

Enhancing the Functionalities and Uses of Fences Around Public Buildings in Addis Abeba Through an Advanced Design Approach

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Abstract

A fence is an integral part of the building and urban design but is mostly considered as a secondary development. The problem related to fence seems simple but have a huge impact on the livability of the urban environment, especially around the public buildings. One of the major problems related to fence is, it is only considered as a defensive architecture and they are structures and sculptures than space. In fact, they are necessary for the selected types of buildings for a developing country like Ethiopia, which hasn't technological advancement related to defensive architecture. This research aims to enhance the functionalities and uses of fences around public buildings by studying the functionality and the observed problems related to fences in detail. This study explores different advanced design approaches to enhance the functionality of the fence as literature. The research was conducted using a case study approach with different methods and tools such as personal observation, interview, mapping, documentation, and it analyzes through images, tables, and maps. The research finding indicated that there are different problems related to fences around public buildings such as lack of attraction, lack of design quality, not encouraging social interaction, they provide limited purpose, lack of setback, lack of integration with the urban environment, lack of integration with the building, etc. In response to those findings, the study confirms the importance of enhancing the function of fence design to create a livable and lovable urban environment through an advanced architectural approach. The respondent's and professionals' experiences and perceptions were used as input for the research. The study provides a better design approach and prepares acceptable guidelines or standards for future design to make the fence a more functional and attractive place for the public.

Keywords: Advanced design; Interactive; Social interaction; Functionality

Introduction

Fence is a defensive barrier that encloses an outdoor space, for security-related issues [1]. It is also used to defining the boundaries, shape of the land, and the extent of land [2]. Fences and boundaries are the results of the struggle of human beings to control different social issues like fears or psychological effects related to Crime [3]. The construction and its purpose are varying amongst countries, owners, and types of buildings [4]. For example: the buildings like; shopping complexes, mixed-use buildings, malls, offices, and commercial buildings, a boundary exists but, weakly defined or has no sense of territoriality. Buildings like museums, parks, and churches, the boundary will exist but should be designed approachable to users. Educational buildings like schools, colleges, and universities are defining with the strong territory. Residential buildings are owned by private owners and define with strong types of boundaries [5,6]. This paper is only focusing on fences around public buildings and spaces in Addis Abeba, Ethiopia.

The design of public buildings should not offer any form of restriction to the possible users [7]. Using unnecessary types of barriers for these kinds of spaces by the name of security will lead to a decrease in the urban quality and the building itself. The barrier design will have a negative image or consequence for aesthetical value and the welcoming quality of the building [8]. In fact, fences are necessary but the impact also should consider while designing the fence [9].

Different countries like Denmark and Singapore use fences beyond original purpose by considering fences as an urban design element. But, in the Ethiopian context, Fence design is not provided attention beyond its regular purpose and the nature of the design creates poor urban life. The fences are nothing contributing to urban life rather killing it. Different People are trying to use the fence structure even the design not allowing for such activity. This study focuses on the functionality of

fences around public buildings in Addis Abeba, the existing problems with fence architecture, and explores different design approaches includes advanced design approaches to solve the problem.

Functionality of fence around public buildings

First of all, public buildings are buildings that are mainly occupied by a public authority and frequently visited by the public. Most of the time public buildings are owned by the government or non-governmental associations (but not private owners) and provides public services. The buildings that categorized under public buildings are governmental office buildings, commercial buildings owned by the government and public, , post offices or telecommuting centers, hospitals and health facilities (not including private hospitals), public libraries, sports buildings like a stadium, religious buildings, public transit buildings, government administrative buildings like municipality building, educational buildings including's schools, colleges, and universities owned by the government, religious buildings, courthouses, banks, etc [10].

The fence will be necessary for selective types of public buildings to control access through the gate. But using unnecessary strong fence design is an issue that reduces the architectural and urban value of the

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surroundings such as reducing welcoming quality and aesthetical value. It can improve this problem by complete removal or proper design [8]. The primary function of fences for public buildings are security, access control and boundary definition but it differs among countries and building purpose. In general, this study focuses on how fences function around public buildings in Addis Abeba [11].

