THE INTEGRATION OF TALL BUILDINGS WITH THE URBAN ENVIRONMENT: CONSIDERING THE KEY SUSTAINABILITY CONCEPCTS

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Abstract

As a result of physical, social and economic needs, demand for tall buildings is increasing worldwide. Due to their great size and large impacts on the urban environment, tall buildings, through careful design and urban integration, have the potential to improve the quality around them. Also, depending on their large area of influence, design considerations regarding sustainability and environmental integration of tall buildings need to be handled with more care than with other conventional buildings to provide the most positive impact.

This study focuses on the physical and social environmental impacts of tall buildings where these impacts are examined through determined ‘key sustainability concepts’. The identified relevant ‘key sustainability concepts’ reveal the positive or negative, physical and social environmental impacts of tall buildings. These key sustainability concepts provided to be an observational tool to conduct a study on existing or new tall buildings, from the architectural scale to the urban scale.

As a demonstration of its effectiveness on the urban environment, the defined key sustainability concepts of two tall buildings located in London, ‘The Shard’ and ‘30 St Mary Axe (Gherkin)’ were selected and compared through site analysis and survey methods. With this study, the possible negative and positive effects of tall buildings both on architectural and urban scale have been revealed through a physical and social sustainable approach.

Keywords: Sustainable Tall Buildings, Environmental Harmony, Sustainability Concepts, Architectural Scale, Urban Scale.

1. INTRODUCTION

Tall buildings can have both negative and positive impacts on the urban environment both physically and socially; they should be designed with consideration of basic parameters that satisfy both their structural requirements and ideally the requirements of the sustainable built environment. The harmony between a tall building and its environment is an important concern that should be handled together. Researches in the field of tall buildings and their sustainable capabilities identify important design issues in different scales from urban scale to architectural scale. Location, site organization, transportation, urban skyline, material selection and façade design, entrance floor design, vertical design and the urban microclimate are some of the fundamental concepts that should be considered in order to define the boundaries and intersection points of a tall building and the city. These key concepts should be used when identifying the negative and positive impacts of this building. The aim of a tall building design should be; minimizing damage to the existing built environment and expanding the usable space provided by its current physical footprint on the site. Benefits are not just provided for a tall building itself, but also make it more livable, and give it better current and future harmony with its urban environment.

It is also important to identify that tall buildings are not always elements which negatively affect the physical and social urban environment. Positive impact can be achieved via the correct strategy of design and suitable construction of a tall building on the existing urban texture. Analyzing tall buildings
according to defined key sustainability concepts enable us to conceptualize the topic of ‘sustainable and environment friendly tall buildings’.

The building’s perception of users’ can transform from a solid concrete structure to an active city element with social considerations. This study uses case studies to review the differences and common points of the impacts of the design of tall buildings. Investigating a wider range of tall building cases by using the key concepts presented in this study, and hence providing a wider range/variation of results, would provide a more robust pattern for revealing the physical and social impacts of tall buildings on their surroundings. A better understanding of this pattern can shape the thinking of sustainability for existing or new tall buildings on their urban environment; this pattern highlights critical design strategies that can strengthen the sustainable integration of tall building design within the existing urban fabric.

1.1. The Definition of ‘Tall Building’ and its Necessity within the Urban Environment

There is no precise definition of a tall building. But it can be said that, tall buildings are structures with more story than other building types and are buildings that have the power of giving an ‘identity’ to a city and reshaping its skyline. Tall buildings are differentiated from other structures or buildings in their surrounding environment by their height, proportion and shape. There are many names given to tall buildings such as; very tall buildings, super-tall, mega structures, skyscrapers and etc. In general, structures higher than 300 meters are called as ‘super-tall’ and above 600 meters height these buildings are called as ‘skyscrapers’.

