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Sustainable Potentials and Limitations of Using Media Façades in Egypt

Sustainable potentials and limitations of using Media Façade in Egypt

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Abstract

Media Façade is expressed in many cities by providing new attractive city images. The term 'Media Façade' is a façade that is functionally and aesthetically specific and thus it represents the integration of architecture, technology. This integration is applied to represent new form of modern art and communication (Haeusler et al., 2012). Implementing new technology such as " Media Façade "following the purpose of fashion trend or adding new stylistic feature without being well studied will cause a massive impact on architecture.

This technology " Media Façade " started to be used in Egypt in various buildings with different functions. This paper will firstly illustrate what is Media Façade then state the social, cultural and environmental impacts of these techniques by analyzing local examples using SWOT analysis.

Keywords

Mediafacade; urban screens; Digital screens; Social impacts; Cultural impact; Environetal impacts; Sustainability

1. Introduction

The introduction of video screening or illuminated cladding totally covering the facades of a building, diverts the architectural concept from placing buildings in three-dimensional space, into buildings placed in four dimension space. So as a result, the presentation of the building itself depends on vital features, which are the exterior lighting, pictorial and iconic imagery." The convergence of digital display on a building surface now places it in the fourth dimension."(Brill,2014)

Nowadays architects incorporate technology to represent the marvel of a city. Modern cities are recognized by the integration of technology and architecture. Digital façade is about viewing messages and displaying advertisements by using the building as a background, this provides a new sort of communication in urban spaces(Brill,2014). As McQuire has put it, "The migration of electronic screens into the external cityscape has become one of the most visible tendencies of contemporary urbanism." (McQuire, 2006)

This technology introduction to the urban sight has its own cultural, social, economical, physical and environmental impacts. The usage of this new type of media and technology in urban spaces developed rapidly. This resulted in attracting people to the illuminated spaces with LED screens, introducing a new form of relationship between

people and spaces producing sustainable urban space. In other words, the media display major aim is to connect people locally.

This technology can change the public perceptions. It can make historical buildings more attractive and noticeable for visitors and sequentially helping tourists in distinguishing these places from others as historical places. These dynamic facades have the central role in creating spectacular views in public spaces in addition to relating the buildings to their historical and cultural background. This new methods of digital reconstruction resemble the best way in preserving the historical and cultural aspects of cities.

Urban Screens are defined as various kinds of dynamical digital displays in the urban space. These screens are used while considering a well-balanced, sustainable urban society. The urban screens support the fundamental idea of using public space for the creation and the exchange of culture.

1.1. What is Media Façade ?

During the early twentieth century, people started using the electrical light for advertisement of products and events. Light was produced by adding light bulbs such as the citreon campaign implemented on the outer skin of the Eiffel tower to transform the passive façade into glaring façade for the building. At this time, lighting of the exterior façade was firstly used to emphasize the features of the façade. Then sequentially , the advertisements turned to be glowing signs. Afterwards, in a short time span the traditional billboards were replaced by the dynamic and super bright LED billboards such as Times Square in New York, and Shibuya in Tok yo. These squares were converted into new glaring spectacles. The increase of usage of LED screens is due to its tremendous advantages, firstly these screens have long time span, secondly, they work in low temperature zones, they also present wide range of colors. At last, LEDs help in inducing radical change in the architecture design.

Nowadays Media Façade became one of the architectural tools that tend to be used as an aesthetical element, decorating the space and creating more attractive city even at the dark. This new architectural tool was firstly used in a Non-Direct relation, (no relation between the advertisement content and the building). Generally clips or images produced for TV or internet commercials. And then a Semi-Direct relation (there is a relation between the display form and the building , however, still there is no relation between the advertisement content and the building). Finally, a fully-Direct relation (where the screening project serves the building architectural concept in addition to the main town state or event). Through this development different techniques of media façade has been merged by which some are static and others are non-static.(Fritz, 2015).

1.2. Techniques of Media Façade

There are many types of Media Facades that are used in events, commercial advertisements or even for architectural purposes. According to (Haeusler, 2009) categorized urban screens into several technical categories:

- Artistic projection is a technique implemented in old buildings to renovate the historical places and to encourage the tourism again. This illumination type is used to show the ornaments and the architectural decorations of such a building. This technique has a remarkable advantage such as, no requirement for regular maintenance and preserves energy. Video mapping is a projection mechanism that projects dynamic videos and images on irregular surfaces. Using a special software in video mapping which fits the picture to the edge to produce unconventional videos.
- Display façade: This technique is adding a dimensional screen to show advertisement videos and images.
- LED facades: The solid state semiconductor LED façade devices which afford up to 16.7 million various colors beside producing light in multi direction. It is used for exhibiting videos, images and graphics. As a result, this LED facades turned into an architectural material. It provides countless potentials for creativity to produce animated concepts for buildings.