Research Methodology

The study was conducted in different areas of Addis Abeba, Ethiopia. The study uses a case study approach and descriptive-analytical-qualitative method to get deeper information about the problem. Public buildings located around the active area, buildings faced the main street, and a group of buildings within a compound are selected for the study. In general, seven buildings were selected for a case study based on the above criteria, including; National Museum of Ethiopia around sidist kilo, Lion Park round sidist kilo, St. Mary church around amist kilo, Yekatit 12 hospital around amist kilo, Addis Abeba Arat kilo campus around Arat kilo, Bole sub-city administration building around Megenagna, and Ethiopian red cross society around LeGare. Those buildings are samples that will represent other similar buildings in Addis Abeba.

Based on the availability of respondents around public buildings during data collection, their willingness to participate in an interview, the richness of information gathered from them, the time and budget allocated to the research, five respondents (users) and seven owners are taken for each case study buildings. Architects who are responsible for

fence design and planners also conducted an interview. The case study buildings are analyzed in different parameters in qualitative data forms and presented using images, tables, and maps. The data are analyzed using different parameters, such as physical includes; include; height, perforation, material, color, texture, and functional characteristics like security, privacy, boundary definition, access control, extra-urban function, etc.

Direct observation, interview, and document review are the sources of data for the research. The study used different software such as MS Excel, MS Word, In Design and simple graphics and presented in maps, pictures, graphs, tables, and 3D images.

Results and Discussion

Data investigated and analysed through observation

Physical and functional characteristics of type one fence: According to the data collected, there are three types of fences based on physical and functional characteristics case-study fences are categorized into three, a combination of masonry with an iron grill, solid stone, and the last one is a unique design (Figure 1) (Tables 1 and 2)

Physical and functional characteristics of type two fence (Figure 2) (Tables 3 and 4).

Physical and functional characteristics of type three fence (Figure 3) (Tables 5 and 6).

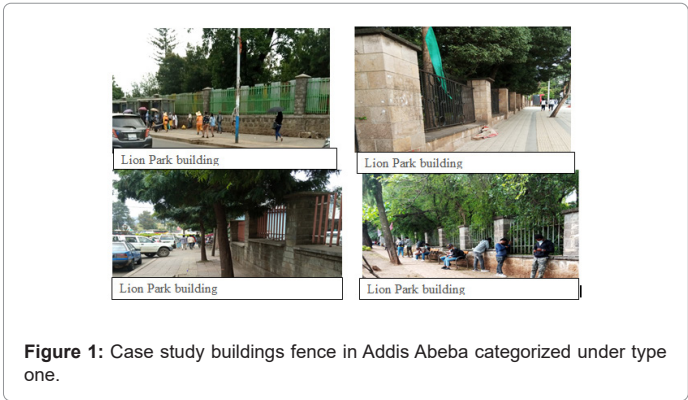


Figure 1: Case study buildings fence in Addis Abeba categorized under type one.

Table 1: Physical characteristics of type one fence.

No	Physical feature	Data collected from observation	Analysis
1	Height	2- 2.5 m	Above human scale
2	Material	Stonemasonry with iron grill on the top	The combination of materials is similar around the study area
3	perforation	1.5 -2m wide opening and the height is different.	
4	Color and texture	The solid parts are not painted and the grill parts are painted	The color selection and texture do not disturb the context.

Table 2: Functional characteristics of type one fences.

No	Function	Availability	Analysis
1	Security	Yes	The security system is not strong but the grill makes it difficult to access
2	Boundary definition	Yes	
3	Access control	Yes	The access is controlled through one gate
4	Privacy	No	
5	Environmental contribution	No	The fence nothing contributes to the environment
6	Extra-urban function	No	



Figure 2: Case study buildings fence in Addis Abeba categorized under type two.

Table 3: Physical characteristics of type two fences.

