PEOPLE’S EVALUATION TOWARDS MEDIA FAÇADE AS NEW URBAN LANDMARKS AT NIGHT

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Abstract
This paper attempts to help designers to turn a building into media facade as an attractive landmark for people’s urban night life. The literature survey points towards being dynamic and interactive with observers as the two quality dimensions for implementing this emerging lighting technology. Based on a survey of eleven selected media facades using video films to 250 students and staff at a public university, results identified twelve attributes for these two qualities. However, item analysis and exploratory factor analysis of the results determined only ten attributes actually support people’s attention towards media facade. The attributes of unique landmark, different nocturnal appearance, dynamic colour, informative lighting, artistic lighting performance, on going process, and dynamic advertisement could be categorized under the visual quality dimension. On the other hand, attributes of covert interaction, overt interaction, and predesigned interaction could be categorized under the interactive quality dimension. This study contributes in prioritizing visual qualities for guiding the attractiveness of buildings’ appearances at night, hence enabling the creation of new dynamic urban spaces when designing buildings.

Keywords: Architecture; Nocturnal Appearance of Buildings; Exterior Lighting Technology; Media Façade; Sustainable Design Informatics.

INTRODUCTION
The recent history of the built and urban environment is, to a great degree, about advances in building technologies. Late nineteenth- and twentieth-century developments in new materials led to a revolutionary transformation of cities and buildings, which are not initially associated with the construction systems, but, in turn, transformed the ways in which we live and work within the built environment (Haeusler, 2009). Schieck (2006) theorizes the possibility of altering the form and dynamics of cities through the effects of technologies. The role of electricity is obvious for the architecture after dark when the value of night in modern life—as the main part of the day for spending leisure time outside—would make it notable.

Electricity is the technology that has been a source of profound wonder from the first moment of its recognition (McQuire, 2005) through its ability to increase the duration of liveability and usability of a city and hold the attention of people for a longer period (Santen, 2006). However, lighting is no longer exclusively functional but should be pleasing (Neumann, 2002) in order to follow the purpose of ‘beautification of the city’ to make a city more attractive and inviting even after dark. Therefore, the importance of lighting for urban spaces would be highly appreciated in order to keep the city dynamic for a longer period and also enhance the nocturnal scenery of the city.

Users are the key components of urban places where the physical features and architectural appearance play an important role in influencing their sense of place and the degree of attachment (Ujang, 2012). In this regard, people’s emotional responses to buildings are prominent among many personal and contextual factors that affect the assessment of the
architectural beauty and the environment in general (Nasar, 1994; Mehrabian and Russell, 1974). The facade is the face and the image of the building to the public (Nicolai, 2008), which plays a key role in the emotional and rational communication between the building and the public. Therefore, exterior façade lighting has a vital role in urban spaces and predominantly influences the environment and memories of a city at night. The possibility of programming the new lighting technology would consider the potential for architecture to go beyond the stasis of a frozen process or repetitive script (Moloney, 2007). As a result, architecture is no longer considered an unchangeable constant appearance, and, hence, the static impression of buildings is disappearing. The dynamic behaviour and the diversity of aesthetic opportunities are gradually changing the image of modern architecture (Nicolai, 2008).

According to Ujang and Muslim (2014), there is a need to enhance the attractiveness of building and spaces in the city centre of Kuala Lumpur for visual fulfilment for the pedestrian. The purpose of our study is to determine whether the emerging media facade has the potential for turning a building into an attractive landmark for people’s urban night life. The literature review in the following section covers the history of exterior lighting for building facades and develops the main concepts of media facade as the theoretical bases of this study. This is followed by a presentation case study analysis of eleven distinguished buildings from the Media Façade Festival in Berlin (2008) and London (2009), which highlight the characteristics of media façades. We later present the survey methodology of people’s evaluation towards these characteristics and the relevant analysis and results before concluding with recommendations for further studies on the use of media façades.

LITERATURE REVIEW

This study intends to determine whether the emerging media facade has the potential for turning a building into an attractive landmark for urban night life. Disregarding the studies related to the technology aspect of this phenomenon, the existing literature is reviewed for identifying the distinctive concepts of this new technology compared with the conventional approach of exterior façade lighting. From the unique dimensions of the technology, we formulate our theoretical proposition for further qualitative analysis of selected projects in order to redefine the attributes pertaining to these qualities and then evaluating people’s perception.