- Mechanical facades : developed facades that react to the environmental changes by the aid of sensors to create movable facades. Consequently, enhancing the artistic and aesthetic quality to attract people.
- The use of illuminated façade perfectly illustrates the ideal role that Florescent, glow in dark features and at times ETFE material play in making a building the prime focus.
- Window Raster Animation: It is a technique the uses the lighted windows of a building as pixels to present low resolution images.
- Sustainable media façade, this technology depends on using low energy consumption materials such as using photo voltaic cells to produce its own energy to illuminate or using recycling materials.

2. Discussion

In this section we will start illustrating the social, cultural and environmental impacts of Media Façade on urban spaces and extracting criteria for analyzing the examples located in Egypt.

Social impacts

The first digital outdoor screens were used as televisions with the aim of advertising and transferring news . Afterwards, the digital screens were used for entertainment such as concerts, film screenings and sports events. Through the reaction of users by walking, sitting, watching and interacting towards the implemented techniques . Digital screens created a livable public space. Additionally, digital screens introduce and highlight the modern landmarks and this represents the technological development of the country.

Urban screens contribute to the physical environment by changing it to a livable environment due to the communication between people. Digital screens attract wide range of audiences to town centers, and support activities in spaces by extending the visitor offer beyond the normal shopping hours.

Times Square in New York City is a famous example for social public space as shown in figure (no.1). Times Square one of the most popular and highly visited attractions in the world. Throughout the whole year, Times Square is super busy with high pedestrian traffic. In Times Square various activities and ceremonies take place throughout the year such as annual New Year's celebrations. Times Square resembles the image of the city in addition to being one of the most important New York's landmarks. All citizen's demographics of different social, economical, and cultural backgrounds, age groups, etc, have equal accessibility to this public space to provide social interaction and cohesion. (Memluk, 2013)

Figure 1. Times Square, New York source: www.blogs.oracle.com

Another example is victory Park which consists of a complex of community shops, restaurants, cafes, offices, a hotel, and a broadcast studio. A plaza is formed by integrating 11 large LED video screens into the Victory Park buildings. Eight of these screens (four on each side of the plaza) move along 200-foot-long horizontal tracks, offering variety of screen configurations and creative possibilities. Combining the screens in sets of four, creates a 31' x 53′ "super screen" with HD resolution, These combined screens facilitates the promotion for the plaza activity in addition to event's promotions such as new year's celebrations. It is shown in figures no.(2).

Figure 2. The Victory Park, source: www.showandtell.com

2.1. Cultural impacts

Landmarks and historical buildings are two of the main attraction for tourism in any city. Implementing certain lighting techniques changes these attractions into new urban landmarks producing new city image.(Javadi & Dagli, 2016)

The usage of laser tagging and artistic projection to organize cultural events has proven to be the most effective way to enhance the tourism. The artistic value added to the building or to an event not only encourages tourism but also directly influences the human perception of a building.

Digital screens facilitate the spreading of historical and cultural information as these screens can be used in various ways. So the digital screens can be used to relate to touristic activities or attractions or events by this way screens promote local history and culture. This technological phenomenon — digital screens — plays an important role in influencing region's architectural identity and culture. This phenomenon helps in:

- Providing a strong connection between the identity and the meaning of the place, this link is considered one of the highest priorities in any urban context.
- Creating a lighting space through using appropriate light's color, intensity and angle of radiation to highlight the building's main components. This results in attracting a wide range of visitors and highlights the aesthetic elements of the building or the place.
- Encouraging the observational quality and promoting the experience of a site against the building's background at nighttime.
- Enhancing the historical and social values of the building by introducing new face to the historical building.
- Enhancing the country's economy due to the introduction of night visits to historical places rather than limiting visits to day time.

– Encouraging the visitor's visual perception to the illuminated buildings.

Notre Dame de Paris light show is a mere example for cultural events. The Notre Dame is illuminated to celebrate both the cathedral's enduring majesty and the centenary of World War I. The director Bruno Seillier created a 20-minute video projected on the Notre Dame, using 3D mapping and including 17 luminous images. This video conveys a great message that reminds people that the 850-year-old cathedral has survived revolutions, rioting, vandals of the two world wars. Figure (no.3) shows the illuminated façade during the event.

Figure 3. Notre Dame de Paris source: (www.npr.org)

2.2. Environmental impacts

Urban screens has a number of drawbacks on the environment, first of which it causes visual pollution. Visual pollution happens due to the light scatterings that annoys people. Secondly, night exploration is affected negatively by the too much light. Also, these screens cause electrical power wastage as only small amount of light is effective.