The reason for constructing tall buildings and their rise in cities came into being due to several kinds of necessities, such as social, cultural and economic. Tall buildings are usually very noticeable in their environments, and their solid appearance can add a powerful reflection onto the city. Given their scale and visibility, tall buildings’ form and orientation can have a dramatic impact on the urban prospect, both positively and negatively (Strelitz, 2011). Besides their impacts on the urban environment, their functions are also very important for satisfying urban needs. According to Ali et al. (2007, 395), tall buildings have important functions in meeting specific urban needs as follows; commercial business, residential, industrial, institutional, public assembly, special purpose and multi-use.

The physical urban environment makes it possible to build such structures; if there was not any a suitable ground for constructing, designers and engineers would not be able to easily construct but also ‘think’ about designing tall buildings. In each phase of urban design (renovation, restoration, rehabilitation, renewal or gentrification and etc.) construction of a building is always a new additive on the city. Together with planning and determining the design principles at the initial phase comes the focal point of its integration with the city.

1.2. The Harmony of Tall Buildings with the Urban Environment

The harmony between a building and its environment is an important dialogue that should be assessed, evaluated and calculated together when having specific solutions through sustainable architectural design considerations. It is not always possible to create healthy urban environments without considering the surrounding and the tall building as two separated concerns. This is why the harmonization of all of these factors enables us to better define the relationship between tall buildings and their urban places in different scales.

A suitable location can create more convenient and sustainable urban places on the ground for buildings as well as it can strengthen the relation between the building and the environment. Montgomery (1998) puts forward the importance of a good city; as one that is the best designed, managed and developed. The author also states that, these situations create a legible city within a complexity. A legible city makes anybody feel comfortable with their living space as they are conscious of where they are going and to which direction within urban areas. Being comfortable and relaxed can be provided only with correct and balanced physical arrangements of urban materials such as; buildings, streets, landscape patterns, landmarks and etc. Tall buildings can be involved within this idea by being constructed and conditions on suitable site locations with right decisions of architecture; so, tall buildings can become a reference for people living in the city.

Social and cultural theories should also be discussed; “The urban quality must be considered in much wider terms than the physical attributes of buildings, spaces and street patterns” (Montgomery, 1998: 95). A conceptual diagram by Canter (1977) is given by Montgomery (1998) regarding on nature of places:

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**Figure 1. A visual metaphor for the nature of places - Canter, 1977 (Montgomery, 1998)**
Not only physical structures provide and present well quality of urban places. The harmony of physical and social actions both create the urban environment; as shown in Figure [1] ‘physical attributes’, ‘perceptions’ of human beings and ‘activities’ altogether work together to create ‘places’. From this point of view, the relationship between a tall building and the urban environment is an extension of the relationship between the human (as the city dweller) and the building. Where city dwellers do not accept the idea of a tall building within their ecosystem, this issue may become the most important problem due to their everyday use of the urban environment. The city must be legible for inhabitants in order to live in a harmony.

1.4. A Sustainable Perspective: The Environmental Impacts of Tall Buildings

In our modern day, sustainable design became a method for tall buildings that to perform well in current time and the future. When sustainability for buildings is considered in long-term, this situation is usually associated with the buildings’ physical energy efficiency (energy consumption, material usage and etc). However it must be looked beyond this concept and the harmony and integration of the building with the environment should be assessed. Further, besides physical considerations of a tall building sustainability also needs to be viewed from the social harmony perspective. Sustainability, and the creation of sustainable tall buildings, goes far beyond just energy use and even broader environmental considerations (Oldfield, 2012, 6). Meeting the needs of environmental, economic and social concerns are separate objectives, however are all jointly satisfied through a sustainable approach. Sustainability is "about improving quality of life" (Sutton, 2000). For better urban environments the social side of the perspective must be issued; tall buildings can adapt to both physical and social environment.

As it is very difficult to meet all of the physical and social requirements of a tall building design, the harmony between a building and the urban environment should be configured according to specific mutually-supporting principles of sustainable urban and architectural designs. Successful sustainable approaches require the fulfillment of high expectations of all design strategies both in physical and social phases in order not to lose its reliability towards future.