From Conventional Façade Lighting To Media Façade

Electric lighting began in the 1890s by introducing various forms of incandescent and arc lighting (Boyce, 2006), whilst the history of public lighting began in the sixteenth-century by using candlelight (Santen, 2006). The first systematic explorations of the possibilities for using electric light to alter the appearance and ambiance of urban space occurred in the controlled environments of the world’s fairs of the nineteenth-century (Krylov, 2008; McQuire, 2005). By that time, a new level of control over the living environment was achieved by the wide adoption of electrical systems for practical uses (McQuire, 2005). However, the first century of this invention/discovery was almost allocated to developing a system for quantifying and measuring light and also introducing many new light sources (Boyce, 2006). Over the same period, which is considered as the reign of the illuminating engineer, the focus was mostly on the science of lighting and the main functionality, safety, security, and visual task. Whereas, the new era, from about 1970, is seen as a transformation associated with a shift in emphasis from the science to the art of lighting by the rise of the lighting designer. In this regard, accentuating the architectural form of building was the most common approach in exterior façade lighting for a long time; such as delineating the outlines of buildings (outline lighting), and illuminating those features of a building that deserve attention (floodlight illumination) (Santen, 2006; Neumann, 2002).

Most recently, a new dimension has been applied in façade lighting design, which belongs neither to architecture nor lighting, as they were traditionally understood. The new level of exterior
lighting for building facades appeared through the use of computer-based technologies in the 1980s, since when there has been an increasing revival and renewed interest in artificial light as an artistic tool (Neumann, 2002). This has become possible due to the proliferation of transparent and highly reflective surfaces and the new ways of illuminating the cityscape. In relation to this, the new environment is progressively characterized by the overlap of the material and immaterial and urban surfaces function as illuminated screens in the modern city (McQuire, 2005).

Media facades are an innovative trend in the world of lighting design, which emerged through a combination of striking lighting design and interactivity (Lighting Academy, 2006b), in order to influence people psychologically and “tickle the user’s joy button” (Delores, 2000). Based on Frenchman (as cited in Lighting Academy, 2006a), this new lighting is integrated, programmable and interactive. While being integrated with the urban functions and able to satisfy demands on the spot of people, lighting has to be programmable according to the users’ wishes and thus, facilitate experiences in the urban space, changing contents, moods and messages. It should also be interactive as it responds directly to people and the environment. Therefore, lighting is no more simply lighting but becomes information. Striking the attention with interactivity is the key concept of media facades, which is expressed through dynamic lighting (Lighting Academy, 2006b). An interactive relationship between the user, the building and the city can be created by applying media architecture as a spatial and temporal programming of light (Vermang, 2007). Therefore, interaction with the surrounding environment and its inhabitants is the unique dimension of this technology. According to the significance of connectedness, interactive installations fill an important role in engaging people with architecture and connecting them with others (Knapp, 2007).

From another perspective, artificial light, which allows a building to be illuminated, and can underline parts of the building and create an atmosphere by using different colours and brightness, is considered as “light architecture” by Haeusler (2009). In the following respects, media architecture differs from light architecture and the important difference here is the dynamic aspect. Media architecture includes all aspects of displaying dynamic graphics, dynamic text, dynamic image and spatial movement. In other words, the projection of a light source on a surface, such as a lamp, would be classified as light architecture whereas the integration of a moving graphic, text or image is classified as media architecture. Schieck (2006) believes that the moving images as architectural surfaces play a critical role in our understanding and evaluation of the new form of architectural space. Therefore, the dynamicity is the other unique characteristic of the new technology of exterior lighting.

Our literature survey reviewed also the contents and design purposes of media facade by considering “dynamicity” and “interactivity” as the main dimensions. There is not one single goal that media facades try to achieve so that different contents are offered (Alt et al., 2012). Media facade’s contents that have been employed in urban displays are categorized in a broad range of possibilities. For example, where Diniz et al. (2012) point out aesthetical, information, adaptive landscape, and community reflection or mediation as different categories, Vande Moere and Wouters (2012) only focus on commercial, artistic or entertainment purposes. Haeusler (2009) demonstrates that media facades are regarded as a multipurpose design due to the variety of its possible contents, such as illumination only, text and/or graphic with different resolutions, and different formats of video. It provides a living canvas for public art, a brave new tool for advertising and branding, and innovative ways for designers to interact with large-scale built environments (Knapp, 2007). Media facades are early manifestations of architecture adapting to an information rich society by mediating between the physical and information space (Moloney, 2006). However, most large public displays have been used for conveying information to passers-by through their one-way information channels (Peltonen et al., 200) which merely present them as visual displays. Today’s urban space is not mediated by just the current levels of visual display, rather should be considered with interaction and communication (Townsend, 2004).
Thus, media facade contents can be reviewed and analyzed based on the degree of user engagement. In this regard, media architecture would be considered as a field that comprises physical structures utilizing digital media to broadcast information to their immediate vicinity, passively or interactively (Vande Moere & Wouters, 2012).