No	Physical feature	Observation	Analysis
1.	Height	2 m	Above human scale and reflect Reflects a strong sense of enclosure
2.	Material	Stonemasonry	The nature of the materials restrict visual interaction to the inside
3.	perforation	The fence is a solid wall	Visually interaction strongly restricted
4.	Color and texture	The solid parts are used natural color of the stone	The color selection and texture do not disturb the context.

Table 4: Functional characteristics of type two fences.

No	Function	Role	Analysis
1	Security	Yes	The security system is weak and anyone can access it easily
2	Boundary definition	Yes	Strongly defined space
3	Access control	Yes	Anyone access through the gate
4	Privacy	No	No visual continuity
5	Environmental contribution	No	The fence design can control dirt.
6	Extra-urban function	No	The fence is nothing that contributes to urban life.



Figure 3: Case study buildings fence in Addis Abeba categorized under type three.

Table 5: Physical characteristics of type three fences.

No	Physical feature	Observation	Analysis
1	Height	2.4m	Above human scale
2	Material	Concrete with iron mesh	Using modern material
3	perforation	Each square-shaped box has a void.	The openings allow visual continuity to the building
4	Color and texture	Light Gary and white.	Good color combination.

Table 6: Functional characteristics of type three fences.

No	Function	Role	Analysis
1.	Security	-	Anyone can easily access the building.
2.	Boundary definition	Yes	Strongly defined space
3.	Access control	Yes	The access is controlled through one get.
4.	Privacy	No	Not designed for privacy
5.	Environmental contribution	No	Nothing contributes to urban life
6.	Extra-urban function	No	Integrated with advertisement purpose

Data investigated and analyzed through the interview

Standards, laws, and Regulations related to the fence for public building: The standards, laws, and regulations were studied to know, where the problem related to fences is begun. So, study about it will help to know, whether the problem is related to the weakness of rule and regulation or the applicability (Table 7).

As the data collected from architects, there is no standard, rule, or regulation related to fence design, especially for public buildings. But as the data collected from the Addis Abeba city construction office 2/2011/30.3, the height of the fence faced to main streets shall be 150 and 90 cm-1.50 m) for the minor street with 80% transparency. But the Standard is not applicable, So the problem related to the fence would start from the weakness of law and regulation.

Types of activities taking place around public building fence: The respondents conducted for this research were those who live around the surroundings and who use the fences during data collection. The types of activities performed around the public buildings are analyzed in the following figure (Figure 4).

According to the data collected, the main activities around the public building's fence are sitting, interacting, and income-generating. From those activities, most of the respondents were uses the fence as a sitting and perform other personal interests including reading books, using the internet, or just refreshing. The bottom line is, they try to sit around the fence even the design of the fence is not designed for this activity.

Perception of the peoples on the use and function of fences for public buildings: The professional perception will help to understand the design quality and architectural concept whereas the user's preference will help to develop programming for the urban need (Tables 8 and 9)

As the data collected from professionals, provision of setback, enable fences to contribute urban life, interactive, functional varieties, make the fence beneficial for both the building and urban, etc. are the main points raised as their preference for the future. They also mentioned, the consequence when trying to incorporate the above points such as: create a place for the homeless and will cause safety and environmental

quality, especially at night.

In general, the overall findings related to the functionality of fences around the public building and the observed problems around public building fences are discussed in this part.

- The purpose of the building and the owner's need are determining the design and function of the fence.

- The main function of fences for public buildings are; access control, boundary definition, and safety.

- Fence will be necessary for a selected type of buildings in developing countries like Ethiopia which have not technological advancement related to architecture. The fence will necessary if there are more than two buildings within a compound if the building is located around active space and if access control is necessary such as schools and paid services which is difficult to control with other options.

- Peoples including Passerby and users try to use the fence for sitting, interacting, and income-generating activities, etc.

- There are different problems related to the design and the function of fence around the existing public building fence such as poor aesthetical value, no visual continuity, no green concept (not contribute to the environment), unnecessary height, not interactive or discouraging social, lack of t integration with the building and the context, not functional variety are the observed problems around public building fence (Tables 5 and 6).