2. Material and Method of The Study

2.1. The Key Sustainability Concepts

The physical and social requirements of sustainability create a balance between the building and the environment. To achieve a degree of sustainability in a building, the following critical concepts are important to consider; "site context, environment, structure and use of materials, energy consumption, use of water, ecological balance, community development" (Ali and Armstrong, 2008, 3). It is necessary to have design principles that achieve a healthy balance between the building and the environment. Whereby buildings have to be evaluated according to their environmental performance, and be designed and constructed according to city planning regulations and urban design considerations. Tall buildings can host more people than low rise buildings for the same footprint area on the site. Constructing a high or low rise building is still a choice depending on designer, requirements given by employer and function of the building. According to Aksamija and Ali (2008), a suitable choice can be made by considering various factors; the availability of land, balance between public and private transport, population pressures, planning and development regulations, the availability of urban services, existing infrastructure, future plans. These factors are in a harmony with each other, for example; transportation systems and existing infrastructure affect the site organization and land use where urban services are provided by transportation facilities. For this research study, the selected key sustainability concepts for the physical and social integration of the urban environment and a tall building are; site selection, site organization, transportation, urban skyline, façade design, entrance floor, vertical design and urban microclimate. These concepts were chosen because of their compatibility with tall building design strategies;

Site Selection,

Key concept points;
- Site analysis,
- The relation of the new tall building with the surrounding physical structures (height, form and mass),
- The relation of the new tall building with the surrounding context (historical heritage, open areas, public spaces and etc.).

Site Organization,

Key concept points;
- The integration of the building with the physical, social urban environment and street life (contribution on physical and social facilities),
- The relation of the new tall building with the surrounding physical structures (height, form and mass),
- Public access to the site and existence of pedestrian areas,
- The relation of the public spaces within the site with the surrounding urban places,
• The visual impact of the tall building on the surrounding historical views or landmarks in considering its settlement within the site,
• Vehicle services.

Transportation,
*Key concept points;*
• Contribution of the building on the transportation network system,
• Existence of underground subway stations within the site,
• Ease of pedestrian accessibility to the site,
• The variety of the building functions and its effects on the usage of public transportation.

Urban Skyline,
*Key concept points;*
• The importance of the height,
• The improvement on the urban skyline,
• The impact of a tall building on historical structures, sites or buildings within the skyline,
• A different approach; becoming a district composed of tall buildings within a city,
• A new view from the tall building or a new view through the new tall building? (Contribution on the existing skyline).

Facade Design,
*Key concept points;*
• Providing a social screen on the street level,
• Transparency,
• Providing energy from natural sources,
• Intersection pattern between the outside and inside environment of the building.

Entrance Floor,
*Key concept points;*
• Height balance of the entrance floors with the surrounding built environment,
• Relation with facade design,
• A transition pattern between the inside and outside environment (a connection sense),
• Welcoming people by creating public spaces on entrance floors (increasing the sociality and physical usage)
• Necessity of creating wide open areas around the entrance floor, plaza
• Architectural contributions to strengthen the connection of the building and the urban environment,
• Providing several entrances for different functions.

Vertical Design,
*Key concept points;*
• Indoor circulation,
• Atrium and inner garden designs within the building,
• The usage of green within the building,
• The vertical connection between the inside and outside environment.

Urban Microclimate,
*Key concept points;*
• Sunlight access on the site (a barrier or reflective?),
• Creating wind corridors/tunnels,
• Effect of the building on climatic conditions on the ground Level.

2.2. Selection of Case Study Buildings

Tall buildings in London are generally located in different clusters in separate districts, mainly in financial and commercial districts. These tall buildings are directly built into the urban heritage texture, making it possible to see tall buildings populated near historical structures. London is continuously rejuvenating itself with design and construction of new, modern buildings. The density of tall buildings in London increases when one gets closer to financial/commercial districts.