This theory is also supported by media facade classification into expressive and interactive categories. “Expressive display” is the term used by Park et al. (2011) for those media facades without any interaction with users and environments. Designers and artists are the main creators of such digital contents to inform and entertain urban dwellers through uni-directional communication in visually diverse formats; such as video, animated text, and graphics (e.g. African Pavilion, BIX, Spots, and Uniqa Tower projects). Compared to the more wide-spread, passive public screens, “interactive media facades” not only provide an interface between the media and the audience but are designed to facilitate interaction in response to changing conditions in their surroundings and handling variations on audience flow and engagement at real-time (Hespanhol & Tomitsch, 2012). In this regard, the artist is not the sole creator, rather often plays the role of a mediator or facilitator for audiences’ interaction (e.g. Tower of Wind, and Allianz Arena projects). “Reactive” could be defined as another form of content in which content is not fixed and changed based on data collected from environmental stimuli; such as weather, lighting conditions, sounds, user movement, traffic density, population density, and other socio-cultural quantitative data (Park et al., 2011). Even though people can play a role in some types of reactive content, but their interaction with the media facade is unintentional without awareness about their role. In other words, people have the opportunity to decide and influence only the interactive contents of media façade, but not its expressive or reactive ones.

From our selected literature survey, the paper found that being dynamic and interactive are the two main concepts differentiating the new trend from the conventional approach of exterior façade lighting. Hence, we are proposing that dynamicity and interactivity could attract the public towards the urban spaces that a building belongs to at night. Therefore, it is critical to identify the attributes of these dynamic and interactive exterior lighting features to support novel entertainment, information seeking, and social discourse in a way that involves and attract urbanites. In this regard, the study had proposed a qualitative case study analysis of the selected buildings to identify the dynamic and interactive attributes of media facade in the first step, and then a questionnaire survey to determine the people’s evaluation of them and accordingly towards such a new landmark at night.

**METHODOLOGY**

This study carried out a mixed-method (Creswell, 2007) research approach involving qualitative and quantitative methods in order to design a research process for investigating new exterior facade lighting and determine the potential for increasing the attractiveness of the nocturnal appearance of buildings, and thus creating new dynamic urban spaces.

First, a collective or multiple case study (Stake, 2005) was employed for concentrating qualitatively on a single phenomenon (Media Facade) through which the study aims to uncover the interaction of significant factors characteristic of the phenomenon (Cronbach, 1975). In this sense, the samples were chosen purposefully from which the most can be extracted (Patton, 2002). Maximum variation (Creswell, 2007) was considered for initial sampling among the media facades introduced in the international conference of Media Architecture in London (2008) and Berlin (2009). The process of analysis included two stages, within-case analysis and cross-case analysis (Yin, 2008). While the study started with the most information-rich cases (Patton, 2002), it continued until nothing new was being added, and, therefore, a sample size of eleven was determined based on the saturation point (Kumar, 2005). Table 1 illustrates the information of the buildings, which were selected as the final samples.
In the second part, a questionnaire-based survey was used as a tool for data collection (Kumar, 2005). It was designed based on the findings of the first part. This self-administered questionnaire was developed in two languages—Bahasa Melayu and English—for enabling the researchers to achieve better feedbacks from the respondents. In order to measure how people perceived the quality of the new exterior lighting for building facades, respondents were asked to rate each of 12 statement items using a 7-point Likert scale (1 extremely disagree - 7 extremely agree). The 12 statements represent the 12 characteristics found from the earlier qualitative part. Since the respondents needed to watch a video film before filling up the questionnaires, a suitable place was considered to gather a number of participants for each session. For ease of the research, a laboratory survey of a sample population at a public university was considered.

A total of 250 respondents were selected based on a systematic sampling among local students, lecturers and staff of a public university to represent the Malaysian population. The validity and reliability of the instrument design were considered through different steps; the questionnaire was drafted based on the literature and first qualitative analysis of the phenomenon, and then discussed with the supervisory committee to review it. Moreover, participants of the pilot study were asked to assess the questionnaire to gauge for clarity and validity of items in terms of content and construct. The scale used in every question and statement in the questionnaire was tested on its reliability by using Cronbach’s Alpha. We discuss the results and analysis below. Ultimately, the conducted statistical analysis (Item Analysis and Exploratory Factor Analysis) on the results of the questionnaire survey and further discussions on the interpretations provided an adequate basis for the final conclusions (see Figure 1).

Figure 1. Data collection and analysis steps of the employed research methodology (Source: Authors).

