriate /appropriate/ distinguished)
- Interior wall openings (inappropriate /appropriate/ distinguished)
- Ceiling openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.6. Natural Lighting

- External wall openings (inappropriate /appropriate/ distinguished)
- Interior wall openings (inappropriate /appropriate/ distinguished)
- Ceiling openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.7. Finishing Materials

- Finishing the external facades (inappropriate /appropriate/ distinguished)
- Finishing the internal walls (inappropriate /appropriate/ distinguished)
- Finishing the ceilings (inappropriate /appropriate/ distinguished)
- Floor finishing (inappropriate /appropriate/ distinguished)
- Finishing of door openings (inappropriate /appropriate/ distinguished)
- Finishing of window openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.8. Building Materials

- Reinforced concrete structure (inappropriate /appropriate/ distinguished)
- Interior walls (inappropriate /appropriate/ distinguished)
- External walls (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.9. Sanitary Installations

- Devices, fixtures and materials used

  (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.10. Electrical Installations

- Devices, wiring and materials used

  (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.11. Air Conditioning Systems

- Devices, connections and materials used
- (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.12. Security Systems

- Internal and external surveillance cameras
- (inappropriate /appropriate/ distinguished)
- Wrought protection iron for doors and windows
- (inappropriate /appropriate/ distinguished)
- Security offices (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.13. Fire Protection Requirements

- Automatic fire alarm systems (inappropriate /appropriate/ distinguished)
- Manual fire extinguishers (inappropriate /appropriate/ distinguished)
- stairs, corridors and escape doors

  (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

8.14. Roof of the Building

- The ladder leading to the roof (inappropriate /appropriate/ distinguished)
- Cover the hatch leading to the roof
- (inappropriate /appropriate/ distinguished)
- Roof floors finishing (inappropriate /appropriate/ distinguished)
- Brick fences above the roof and their finishing from the inside

  (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished), (15).

9. FUNCTIONAL EVALUATION AND TECHNICAL EVALUATION OF THE PERFORMANCE FOR THE MOTHERHOOD AND CHILDHOOD CARE CENTER BUILDING

The evaluation was made for both the functional and technical performance of the ground floor and then the first floor of the building according to the following:

9.1. Ground Floor

The evaluation was performed for both the functional performance, the technical performance of the ground floor and the general location surrounding the building according to the following:

9.1.1. Building Layout

- Layout selection (inappropriate/ appropriate/ distinguished)
- Layout design (inappropriate/ appropriate/ distinguished)
- Services surrounding the layout (inappropriate/ appropriate/ distinguished)
- Mass and orientation (inappropriate/ appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.2. Functional Spaces

- Entrances (inappropriate/ appropriate/ distinguished)
- Architectural spaces (inappropriate/ appropriate/ distinguished)
- Indoor and outdoor open squares (inappropriate/ appropriate/ distinguished)
- Designated areas (inappropriate/ appropriate/ distinguished)
- The general shape of the building (inappropriate/appropriate/distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.3. Service Spaces

- Bathrooms (inappropriate/ appropriate/ distinguished)
- Kitchenette (inappropriate/ appropriate/ distinguished)
- Horizontal transition elements (inappropriate/ appropriate/ distinguished)
- Vertical transition elements (inappropriate/ appropriate/ distinguished)
- Stores (inappropriate/ appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.4. The outer Envelope of the Building

- Architectural formation of external facades
- (inappropriate/ appropriate/ distinguished)
- Climate treatments for floors (inappropriate /appropriate/ distinguished)
- Climate treatments for exterior wall (inappropriate /appropriate/ distinguished)
- Climate treatments for roofs (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.5. Natural Ventilation

- External wall openings (inappropriate /appropriate/ distinguished)
- Interior wall openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.6. Natural Lighting

- External wall openings (inappropriate /appropriate/ distinguished)
- Interior wall openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.7. Finishing Materials