The Shard and 30 St Mary Axe buildings are used as case studies for comparison. The Shard and 30 St Mary Axe are located in districts that are used by dense flow of people due to their functional purposes. These areas support much kind of needs of the people (commercial, educational, health care, offices and etc. Thus, the reasons for selecting The Shard and 30 St Mary Axe can be listed as;
• The intensive usage of the area by people,
• The functional differentiation of the two buildings,
• The contrast of the two buildings’ architectural, environmental, functional and social considerations,
• This selection may enable one to derive different results although the buildings belong to the same city,
• This selection may enable to configure separated empirical observation platform to discuss,
• The variable usage of different population groups,
• The differentiation of districts,
• Different usage in different hours in day.
2.3. Case Study Building I: The Shard (London Bridge Tower)

The Shard is a multi-functional building 310 m. in height, which includes offices, residential apartments, hotel (Shangri-La), restaurants and observatory view floors of London. London city skyline has been redefined with construction of The Shard building. The building is located in the central area of London (London Bridge).

Sustainable approaches are taken into consideration with this building; The Shard is designed through environmental and sustainable criteria; sustainability requirements of this tall building have been provided with advanced technological methods in construction.

2.4. Case Study Building II: 30 St Mary Axe (Gherkin)

Commonly referred to as the “Gherkin”, the 30 St Mary Axe is an office building that is located in the central financial district area in London. It is surrounded by several office buildings where public activity areas are in a walking distance. 30 St Mary Axe is 180 meters in height with including offices, a restaurant & bar at the top roof floor with a 360 degrees view of London, private dining rooms and a lobby floor which is only for members. The building is located in the Bank district of London where several tall buildings surround the area.

2.5. Method

There are two methods used while conducting the study which are the ‘analysis’ and the ‘survey’ methods. The results have been obtained by both observational site analysis and survey questionnaire. Observation remarks were mapped onto observation maps, to create the image of the case study buildings sites. All results obtained from the analysis are primary qualitative observational sources as the site location was visited and observed first-hand for each building separately. The results contain qualitative data concerning; height, function, façade designs and material selections, vertical design and circulation, modern and technological appearances within their neighborhood, locations, transportation on site, their microclimatic effects, land uses, the design of their entrance floors (by means of creating physical and social urban areas), their impacts on the pedestrian life, public spaces around and social interaction facilities.

2.5.1. Site Analysis

The site analysis was made through key sustainability concepts (Site Selection, Site Organization, Transportation, Urban Skyline, Façade Design, Entrance Floor, Vertical Design and Urban Microclimate). Besides, architectural, urban and environmental features are considered during observation. Architectural features include investigations on architectural form and shape, height, function, façade design and material selection, vertical design, modern and technological appearance of the tall building. Secondly the urban features include examination of; urban skyline, location, transportation and urban microclimatic effects of the tall buildings. Finally, the environmental features include observations concerning; land use, entrance floor design (the integration with the outside open area), pedestrian realm, creation of public spaces and social interaction of users. This method is necessary for making a complete analysis about the conditions of these buildings within their locations in London and will give qualitative data about the case studies. The surveys are conducted and resulted in accordance with site analysis.

2.5.2. Survey
In order to achieve a reliable comparison and valuable results for two different case studies, 40 questionnaires were completed by participants. More participants were able to answer questions about The Shard and 30 St Mary Axe;

- All of the 25 participants (of which 12 were onsite and 13 online) answered questions for the Shard.
- 15 of the 25 participants (of which 10 were onsite and 5 online) answered questions for the 30 St Mary Axe.
- Therefore the 25 participants answered a total of 40 questionnaires (22 of them on site and 18 online).

3. Results of Site Analysis & Survey

3.1. Comparison of Observational Site Analysis Results of ‘The Shard’ and ‘30 St Mary Axe’

A comparison table has been achieved for every key sustainability concept separately depending on the considerations and analysis made on site. In order to achieve a full observation of each key sustainability concept a set of criteria (as shown in the observation checklist column of Table 1) for each key concept were selected. The comparisons are expressed with a scoring scheme from 1 (poor) to 5 (excellent) points expressed with dots; 1 (poor), 2 (below average), 3 (average), 4 (good), 5 (excellent).