RESULTS AND ANALYSIS

Characteristics of Media Façade
This section presents the results of our qualitative analysis on eleven selected buildings, which have media facades (see Table 1). The study found twelve characteristics: uniqueness landmark, different nocturnal appearance, dynamic colour, informative lighting, artistic lighting performance, on-going process, match content with building, permanent Installation, dynamic advertisement, covert interaction, overt interaction, and predesigned interaction. All the found attributes are related to dynamicity and interactivity as the main dimensions. Their attributes are supported by relevant literature mentioned following Table 1 below.
Table 1: List of buildings having media facade for the study (Source: Authors).

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Location</th>
<th>Year</th>
<th>Description – Building Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Uniqa Tower</td>
<td>Vienna, Austria</td>
<td>2004</td>
<td>The headquarters of insurance company</td>
</tr>
<tr>
<td>2. African Pavilion</td>
<td>Saragossa, Spain</td>
<td>2008</td>
<td>The pavilion of the African countries</td>
</tr>
<tr>
<td>3. Dexia Tower</td>
<td>Brussels, Belgium</td>
<td>2006</td>
<td>An office building</td>
</tr>
<tr>
<td>5. BIX</td>
<td>Graz, Austria</td>
<td>2003</td>
<td>A museum</td>
</tr>
<tr>
<td>6. Spots</td>
<td>Berlin, Germany</td>
<td>2005</td>
<td>An empty office building</td>
</tr>
<tr>
<td>8. Channel Ginza</td>
<td>Tokyo, Japan</td>
<td>2004</td>
<td>A leading, luxury and historic fashion brand</td>
</tr>
<tr>
<td>9. Galleria Store</td>
<td>Seoul, South Korea</td>
<td>2004</td>
<td>A department store</td>
</tr>
<tr>
<td>10. Allianz Arena</td>
<td>Munich, Germany</td>
<td>2005</td>
<td>A stadium</td>
</tr>
<tr>
<td>11. Tower of Winds</td>
<td>Yokohama, Japan</td>
<td>1986</td>
<td>A ventilation for an underground shopping centre</td>
</tr>
</tbody>
</table>

Uniqueness landmark

In contrast with ambient lighting, which favours uniform lighting (Hanyu, 1997), exterior lighting would make buildings stand out from their neighbours (Warson, 2007). Non-uniformity has been reported as a preferable characteristic in interior lighting (Flynn, 1988; Hendrick et al., 1977; Flynn et al., 1973), and it could be generalized to the new approach in exterior façade lighting with the purpose of attracting people’s attention. In this regard, the most common attribute of using media façade is altering the structure of the building to an outstanding edifice and distinctive in its vicinity or on a bigger scale, which could be a town, country or even the world (Figure 2).

Different nocturnal appearance

Unlike the conventional approach in exterior façade lighting, the media façade is somehow independent from architectural form, structure and detail. They cause different nocturnal appearance of a building emerging at night compared to its daytime appearance (refer Figure 3). In this aspect, these media façades present different views of a building at night, which would not have been experienced with the conventional exterior façade lighting approaches. Such as, the effects of outline lighting or floodlight illumination. The results support Neumann’s (2002) opinion that since artificial light could never compete with daylight, any attempt to give a forced daytime appearance of buildings at night is rejected. Therefore, the study finds the collaborative potential
between digital designers and architects for enhancing or altering the structural image, while creating a new identity in the darkening sky.

Figure 3. Independence of Uniqa Tower exterior lighting to the building structure.  

**Dynamic colour**

Colour is also defined as one of the visually perceived factors in conventional exterior lighting for building façades (Masuyama, 2003), which has become one of the most effective commanding factors by removing the cornice in modern architecture (Neumann, 2002). Colourful lighting as the main and basic factor in attracting people to buildings at night would be more prominent in media façades due to the possibility of continuous change based on the programmed pattern (Figure 4).

Figure 4. Different colour for exterior façade lighting of Galleria Store.  
(Source: http://www.unstudio.com/projects/galleria-department-store)

**Dynamic advertisement**

The dynamic character of contents for media façades has good potential for advertising purposes in that they could direct people’s attention towards a specific product or process (Figure 5). Since dynamic images can offer much more than a static image, which often stays on the level of a sign (Haeusler, 2009), media facades are now introduced as an important tool for advertisers by reaching the primary goal of attracting and bringing people together to visualize certain themes and values (Lighting Academy, 2006b). The dynamic potential of this technology means it is not
boring and repetitive, and, as a result, time-based media would take a leading role in broadcasting art through a commercial and advertising base (Kumra, 2006).