- Finishing the external facades (inappropriate /appropriate/ distinguished)
- Finishing the internal walls (inappropriate /appropriate/ distinguished)
- Finishing the ceilings (inappropriate /appropriate/ distinguished)
- Floor finishing (inappropriate /appropriate/ distinguished)
- Finishing of door openings (inappropriate /appropriate/ distinguished)
- Finishing of window openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.8. Building Materials

- Reinforced concrete structure (inappropriate /appropriate/ distinguished)
- Interior walls (inappropriate /appropriate/ distinguished)
- External walls (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.9. Sanitary Installations

- Devices, fixtures and materials used (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.10. Electrical Installations

- Devices, wiring and materials used (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.11. Air Conditioning Systems

- Devices, connections and materials used (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.12. Security Systems

- Internal and external surveillance cameras (inappropriate /appropriate/ distinguished)
- Wrought protection iron for doors and windows (inappropriate /appropriate/ distinguished)
- Security offices (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.1.13. Fire Protection Requirements

- Automatic fire alarm systems (inappropriate /appropriate/ distinguished)
- Manual fire extinguishers (inappropriate /appropriate/ distinguished)
- stairs, corridors and escape doors (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

The evaluation is calculated for the previous elements in order to determine the extent of the performance evaluation of the ground floor in building as shown in Table 2.

Table 2. Evaluate the efficiency of the performance of the ground floor of the building of the motherhood and childhood care center after the changes

Performance efficiency	**No**	**Elements of evaluation**	**Classification Of evaluation levels**			**General evaluation points of the element**
			inappropriate	**Appropriate ***	**Distinguished ****	
Efficiency of functional performance	1	Building layout		*		*
	2	Functional Spaces		*		*
	3	Service spaces		*		*
	4	The outer cover of the building			**	**
	5	Natural ventilation		*		*
	6	Natural lighting		*		*
Efficiency Of technical performance	7	Finishing materials		*		*
	8	Building materials			**	**
	9	sanitary installations		*		*
	10	Electrical installations		*		*
	11	Air conditioning systems		*		*
	12	Security systems				
	13	Fire protection requirements		*		*
Total General evaluation points of the elements						14

(15)

9.2. First Floor

The evaluation was carried out for both the functional and technical performance of the first floor of the building according to the following:

9.2.1. Functional Spaces

- Entrances (inappropriate/ appropriate/ distinguished)
- Architectural spaces (inappropriate/ appropriate/ distinguished)
- Indoor and outdoor open squares (inappropriate/ appropriate/ distinguished)
- Designated areas (inappropriate/ appropriate/ distinguished)
- The general shape of the building (inappropriate/ appropriate/distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.2. Service Spaces

- Bathrooms (inappropriate/ appropriate/ distinguished)
- Kitchenette (inappropriate/ appropriate/ distinguished)
- Horizontal transition elements (inappropriate/ appropriate/ distinguished)
- Vertical transition elements (inappropriate/ appropriate/ distinguished)
- Stores (inappropriate/ appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.3. The Outer Envelope of the Building

- Architectural formation of external facades (inappropriate/ appropriate/ distinguished)
- Climate treatments for floors (inappropriate /appropriate/ distinguished)

- Climate treatments for exterior walls (inappropriate /appropriate/ distinguished)
- Climate treatments for roofs (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.4. Natural Ventilation

- External wall openings (inappropriate /appropriate/ distinguished)
- Interior wall openings (inappropriate /appropriate/ distinguished)
- Ceiling openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.5. Natural Lighting

- External wall openings (inappropriate /appropriate/ distinguished)
- Interior wall openings (inappropriate /appropriate/ distinguished)
- Ceiling openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.6. Finishing Materials

- Finishing the external facades (inappropriate /appropriate/ distinguished)
- Finishing the internal walls (inappropriate /appropriate/ distinguished)
- Finishing the ceilings (inappropriate /appropriate/ distinguished)
- Floor finishing (inappropriate /appropriate/ distinguished)
- Finishing of door openings (inappropriate /appropriate/ distinguished)
- Finishing of window openings (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.7. Building Materials

- Reinforced concrete structure (inappropriate /appropriate/ distinguished)
- Interior walls (inappropriate /appropriate/ distinguished)
- External walls (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.8. Sanitary Installations