The comparison tables are given below:

Table 1. Site Selection; the site analysis comparison of The Shard and 30 St Mary Axe

<table>
<thead>
<tr>
<th>Observation Checklist</th>
<th>The Shard</th>
<th>30 St Mary Axe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence of public places within or near the site</td>
<td>*****</td>
<td>***</td>
</tr>
<tr>
<td>Existence of other tall buildings within the surrounding area</td>
<td>**</td>
<td>*****</td>
</tr>
<tr>
<td>Existence of historical heritage within the surrounding area</td>
<td>*****</td>
<td>**</td>
</tr>
<tr>
<td>Accessibility for pedestrians to the area</td>
<td>*****</td>
<td>*****</td>
</tr>
<tr>
<td>Visual impact of the building on any historical sites or buildings nearby</td>
<td>*****</td>
<td>***</td>
</tr>
<tr>
<td>The accessibility of the Thames River from the site for people</td>
<td>*****</td>
<td>***</td>
</tr>
<tr>
<td>Height harmony of the building with the surrounding built environment</td>
<td>*</td>
<td>***</td>
</tr>
</tbody>
</table>

The Shard building is located in an area where social and public facilities can be brought in to the site. This case is also supported by strong pedestrian circulation through the site. The distance to the River Thames is very short and the access comfortable when compared with 30 St Mary Axe. The surrounding tall building zone. The Shard is a totally new and modern building by means of height, form and social contributions within the district.
transportation network with the development of the ‘London Bridge Station’. Correspondingly, this makes the area more usable for the public and holds the area lively with a social circulation. Both buildings are within a walking distance of underground subway stations. As long as, the pedestrian route connections are much stronger for The Shard project area than 30 St Mary Axe zone; the existence and creation of public places within the site strengthen this situation. Further, The Shard’s site selection and multifunctional purpose make it a stronger of a social hub for the people. So, The Shard building area is always used by people and the effect of the existence of London Bridge Station on this case is effective.

Table 4. Urban Skyline; the site analysis comparison of The Shard and 30 St Mary Axe

<table>
<thead>
<tr>
<th>Observation Checklist</th>
<th>The Shard</th>
<th>30 St Mary Axe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height of the building</td>
<td>310 m</td>
<td>180 m</td>
</tr>
<tr>
<td>Effect of the height/shape on the skyline</td>
<td>•••••</td>
<td>••••</td>
</tr>
<tr>
<td>Potential of the building being a landmark of London</td>
<td>•••••</td>
<td>••••</td>
</tr>
<tr>
<td>Existence of viewing galleries or terraces for watching the city skyline</td>
<td>•••••</td>
<td>Only for occupants</td>
</tr>
<tr>
<td>Power of its visuality in affecting the historical city skyline</td>
<td>•••••</td>
<td>••••</td>
</tr>
<tr>
<td>Existence of any important historical landmarks on the nearby city skyline</td>
<td>•••••</td>
<td>••••</td>
</tr>
<tr>
<td>Contribution of the building on the city skyline (view from the top of the building)</td>
<td>•••••</td>
<td>••••</td>
</tr>
<tr>
<td>Contribution of this building on the city skyline (view from street level)</td>
<td>••••</td>
<td>••••</td>
</tr>
</tbody>
</table>

The height and the shape of both buildings include architectural and technological challenges. Although The Shard building is significantly higher than 30 St Mary Axe, the urban skyline key concept was equally investigated for both buildings, as they both affect and improved the urban silhouette. The Shard building is located in an area which has a critical viewpoint on historical buildings. 30 St Mary Axe is not in a location for being a harmful structure on historical urban skyline. Although The Shard’s location near historic heritage makes its impact on the urban skyline a more sensitive issue than with 30 St Mary Axe, the observations show that The Shard as succeeded in being a positive potential landmark, despite this arguable disadvantage.