Figure 5. Chanel Ginza store presenting different advertising contents relevant to the Chanel brand.
(Source Left: https://mgbarahona.files.wordpress.com/2011/09/chanel_tower.jpg
Right: http://www.deankaufman.com/worka/imgs/img07.jpg)

**Ongoing process**

The dynamic character of content in media façade transforms the building from static status towards a dynamic one, which brings a further characteristic to the building appearance. According to Dorin (2001), who illustrates ‘painting, acting, and gardening’ as ‘fixed, repetitive and ongoing’ approaches in the process of creation, conventional lighting is presented as a fixed process while media architecture could be offered as repetitive (Figure 8) or ongoing (Figure 6). However, contingency and unpredictability play a greater role (McQuire, 2006) for the contents, which are defined based on the received information from the environment or people’s participation.

Figure 6. Tower of Wind lighting reacts to the direction and the force of the wind and surrounding noise.
(Source: http://www.archdaily.com/344664/ad-classics-tower-of-winds-toyo-ito/)

**Permanent Installation**

Even though the media have to be an integral part of the architecture, media façades could be seen as an additional option to the conventional building shell in order to extend the ways of expressing architecture (Nicolai, 2008). In this respect, the investigated media façades are
categorized into two different groups, those designed to have media as an integral part permanently (e.g. Spots), and the ephemeral ones, which present media content for limited periods of time or in specific events (e.g. Blinken Lights). Media Facades, either permanent or temporary, could be applied based on the existing conditions and desired purposes.

**Artistic lighting performance**

Lighting design is a combination of an art and a science, and, therefore, designers should be concerned not only about the aesthetics, but also about the digital world and the latest technical knowledge. While the mastery of new technologies influences the production of art, twenty-first century artwork is dominantly formed by employing computers. Hence, ‘Kinetic Art’ as the new interpretation and use of light and motion (Popper, 1993) enables designers to exert an influence on the public to such an extent and becomes one of the most noticeable factors in the new approach of exterior façade lighting (Schieck, 2006). Therefore, being aware of the progress in science and the art of lighting seems inevitable to create a new architecture, which is responsive to the needs of our age (Neumann, 2002). As a result, Media Facades provide a living canvas for public art for designers to interact with large-scale built environments (Knapp, 2007) (Figure 7).

![Figure 7. Artistic performances in BIX (Left) and Spots (Right).](http://realities-united.de/#PROJECT,69,3; Right:http://realities-united.de/#PROJECT,81,3)

**Matching content with building**

Since cities have recently become more and more engaged in the struggle against a feeling of ‘placelessness’ (Struppke, 2006), relevance of content to the context is another highlighted criterion (Figure 8). Media Facades have a social responsibility and a civic function beyond advertising, and, accordingly, should not be considered just as video billboards for rent (Velicescu a.c.f. Popper, 1993). The narrative on the façade should be expressive of the building, its architectural stance and its interior (Sauter, 2007), as irrelevant content fails to obtain the appreciation of the surrounding community (Knapp, 2007). If the content of media facades bears no relation to the building or the place where it is located, not only may unavailing media architecture arise, but also poor advertisements (Tscherteu, 2008). The paper agrees with Struppke (2006) that the consideration of the locality and site-specificity of such screens could help to prevent further disconnection in the perception of urban space.
Informative lighting
Due to the ability of being networked and conveying information, such architectural surfaces as visual interfaces become a medium of communication in the age of information (Knapp, 2007; Schieck, 2006). This potential for communication gives architecture a dimension other than the purely decorative due to computation and sensing, which are moving from computers and devices into the environment itself (Sparacino, 2002). One way communication is a unique characteristic of architecture adapting to an information rich society by mediating between physical and information space. In this regard, this kind of surface could respond to changing contexts, such as environmental and socio-cultural (Moloney, 2007), and could present the information in different visual forms while being decoded by observers (Figure 9). The result is an “augmented space” referring to the physical space, which is overlaid by dynamic data (Manovich, 2006).

Overt interaction
The immediate effect on media facade could be accomplished in another form of interaction when a distinctive platform/kiosk or medium is considered for the interaction. In such cases, the action is generally not about playing or texting by personal devices but making decisions on the colour and pattern of the geometric shapes for being displayed on the façade concurrently. The difference of this attribute with the previous one is its performative perspective which makes such interaction interesting not just for those who are involved but also for the other spectators. In this respect, pedestrians could easily show their impression on the lighting appearance by changing...
the colour or graphical forms based on their favourites and others’ recommendations (Figure 10). The idea of participation and interactivity between the artist and the general public would be considered as the most noticeable factor of this lighting technology (Schieck, 2006).