- Devices, fixtures and materials used (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.9. Electrical Installations

- Devices, wiring and materials used (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.10. Air Conditioning Systems

- Devices, connections and materials used (inappropriate /appropriate/ distinguished)
- Efficiency of implementation (inappropriate /appropriate/ distinguished)
- Efficiency of use (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.11. Security Systems

- Internal and external surveillance cameras (inappropriate /appropriate/ distinguished)
- Wrought protection iron for doors and windows (inappropriate /appropriate/ distinguished)
- Security offices (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.12. Fire Protection Requirements

- Automatic fire alarm systems (inappropriate /appropriate/ distinguished)
- Manual fire extinguishers (inappropriate /appropriate/ distinguished)
- stairs, corridors and escape doors (inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

9.2.13. Roof of the Building

- The ladder leading to the roof (inappropriate /appropriate/ distinguished)
- Cover the hatch leading to the roof (inappropriate /appropriate/ distinguished)
- Roof floors finishing (inappropriate /appropriate/ distinguished)
- Brick fences above the roof and their finishing from the inside

(inappropriate /appropriate/ distinguished)

(General evaluation of the element = inappropriate/ appropriate/ distinguished)

The evaluation is calculated for the previous elements in order to determine the extent of the performance evaluation of the first floor in building Table 3.

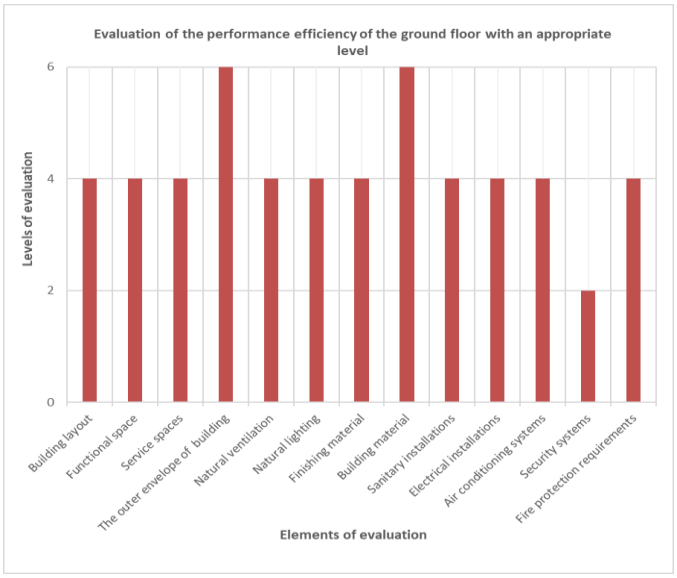
Table 3. Evaluate the efficiency of the performance of the first floor of the building of the motherhood and childhood care center after the changes

Performance efficiency	**No**	**Elements of evaluation**	**Classification Of evaluation levels**			**General evaluation points of the element**
			inappropriate	**Appropriate ***	**Distinguished ****	
Efficiency Of functional performance	1	Functional Spaces		*		*
	2	Service spaces		*		*
	3	The outer cover of the building			**	**
	4	Natural ventilation			**	**
	5	Natural lighting			**	**
Efficiency Of technical performance	6	Finishing materials		*		*
	7	Building materials			**	**
	8	sanitary installations		*		*
	9	Electrical installations		*		*
	10	Air conditioning systems		*		*
	11	Security systems				
	12	Fire protection requirements				
	13	Rooftop of building		*		*
Total General evaluation points of the elements						15

(15)

You may notice from the above that the evaluation of the performance efficiency of the building of the Motherhood and Childhood Care Center, falls at the appropriate level as shown in figures 13, 14. Therefore, a strategy is proposed to raise the efficiency of the performance of these buildings to fall between the appropriate level and the distinguished level as possible.