Table 5. Façade Design; the site analysis comparison of The Shard and 30 St Mary Axe

<table>
<thead>
<tr>
<th>Facade Design</th>
<th>The Shard</th>
<th>30 St Mary Axe</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sense of transparency of the building depending on its material usage</td>
<td>•••••</td>
<td>••</td>
</tr>
<tr>
<td>Façade material selection in considering a sustainable approach</td>
<td>•••••</td>
<td>•••••</td>
</tr>
<tr>
<td>Transmission of natural light through the building</td>
<td>•••••</td>
<td>••••</td>
</tr>
<tr>
<td>Use of transparent material on the façade covering the first floor floors and giving a sense of continuity between the interior and exterior of the building</td>
<td>••••</td>
<td>••••</td>
</tr>
</tbody>
</table>

The Shard building gives better sense of transparency when compared to 30 St Mary Axe. Also, the transition of the sunlight within the building is more perceptible within The Shard building because of the usage of transparent glass on the envelope. Additionally, the visibility of the first floors from outside makes The Shard be ‘in’ the city and collaborate with the street life; this situation could not have been observed for 30 St Mary Axe. However, it must be noted that, 30 St Mary axe having been located amongst tall buildings has a disadvantage in its ability to receive natural sunlight, in comparison to The Shard. As the glass used on the skin of The Shard building, gives a better the sense of lightness and reflects light onto its piazza, the physical effects of the building’s façade is felt more than with 30 St Mary Axe. Furthermore, The Shard building has a differentiation at the first 4 floors which people are able to see the interior of the building where 30 St Mary Axe do not provide this kind of a transparency and so a relation with the outside area.

Table 6. Entrance Floor; the site analysis comparison of The Shard and 30 St Mary Axe

<table>
<thead>
<tr>
<th>Entrance Floor</th>
<th>The Shard</th>
<th>30 St Mary Axe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of entrances</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Number of entrances for the public</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Sense of connectivity of the building with the outside environment</td>
<td>•••••</td>
<td>••</td>
</tr>
<tr>
<td>Height of the base building in comparison with nearby buildings</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Separation of public and service entrances</td>
<td>•••••</td>
<td>•••••</td>
</tr>
<tr>
<td>Availability of public spaces within the entrance area</td>
<td>•••••</td>
<td>•••••</td>
</tr>
<tr>
<td>Entrances on different topographical levels</td>
<td>•••••</td>
<td>—</td>
</tr>
<tr>
<td>Architectural contribution on the entrance level (usage of columns, bridges and etc...)</td>
<td>••••</td>
<td>••••</td>
</tr>
</tbody>
</table>

The Shard building area is always used by people and the effect of the existence of London Bridge Station on this case is effective.
Table 7. Vertical Design; the site analysis comparison of The Shard and 30 St Mary Axe

<table>
<thead>
<tr>
<th>Observation Checklist</th>
<th>The Shard</th>
<th>30 St Mary Axe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of floors open to the public</td>
<td>⭐⭐⭐⭐⭐</td>
<td>Only for restaurants on entrance floor</td>
</tr>
<tr>
<td>Facilities for users to have effective accessibility within the building</td>
<td>⭐⭐⭐⭐⭐</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>Existence of atrium or inner gardens</td>
<td>⭐⭐</td>
<td>⭐⭐</td>
</tr>
<tr>
<td>Contribution of landscaped floors and hardens on suitability concerns within the building</td>
<td>⭐⭐⭐⭐⭐</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>Perceivable green usage within the building and its connection with the outside environment</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Table 8. Urban Microclimate; the site analysis comparison of The Shard and 30 St Mary Axe

<table>
<thead>
<tr>
<th>Urban Microclimate</th>
<th>The Shard</th>
<th>30 St Mary Axe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunlight access through the public places around the building</td>
<td>⭐⭐⭐⭐⭐</td>
<td>⭐⭐⭐⭐</td>
</tr>
<tr>
<td>Shadows on the surrounding public places</td>
<td>⭐⭐⭐⭐⭐</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>Strong wind corridor effects within the district</td>
<td>⭐⭐⭐⭐⭐</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>Variation of microclimatic conditions on pedestrians</td>
<td>⭐⭐⭐⭐⭐⭐</td>
<td>⭐⭐⭐⭐⭐⭐</td>
</tr>
</tbody>
</table>

Both of the buildings do provide separated entrances for different functions. However, The Shard building is directly connected with public facilities at the ground level. Where 30 St Mary Axe has separated doors to enter its social facilities such as restaurants and cafés. The Shard building provides a public circulation with via several functional entrances from different sides. During site analysis, this situation has been evaluated as supporting a physical circulation around the building. Correspondingly, the building offers many open areas for people and this is one of the necessities for social sustainability. Also, The Shard has architectural columns on different levels and this also creates semi open spaces for people where 30 St Mary Axe is a straight building through the sky on a circular plaza.