![Figure 10. A platform in Dexia Tower allows instant changes of the colour and pattern of lighting by the public. (Source: http://www.mediaarchitecture.org/dexia-tower-brussles/)](image)

**Covert interaction**

Entertaining is the quality that amuses visitors through different approaches, such as playing simple games or sending text onto building facades (Figure 11). Tscherteu (2008) believes that the biggest potential for the identification of occupants with media architecture consists of an interactive media concept, through which the users are given different possibilities to communicate with the building itself. In this respect, the two-way communication would enable people to become involved with the building and its content. Since this participation is mostly about spending leisure time to have fun with personal cell phones, it could play a vital role in attracting people. The main point here is doing the interaction, not in a performative way where others usually notice the result not the interaction itself.

![Figure 11. (Right) Playing simple graphical games on Blinken Lights façade through cell phone; (Left) Easy use program enables people to design different animations for the project. (Source: http://blinkenlights.net/project)](image)

**Pre-designed interaction**

There is another opportunity for people in the public domain of having communication with media façades. While this is not an immediate interaction with this kind of buildings, each person who is
interested in designing any content for a media facade have the opportunity to simply download the software, which is presented by the lighting designers of the building. After the proper contents, which mostly include simple graphic forms are designed, they would be sent to the building by the users. Accordingly, they would be presented in the allocated time. It seems that the possibility of interacting with a facade by designing its content appeals to a whole urban population not only the individual users (Tscherteu, 2008).

**Influential Factors Based on People Evaluation**

The following section now presents the results of the succeeding quantitative survey research methodology for the study. The study had hypothesized that the attributes of the emerging media facade have potential in attracting people towards the buildings as an attractive landmark for urban nightlife in Malaysia. In this respect, item analysis and exploratory factor analysis were applied to define latent dimensions for better understanding of people’s evaluation towards media facade.

<table>
<thead>
<tr>
<th>New Lighting Attributes</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniqueness landmark</td>
<td>63.4792</td>
<td>52.605</td>
<td>0.611</td>
<td>0.827</td>
</tr>
<tr>
<td>Different Nocturnal Appearance</td>
<td>63.3912</td>
<td>53.473</td>
<td>0.671</td>
<td>0.826</td>
</tr>
<tr>
<td>Dynamic Colour</td>
<td>63.1520</td>
<td>55.446</td>
<td>0.580</td>
<td>0.833</td>
</tr>
<tr>
<td>Informative Lighting</td>
<td>63.4876</td>
<td>54.613</td>
<td>0.455</td>
<td>0.838</td>
</tr>
<tr>
<td>Artistic Lighting Performance</td>
<td>63.6152</td>
<td>51.528</td>
<td>0.655</td>
<td>0.824</td>
</tr>
<tr>
<td>Match Content with Building</td>
<td>63.9792</td>
<td>55.221</td>
<td><strong>0.290</strong></td>
<td><strong>0.852</strong></td>
</tr>
<tr>
<td>Ongoing Process</td>
<td>63.5840</td>
<td>52.328</td>
<td>0.655</td>
<td>0.825</td>
</tr>
<tr>
<td>Permanent Installation</td>
<td>63.9552</td>
<td>53.702</td>
<td>0.336</td>
<td>0.851</td>
</tr>
<tr>
<td>Dynamic Advertisement</td>
<td>63.6296</td>
<td>51.915</td>
<td>0.572</td>
<td>0.829</td>
</tr>
<tr>
<td>Covert Interaction</td>
<td>64.1380</td>
<td>49.743</td>
<td>0.471</td>
<td>0.842</td>
</tr>
<tr>
<td>Overt Interaction</td>
<td>63.6696</td>
<td>51.250</td>
<td>0.609</td>
<td>0.826</td>
</tr>
<tr>
<td>Pre-Designed Interaction</td>
<td>63.7064</td>
<td>53.246</td>
<td>0.553</td>
<td>0.831</td>
</tr>
</tbody>
</table>

**Item analysis of new lighting technology**

This part further analysed the 12 identified potential lighting characteristics to capture the domains of new nocturnal lighting technology. After careful inspection of the 12 item content for domain representation, 2 items (match content with building, and permanent installation) with low corrected item-total correlations (.29 and .34, respectively) were deleted (Arnold and Reynolds, 2003; Tian et al., 2001). While the Cronbach’s Alpha was .845 for the measurement with 12 items, Table 2 shows that deleting each of these two aforementioned items resulted in increasing the reliability of the measurement. It is concluded that since the data were collected in laboratory conditions, these two items do not seem to be clear to the respondents while they would be more apprehensible when respondents are familiar with the building and experience the environment in the real world. Therefore, even though both of these characteristics have been removed in our study, their impact on people could be comprehended in future studies conducted in the real world context. Thus, the item analysis resulted in a pool of 10 items retained for further analysis.
Exploratory factor analysis of new lighting technology