Fig 13. Diagram to evaluate the efficiency of the performance of the ground floor in the building of the Motherhood and Childhood Care Center after the changes

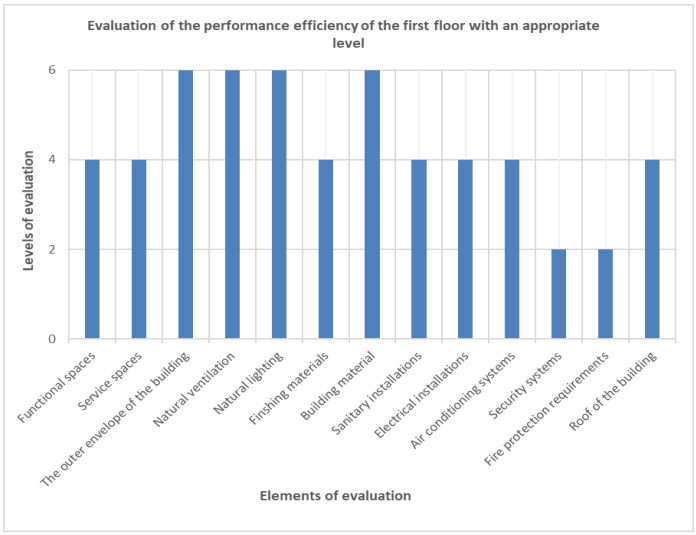


(15)

The evaluation levels were coded according to the following:

(2) Inappropriate (4) Appropriate (6) Distinguished

Fig 14. Diagram to evaluate the efficiency of the performance of the first floor in the building of the Motherhood and Childhood Care Center after the changes



(15)

The evaluation levels were coded according to the following:

(2) Inappropriate (4) Appropriate (6) Distinguished

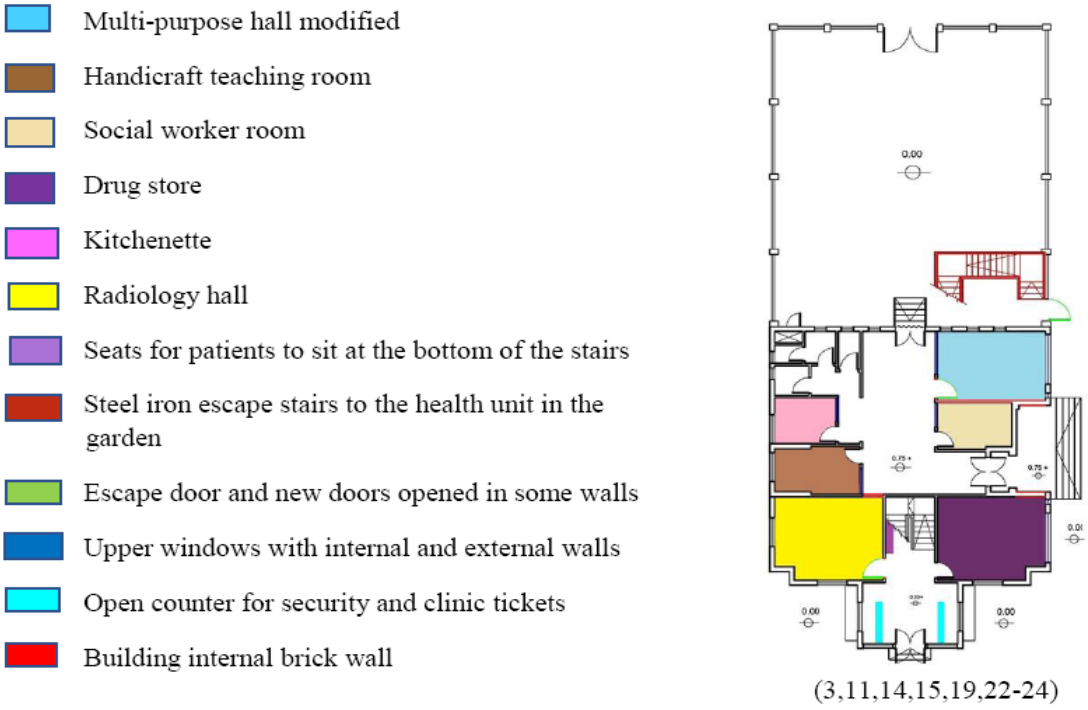
10. THE PROPOSED STRATEGY TO RAISE THE PERFORMANCE EFFICIENCY OF SERVICE BUILDINGS CASE STUDIES