Another cause of negative impact on the environment is the distraction of motorists due to the excessive lighting from advertisements on roadsides and consequently may cause car accidents. Moreover, digital screens badly affects human health, screens high light intensity causes severe health problems such as glaring and distraction. Additionally, the natural life creatures are negatively affected by the introduction of the digital screens. Lastly, the amounts of nourishment's for birds decrease due to high lights spreading. The light radiations disrupt the plant's developments cycles and diverts the immigrating birds. Besides insects lives are threatened as insects die in area of open lights.

Energy consumption (Sustainability) :Urban screens consumption of energy depends on many cases. The amount of energy used by the LED screens depend on the illuminate intensity and number. Generally LEDs are very effective unless they are used in high numbers (exceeding one million units). The excessive usage of LEDs consequently increases the consumption of energy levels by accumulating or squaring. The brighter the LED screen result in larger total area and sequentially more densly packed pixels and at last higher levels of energy consumption.

In order to solve the problem of energy consumption PV cells are introduced and used on facades. These PV cells produce their own energy and help in preserving the environmental energy. For instance, green pix - Zero Energy Media Wall- figure (no.4). This breaking project promotes sustainable and digital media technology to the curtain wall of Xicui entertainment complex in Beijing, near the site of the 2008 Olympics. This great project integrated the largest LED colored display worldwide beside the first photo voltaic system into a glass curtain wall in China, as a result the buildings is turned into a self-sufficient organic system. The building collects solar energy during day time and converts into energy used for illuminating the screen after dark, mirroring a day's climatic cycle.

Figure 4. Green pix — Zero Energy Media Wall-, Beijing source: www.archdaily.com

Another solution for the energy consumption of energy is the usage of ETFE which is a polymer membrane. This membrane can be used instead of glass, as single layer or by creating inflated cushions. The cushions have various sizes shapes. Some of the advantages of the ETFE membrane material is the good transmittance, material fire resistance and the self-cleaning properties. This material was used in Beijing National Stadium (Bird's Nest/Olympic Stadium) as shown in figure (no.5).

Figure 5. Beijing National Stadium (Bird'sNest/Olympic Stadium) source www.visitourchina.com

According to the literature review above and the examples illustrated we may conclude that the social, cultural and environmental impacts of media façades are :

Table 1. Conclusion for the social , cultural and enviromental impacts of Media Facades

Social Impacts	Cultural Impacts	Environmental Impacts
· Producing Liveble Places · Presenting new landmarks · Offering various appearance for the same space	· Revive the historical places · Emphasise thebuilding'sarchitectural ornaments · Encourge tourism · Spreading the cultural awareness	· May negatively affects animals and human life · May increase the consumption of energy · The use of sustainable materials would add value to the building

3. Local Case studies

In Egypt media facade is implemented in some buildings with different functions such as cultural buildings, land marks, public buildings and social urban spaces. Moreover, these applications were used in cultural events and for advertising this will be shown in the next part of the research.

3.1. Cultural buildings

3.1.1. **Temple of Edfu**

Lighting the Temple of Horus in Edfu by the technique of projecting light towards the main gate from a distance of 70m, as shown in figures (no 6,7). Two temperature controlled cabinets encase the projectors, as these equipments s are affected by the high temperature. This technological presentation which uses the LED screens transforms the original site into an artistic space that attracts visitors from all over the world. The spectacular show narrates the historical story of the temple, the audio visual show interprets the architectural jewels of the building of the temple. The show presents a day in the life of a temple dweller, from sunrise to sunset, and tells the mythological story of Isis, Osiris, Horus and Set

Interpreting this technique of lighting encourages the tourism and spreads the culture and history of this site. Moreover, this technique enhances the country's economy due to the introduction of night visits to historical places rather than limiting visits to day time.

Figure 6. The images projected on the wall of temple of Edfu source: WWW. avstumpfl.com

Figure 7. The images projected on the wall of temple of Edfu source: WWW. avstumpfl.com

3.1.2. **The Cairo Tower**

Cairo Tower, figure (no.8) symbolizes the industrial civilization in Egypt. It was constructed between 1956 and 1961. In order to renovate this land mark again. The Egyptian government introduced color-changing LED lighting to the building's facade. This lighting system was chosen to decorate the tower's lotus-like exterior façade and sequentially enhances the building's value. The rich colors used contributed to the building's view by updating and changing its skyline in addition to creating changeable appearance for the same building. Moreover, this new technology requires minimum maintenance and consumes low energy due to the use of environmental LED lights.

Figure 8. The colorful lights of Cairo tower at night source: www.cairotower.net

3.2. Public Buildings

3.2.1. **The Egyptian Ministry of foreign affairs, Cairo, Egypt**

The Egyptian ministry of foreign affairs in Cairo utilized the 'Window Raster Animation' technique on the building's facade on January 25, 2012 for celebrating the 1st anniversary of the Egyptian revolution and for Spreading the cultural awareness. The illuminated windows illustrated texts like "January's Revolution" and "25th of January" on the facade of the building which overlooks the Nile river. Then they used the same technique to celebrate 30th June revolution as shown in fig.(no.9).