Following the item analysis, the item content for each domain representation was inspected. The remaining 10 items were subjected to a series of exploratory factor analyses with varimax rotation to reduce the set of observed variables to a smaller, more parsimonious set of variables. While examination of the Correlation Matrix reveals fairly high correlations between the ten items, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.899) illustrates a meritorious acceptance by exceeding the minimum requirement value of 0.6 (Tabachnick and Fidell, 2007; Pallant, 2005). In addition, the significance value of Bartlett’s Test of Sphericity (p<0.05) in this study, indicated that the data set of distributions was acceptable for conducting factor analysis (Ho, 2006; Pallant, 2005).

Since the appropriateness of the data was ascertained by the results of the preliminary analysis, the study proceeded with a factor analysis procedure (Hinton, 2004). In this respect, the eigenvalues criterion and variance explained (Hair et al., 2010) were used to specify the number of factors that should be extracted. In this way, the result of exploratory factor analysis with varimax rotation, which was delineated by Principal Component Analysis (PCA), reveals the presence of a two-factor structure with eigenvalues of 1 or greater (Ho, 2006). In this study, the 10 items yielded two components, which were able to explain 58.79% of the cumulative variance, whilst the total variance for each component was 34.63% and 24.16%, respectively (Table 3).

Varimax rotation with Kaiser Normalization was used to clarify the factor loadings into a certain dimension, considering .4 as good rule of thumb for the minimum loading (Hair et al., 2010). Examination of the factor loadings shows that all of the ten variables loaded highly (>0.40) on the two factors representing the new lighting qualities, without any significant cross loadings (Table 3). Furthermore, examining the communality criterion (Garson, 2009) shows that they range from .50 to .68 and no low communalities (less than .40) need to be dropped. However, although they could not be considered as high communalities due to the values that are not greater than .80 (Velicer and Fava, 1998), the range of .40 to .70 are more common magnitudes in social sciences (Costello and Osborne, 2005). Finally, according to Costello and Osborne (2005), both of the extracted factors were considered acceptable with more than two items.

Table 3: Results for New Lighting Technology Dimensions (Source: Author).

<table>
<thead>
<tr>
<th>Extracted Factors for New Lighting</th>
<th>Eigenvalues</th>
<th>Variance Explained</th>
<th>Item Means</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attributes (Reliability Alpha)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1: Visual Quality (.85)</td>
<td>4.76</td>
<td>34.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1: Uniqueness landmark</td>
<td>.75</td>
<td>5.96</td>
<td>.97</td>
<td></td>
</tr>
<tr>
<td>V2: Different Nocturnal Appearance</td>
<td>.74</td>
<td>6.04</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>V3: Dynamic Colour</td>
<td>.71</td>
<td>6.28</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>V4: Informative Lighting</td>
<td>.71</td>
<td>5.95</td>
<td>.97</td>
<td></td>
</tr>
<tr>
<td>V5: Artistic Performance</td>
<td>.68</td>
<td>5.82</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>V6: Ongoing Process</td>
<td>.55</td>
<td>5.85</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>V7: Dynamic Advertisement</td>
<td>.65</td>
<td>5.81</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Grand mean</td>
<td></td>
<td>5.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2: Interactive Quality (.72)</td>
<td>1.11</td>
<td>24.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I1: Covert Interaction</td>
<td>.82</td>
<td>5.30</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>I2: Overt Interaction</td>
<td>.78</td>
<td>5.77</td>
<td>1.11</td>
<td></td>
</tr>
<tr>
<td>I3: Pre-Designed Interaction</td>
<td>.71</td>
<td>5.73</td>
<td>.98</td>
<td></td>
</tr>
<tr>
<td>Grand mean</td>
<td></td>
<td>5.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Variance</td>
<td></td>
<td>58.80%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the next step, each factor was named based on the characteristics of its composite variable. The first factor contained seven items and was labelled, “Visual Quality”, because all of them are related to the visual aspect of nocturnal appearances of buildings. Visual quality represented an important aspect of the new lighting technology, which is mostly influenced by its dynamic characteristic. Transforming the immutable appearance of architecture to the changeable and dynamic performance is the major visual difference between the new lighting technology and its former ones. The seven items in visual quality comprised uniqueness landmark, different nocturnal appearance, dynamic colour, informative lighting, artistic lighting performance, dynamic advertising, and ongoing process; all of which were visual characteristics of the new lighting technology in the creation of an aesthetic and attractive atmosphere. As expected, “Visual Quality” captured a larger variance of the characteristics of new lighting technology compared with the other dimension, accounting for 34.63% of the total variance.