- The problem related to the fence is started from the weakness of the authority.

- The existing standards, laws, and regulations have many weaknesses such as; it is not having any rules related to integration with the building and the context and the contribution to urban life.

- The design attributes future fence design including: Improving aesthetics through design, Allowing visual continuity to the building compound, Create a means of interactive environment, Providing set back, Functional variety, Enable the fences for urban contribution, Green concept integration to contribute to the environment.

Table 7: Professional response about standards, laws, and regulations related to the fence for public buildings.

No	Professionals	Standard, rule, and regulation	%	How to come up with the design
1.	Designers (Architects)	No	100	Based on the purpose of the building, owners need

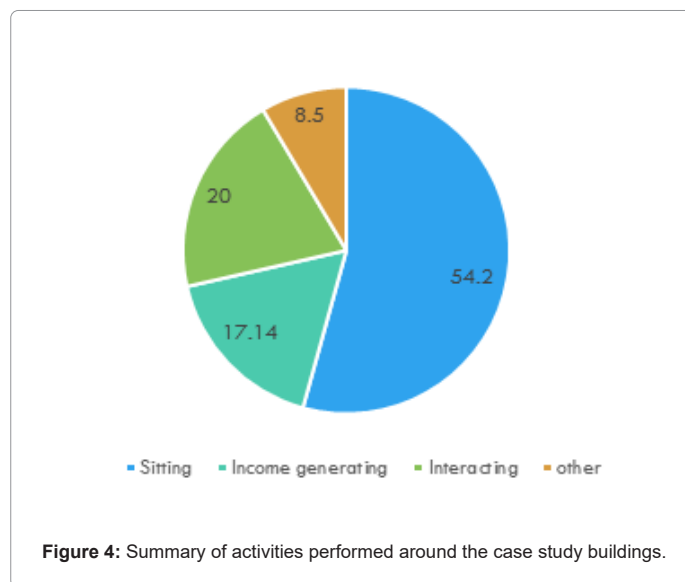


Table 8: Professional's perception.

No	Case buildings	Perception	
		Existing	for the future
1.	National Museum of Ethiopia	No setback, have not green integration with the fence, not interactive	Providing setback, integrate with green concept integration, different functions to encourage social life, interactive environment
2.	Lion Park	Have no setback, unattractive, not contributing to urban life	Providing setback, Aesthetics, view to inside, design quality, accommodation of different functions, allows social interaction
3.	Yekatit 12 hospital	No set back, not contribute to the environment, considered as secondary development	Providing setback, green concept, variety of function, integration to the building, interactive
4.	Addis Abeba University Arat kilo campus	Not attractive, functionally not sustainable, not interactive	Shade, Functional varieties or interactive, Aesthetics
5.	Bole sub-city administration building	No set back, unattractive due to the illegal market practices and the design itself, limited contribution to urban life and the environment	Providing setback, integrate the markets with the fence, sitting area provision
6.	St. marry church around amist kilo	Has not visual continuity, it is a wall, not a fence, not contributing to the environment (green)	View to the inside, reduce height, functional variety at least for the church itself, green concept
7.	Ethiopian red cross society building	No setback, unnecessary height, has no contribution to urban life	Allowing social interaction and contribute to urban life

Table 9: Perception of people around the surrounding (public buildings).

No	Case buildings	Perception		
		Existing situation		For the future
1	National Museum of Ethiopia	Negative	Have not a green concept, no proper sitting area, and shade	Green area integration, Proper sitting space, with shade
		Positive	View to the museum	
2	Lion Park	Negative	Aesthetically unattractive, not view to inside, not sitting area	Improve aesthetics, Visibility, sitting area with shade
		Positive	Green area around the fence	