This technique preserves the architecture of the façade as there is no lights or screens added to the building but using the light of the windows as pixels. These pixels Encourage the observational quality and promoting the experience of a site against the building's background at nighttime and Enhance the social value of the building by introducing new face to the building.

Figure 9. The Egyptian ministry of foreign affairs in Cairo source: WWW. timesofegypt.com

3.2.2. **United National Bank, Cairo, Egypt**

The united national bank figure (no.10) building in Cairo introduced the first sustainable media façade which contains photo voltaic facade system and transparent LED display using lighting lines (total number of lines is 28 in total length of 1040 meters) and media screen (screen size is 8.8 m x 6.2 m, total 54.56m2). Although using photo voltaic system to produce its own energy, it causes light pollution to the surroundings.

Figure 10. The united national bank Cairo, Egypt source: WWW. palami.com

3.2.3. **The water way mall in Cairo, Egypt**

It is a commercial strip with many cafes and restaurants.LED screens about 500 m2, side view angle 120, are fixed on this commercial building. This screen turned the space into luminous place, a space which is active at night. Becoming a new urban land mark However, it has environmental limitations as its brightness causes glaring to the drivers and causes visual pollution to the surroundings. In addition, this place affects the citizen's daily life due to the heavy around the building during all day and night hours. In order to use these screens more efficiently a wider free space must be available in front of it to be more seen. The LED screen is shown in figure (no.11, 12).

Figure 11. The water way mall at the day new Cairo Egypt source: Captured by the researcher

Figure 12. The water way mall at night new Cairo Egypt source: Captured by the researcher

4. Conclusion:

Implementing such a technology raises the country's economic, cultural and social status. Therefore, the government in Egypt started using the easy techniques or types of media façade LED lighting systems according to its potentials : such as reviving the urban spaces and the historical buildings. In addition to producing new land marks that create fabulous night image for the city. Also, it helps in the development of the archaeological sites and in promoting tourism. Furthermore, this technology creates active urban spaces that attracts visitors all the day and nighttime. Regarding the environmental aspects for using LED lighting, this technology doesn't require high frequent maintenance and it does not consume high rates of energy.

On the other hand, this technology has it's some drawbacks, the brightness of the displays cause glare moreover the noise from the videos causes harm to the surroundings (humans and animals life). Furthermore, adding such displays to the building which is not integrated with the façade design may block the interaction between people inside and outside the building consequently influencing the social activity of the space. At last, the misuse of such application might lead to the local identity loss and frustration.

Table 2. The following SWOT analysis is applied on the case studies showing the following result

Criteria	Strengths	Weaknesses	Opportunities	Threats
Social	-Presenting new landmark. - Creating active urban spaces for visitors.	- Blocking the view from inside the buildings.	- Frequently changeable appearance for the same space. - Fascinated nocturnal appearance.	- May negatively affect the daily life of citizens.
Cultural	- Revive the historical places. - Highlight the ornaments and the architectural decorations of the buildings. - Used in cultural events.	- Some screens are used for advertising with no relation to the building.	- Encourages tourism.	- May cause losing of the city identity.

Continued on next page

Table 2 continued

environmental	- Using environmental materials add value to the building, introduce new sustainable materials.	- Causes light pollution if the brightness of the media façade is not well studied.	-Using ETFE membrane , PV cells or movable facades reduces energy consumption.	- May cause harm to the animals and the humans life .

5. Recommendations

According to this swot analysis on the case studies located in Egypt, strengths, opportunities, weakness and threats are derived. For achieving new successful Media Façade applications in social, cultural and environmental aspects. Its much better for the Media Façade to be integrated in the design process on architecture scale (so that using special transparent glass on windows so that at night it can work as urban screen without interrupting the visual connection between inside and outside the building) or even applying this technique on a useless façade that has no openings. And on urban scale there must be guidelines for the physical parameters surrounding the urban screens such (viewing distance, position of the screen to another one, space from the street, brightness of the screen) . To attain adding this technique.

Using the Media Façade technique to enhance the historical buildings and sequentially improving the image of the city at night in addition to flourishing the tourism in the city. The urban screens can also be used for presenting advertisements for cultural events in social urban spaces to encourage more tourism. These digital techniques generally improve the city's economical state. Although the digital screens drive many advantages in reviving historical spaces, however it is preferable to use these screens in modern cities such as New Capital, Egypt, in order to add value to the space and generally the whole city in addition to preventing the loss of identity of the old cities.

It is recommended to start introducing new environmental materials such as ETFE membrane and PV cells in Egypt as they are environmentally friendly and contribute in adding value to the building.

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