The remaining variance (24.16%) is expressed by the second factor, “Interactive Quality”, which included different forms of interactivity that could happen between the buildings and the people. As discussed in the literature review, interactivity is the other significant concept that is considered as a distinction between the new and conventional type of lighting. In this study, “Interactive Quality” featured three attributes – covert interaction, overt interaction, and predesigned interaction – all of which pertain to the two-way interaction between the observer and the building. In different levels and degrees, the role of the people is changed by these possibilities from only observer into an effective factor in what is displayed on the buildings.

**People’s evaluation of two different qualities of media facade**

Respondents positively rated all items of the lighting attributes, where grand means (see Table 3) indicated that both of the dimensions (Visual Quality and Interactive Quality) were consistently highly rated (5.60 and 5.96). Interestingly, all the items belonged to the visual qualities were assessed as relatively positive at higher than 5.80: uniqueness landmark (M=5.96, SD=.97), different nocturnal appearance (M=6.04, SD=.81), dynamic color (M=6.28, SD=.71), informative lighting (M=5.95, SD=.97), artistic lighting performance (M=5.82, SD=1.02), ongoing process (M=5.85, SD=.94), and dynamic advertisement (M=5.81, SD=1.09). Despite occupying a lower place in ranking by interactive quality items comparing with visual quality items, these items are also highly rated, at equal or higher than 5.30: covert Interaction (M=5.30, SD=1.52), overt Interaction (M=5.77, SD=1.11), and pre-designed Interaction (M=5.73, SD=.98). Thus, the findings confirm the hypothesis that the emerging media facade has enough potential in turning a building into an attractive landmark for people.

In the final section, the study intends to compare the level of people’s interest towards different aspects of media façades. Therefore, a paired sample t-test was performed to determine whether or not there is any significant difference in people’s mean interest towards the visual and interactive quality of media architecture. The results indicate that the mean score of the respondent’s interest towards the interactive quality of media architecture (M=5.60, SD=0.98) was significantly lower than the mean score of the respondent’s interest towards the visual quality of media architecture (M=5.96, SD=0.68), t(250)=6.99, p<.05. The 95% confidence interval for the mean difference between the two mean scores was .26 to .46 (Table 4).

The effect size calculated using eta squared was .16 indicating a large difference in mean scores of people’s interest towards visual and the interactive quality of media architecture. In this respect, the findings show that respondents were more interested towards the visual quality of media architecture compared to the interactive quality of this phenomenon. Even though social embarrassment has been discussed as the main reason of peoples’ hesitance to interact with such systems (e.g., Bedwell and Caruana, 2012; Chen et al., 2013; Finke et al., 2008; Tomitsch et al., 2014), preferring the visual qualities rather than interactive qualities needs to be explored and examined in future studies.
CONCLUSION
This research employed mixed method research methodology to determine whether the emerging media façade has potential in turning a building into an attractive landmark for people’s urban night life. The result of first qualitative part is identifying the twelve potential attributes of new exterior façade lighting to enhance a building’s role in its urban space. Eleven buildings with media façade were analyzed resulting in identifying twelve potential attributes of the new exterior façade lighting to enhance the building’s role in urban space. Then, the following public questionnaire survey revealed people’s high positive tendency toward such buildings. Therefore, the identified attributes are considered as potentials to attract people toward these new urban landmarks and accordingly influence people attachment towards such urban spaces at night.

Further statistical analysis showed that new exterior façade lighting could be assessed and explained based on their visual and interactive dimensions. Even though the findings show that people are interested in both dimensions of media façades, visual quality has significantly captured more attention compared to the interactive quality. However, the role of interactive qualities of media façade is undeniable supporting scholars’ perspective (e.g. McQuire, 2006 and Struppek, 2006) about the enhancement of urban spaces livability through changing the law-abiding consumers to pro-active citizens. With such positive inclination towards interactive qualities of media façade in engaging people with the system and built environment, the authors are recommending further research on the different effects of these two dimensions on people’s interest and intention towards media façade. In this regard, the study would like to recommend further study on utilizing these new found attributes for developing an environmental psychology model about people’s perception towards this kind of modern urban spaces at night. The results from this study are expected to help designers to increase the attraction of buildings in Malaysia to attract more people at night thus making new nocturnal landmarks in urban spaces. The study supports Ibrahim and Meor Razali’s (2013) recommendation in advancing the content of designed products in sustainable product development.

REFERENCES


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