This strategy includes a set of operational points such as fire safety, health aspects, beneficial use, sustainability, preservation, comprehensive design, and cost-effectiveness (16). And through which it is possible to achieve optimal utilization of these service buildings in order to raise the efficiency of both functional and technical performance, as follows:

10.1. With Regard to the Building of the Motherhood and Childhood Care Center

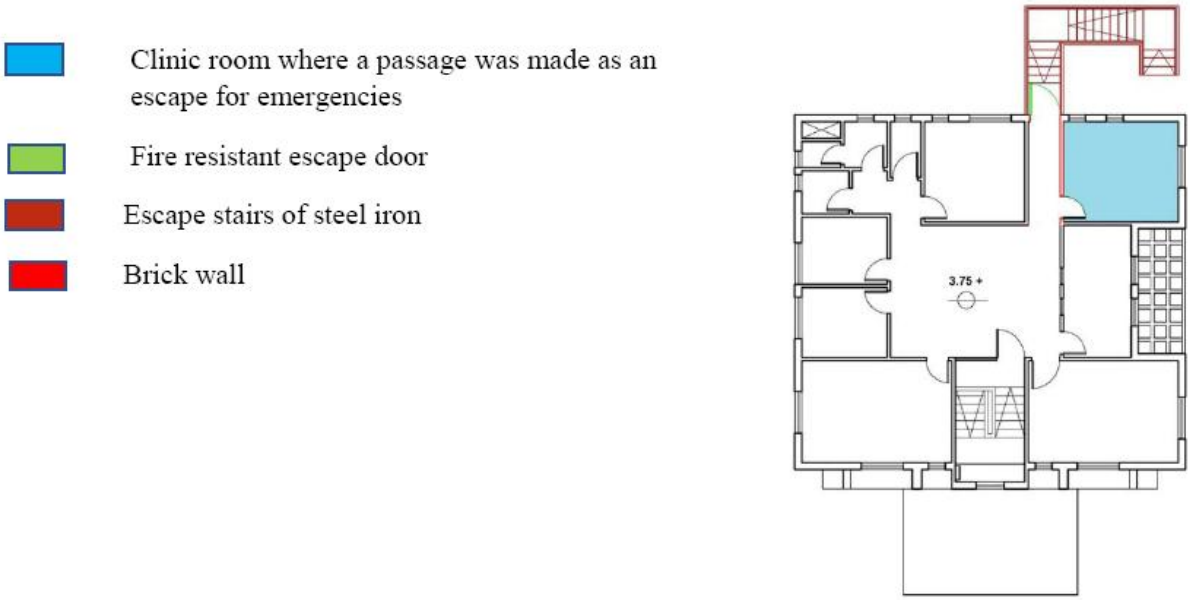
- Raising the efficiency of the services surrounding the building by addressing the responsible sovereign authorities (district presidency), (6).
- Renewal of finishes on the exterior of the building to improve the general image of the urban fabric surrounding the building (14).
- Removing the aluminum partitions in the side entrance on the ground floor leading to the health unit stairs, to expand the entrance for those visiting the health unit (19,22).
- Including some rooms in the abandoned closed ground floor in the orphan care home (formerly the nursery), such as the handicraft teaching room and the social worker's room, transforming it into a radiology hall and opening its door to the entrance to the health unit (11). And utilizing the appropriate space under the last heart of the stairs and placing some seats to sit waiting for patients, as well as building an open corner for a security office and an open corner for ticketing on the right and left with limited spaces at the entrance to the health unit on the ground floor (3,22).
- Removing random plantations in the back garden on the ground floor and re-arranging them appropriately for the required use as a garden for celebrations, with opening a door for side escapes and subtracting an area of part of it with an internal Wrought iron fence and creating an iron ladder to escape to the health unit on the first floor (3,11,23).
- Adding part of the terrace at the entrance to the main nursery to the multi-purpose hall, with moving the window opening to the outer wall, installing a door, building an internal wall to create a space for the social worker and opening a window in it. As well as annexing the other part of the terrace to the warehouse of the health unit and moving the window of the store to the outer wall of the building (3,11,19).
- Transferring the kitchen space to a room for teaching handicrafts, renewing the necessary finishes for the walls and ceiling of paints, transforming one of the three toilets into an office and equipping it with its sanitary fixtures (3,14).
- Opening upper windows in the interior walls of some rooms to increase ventilation and natural lighting in distribution spaces and corridors (11,24), as shown in figure 15.