3	Yekatit 12 hospital	Negative	No green concept, esthetically unattractive	Trees for shade, improve aesthetics, sitting area if possible
		Positive	-	
4	Addis Abeba University Arat kilo campus	Negative	Aesthetically unattractive,	Shade and improve aesthetics, changing the existing plant type
		Positive	Materials and fresh air from trees	
5	Bole sub-city administration building	Negative	Visually unattractive, not suitable for indirect users who try to use the fence	Avoid visual pollution due to illegal markets and advertisement board, sitting area, green concept, improve aesthetics
		Positive	-	
6	St. marry church around amist kilo	Negative	Unnecessary height, no view to the inside, visually unattractive,	Reduce height, allowing visual continuity (sometimes we try to pray outside the building, and creating a view to the church will be necessary)
		Positive	-	
7	Ethiopian red cross society building	Negative	No green concept and not interactive	Adding shade like trees or green area integration,
		Positive	The design of the fence is unique	

Conclusion

This study was made to enhance the functionalities of fences around public buildings through an advanced design approach by deeply studying the gaps or problems based on different parameters. To do that the study was investigated the existing situation of fences around public buildings and the perception of respondents. The owner's need, the purpose of the building, and the context (local guidelines) are highly affecting the design and the function of the fences. As the data collected from observation and interview, fences are designed for the purpose's boundary definition, access control, democrat the land, and somehow security. The main reason to study this is to get a better understanding of why fences are necessary for public buildings. For a country like Ethiopia which hasn't technological advancement related to the safety issue, the fence will necessary for selected types of buildings and the requirement depends on the purpose of the building, the site where the building is located, and the number of buildings within the building.

The problem related to fences around public buildings is started and developed from the weakness of authority relate to laws and regulations, the designer's point of view, and the owner's need. The architects are don't know even the existence of standards related to fences because their design is approved without any comment and interference.. Now a day different buildings especially public buildings are redesigned their fence by demolishing the old fences and improve the quality, the design concept as well as function, but still repeat some design problems. So, this research proposes a new design approach about how the fence is a redesign to meet the current and future needs by deeply studying the needs of building owners, the needs of urban, context analysis, professional's perception.

Recommendations

General

The problem related to the fence design should not be ignored, the problem seems simple but has a huge impact on the quality of architectural and urban design. So, fence design needs critical analysis before it designs and constructs. Fences should design to meet future needs. It should be designed to adopt different urban functions without eliminating the original functions and introducing a new problem. The type, design, and function of fences are determined by its, purpose, context, and design of the building. The fence is necessary for selected

types of public buildings. The fence will not necessary if only one building is within a compound. Safety and access can be control within a building using other techniques. The fence will be necessary if the compound has two or more buildings, and the building has different valuable properties within a compound such as heritage and other movable elements, and if located around an active area.

The need for policy laws and regulations

- The existing fence standard (laws and regulations) about the fence is missing the significant point about the fence design related to functional characteristics. Itt needs to prepare based on the function, the purpose of the building, and the urban need.

- The standard, laws, and regulations should incorporate under the Ethiopian building's codes of a standard to make it serious.

- The architectural team and urban planes work together to prepare the standards because the problem related to the fence affects both architecture and urban quality. The standards, rules regulations should prepare clearly. Each point in the standard, rule, and regulation part should be explained in detail.

In general, the standards rules, and regulations about the fence should incorporate the following points to shape future work.

- The fence has to be integrated with the building and the surrounding context.

- The height of the fence is, determined by the purpose of the building.

- Fences that are faced to the main streets and located around the active area should contribute to urban life by creating an interactive environment. The city development should help to build owners in terms of finances or resources.

- The fence should design to allow visual continuity.

- Public building fences should contribute to the environment (climate).

- Backspace should provide to public buildings fence that faced to the main street.

The role of architects

- Architects should consider the fence as an integral part of the building and should think as the way to think designing buildings.
- Architects should consider urban life while designing the fence because the fence will affect urban quality.
- Architects should respect standards, laws, and regulations while designing the fence, especially for public buildings.

Owners

Since public buildings are designed for public service, the owners (especially governmental) should accept interactive fences idea to make the building approachable to the public.

The role of local authorities

- Local authorities should approve the fence designs based on the standards, laws, and regulations.
- Local authorities at the woreda level should control the applicability of laws and regulations during the construction stage.

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