Fig. 15. Ground floor plan of the Motherhood and Childhood Care Center building after implementing the proposed strategy



- Renewal of the finishes for the internal walls and ceilings of the orphan care home (formerly the nursery) on the ground floor if required, along with conducting the necessary tests for sanitary and electrical works to renew what is needed (14).
- Opening a corridor in the clinic room adjacent to the analysis laboratory on the first floor, building a wall, changing the opening of the clinic room door and converting the window at the end of the corridor into an escape door that opens outward on the escape stairs of an iron located outside the health unit in the back garden of the building to be used for emergency escape (3,11,23), as shown in figure 16.

Fig. 16. First floor plan of the Motherhood and Childhood Care Center building after applying the proposed strategy



- Install internal and external surveillance cameras in the building on the ground floor and first floor (23).
- Installing automatic fire fighting systems in the building on the ground floor and first floor (23).

11. CONCLUSIONS

We conclude from the foregoing that by applying the proposed strategy, it is possible to control many of the changes that occurred in the service buildings and study cases. To raise the efficiency of both functional performance and technical performance, and from these results, each of the following:

- Raising the efficiency of the functional and technical performance of these service buildings leads to their full operation, and the high level of evaluation for them is between appropriate and distinguished. After closing parts of it and operating other parts or closing it completely or leaving it abandoned.
- The optimum utilization of the architectural spaces in these service buildings leads to the comfort of the citizens and employees. While raising the level of quality of work and services.
- The provision of successful service buildings in the heart of the housing complexes of the project leads to saving a lot of time, money and effort for citizens in the event that they go to service places outside those residential communities.
- The use of thermal insulation and moisture insulation in floors, ceilings and walls reduces the heat transfer and increases the insulation against moisture, thus achieving comfort for users in these service buildings.
- Increasing the upper windows in the walls overlooking the distribution corridors leads to an increase in ventilation and natural lighting, which leads to the provision of ventilation and artificial lighting in the building.
- The application of fire protection systems and theft risks lead to providing safety for users of these service buildings, such as providing escape doors and stairs in emergency situations.
- Providing the security system and public and safe means of transportation leads to the operation of those service buildings that are located in the heart of remote areas and the citizens' interest in them and benefiting from them.

12. GENERAL RECOMMENDATIONS

- Take into account not to change the building's functions by more than one function without a detailed study, taking into account the use of specialized external advisory bodies.
- Take into account the provision of a safe system and means of safe transportation as possible, especially in remote and rugged mountainous areas.
- Take into account that there is communication between the architect, the owner and the users of those service buildings to determine their requirements.
- Taking into account the redevelopment of the facades of these service buildings to improve the general image of the urban fabric, not to distort the visual fabric, raise the morale of its workers, and improve the quality of life in that area.
- Prohibition of converting service spaces into functional spaces in service buildings.
- Prohibition of any modification in buildings, whether by demolition or construction, without the approval of the responsible sovereign authorities.

13. SPECIAL RECOMMENDATIONS

- Take into account the application of fire protection systems by providing doors and stairs to escape in emergencies in these buildings.
- Take into account the application of ventilation and natural lighting in the distribution spaces and interior corridors in the buildings, by opening the upper windows in the internal walls of the rooms.
- Take into account the application of thermal insulation and moisture insulation in the roofs of the last floors. and the external walls of the buildings shall be taken into consideration to achieve a moderate climate for the users of those.
- Take into account the application of Security systems in window openings by installing wrought iron protection in all floors, to prevent theft and to avoid children falling from the upper floors.
- Take into account the application of the surveillance systems of cameras.

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