3.2. Comparison of Survey Results for ‘The Shard’ and ‘30 St Mary Axe’

The Shard: According to the survey results the general opinions for this building by demographic are given as:

The Shard results data in relation to the Sex demographic: Amongst males, ‘Urban Skyline’ and ‘Transportation’ key concepts were most scored equally the highest opinion rating and ‘Urban Microclimate’ was least favored. The females also favored ‘Transportation’ for The Shard and again least favored ‘Urban Microclimate’. In general there was a lot of similarity between the answers of males and females. Variation in opinions between males and females separated more for design related questions 9-12, for which males had slightly higher opinions.

The Shard results data in relation to the Age demographic: All ages groups had high opinions for ‘Transportation’ key concept in The Shard, particularly ‘35-44’ and ‘15-24’, age groups who scored a maximum 5 rating for ‘Transportation’. ‘Urban Skyline’ also appears to have been very highly favored amongst all age groups. As with the Sex demographic ‘Urban Microclimate’ scored the lowest opinion ratings, both individually and altogether. Although there is not enough data to make a full analysis on the impact of age on the impression of The Shard’s key concept, the younger ‘15-24’ age group generally had the
highest opinions of the key concepts, and although all age group scored relatively similar results, the highest age group ‘55-64’ had slightly lower opinions for design related questions 7-12 (ignoring age group ‘45-54’ as only one participant for this age group was found for The Shard).

The Shard results data in relation to the Years Living in London demographic: Generally all participants had the highest opinions ratings for the ‘Urban Skyline’ and ‘Transportation’ key concept. Again these group participants also have almost the same positive opinion on the ‘Site Selection’ key concept. The other positive opinion is for the ‘Entrance Floor’ which ‘15-24’ years group had gave. Yet, again all age groups found the ‘Urban Microclimatic’ conditions least effective.

30 St Mary Axe: According to the survey results the general opinions for this building by demographic are given as:

30 St Mary Axe results data in relation to the Sex demographic: Amongst females, ‘Urban Skyline’ key concepts were most scored almost equally the highest opinion rating and ‘Urban Microclimate’ was least favored. The males similarly favored ‘Urban Skyline’ and least favored ‘Urban Microclimate’ for 30 St Mary Axe, they also scored highly for ‘Façade Design’. In general there was a lot of similarity between the answers of males and females. Variation in opinions between males and females separated more for design related questions 11-13, for which males had slightly higher opinions.

30 St Mary Axe results data in relation to the Age demographic: All ages groups had high opinions for ‘Sight Selection’ and ‘Transportation’ key concepts. All age groups appeared to score similar results, apart from the ‘25-34’ age group that generally scored higher for all questions apart from question 4. Perhaps because age group ‘25-34’ is the financial districts target demographic age group. As with the Sex demographic “Urban Microclimate” scored the lowest opinion ratings for all age groups, except the correspondents aged ‘55-64’.

30 St Mary Axe results data in relation to the Years Living in London demographic: Generally all participants had the high opinions throughout all question apart from ‘Urban Microclimate’ that scored low. The people living in London ‘5-14’ generally had the highest opinions for all apart from the ‘Transportation’ key concept, this group particularly had a high opinion of ‘Urban Skyline’.

4. CONCLUSION

This study shows even though both cases are located in central districts of the same city, the case with the more positive implementation of these key sustainability concepts (The Shard building), has a more user friendly and a more attractive integration with environment. The study showed that, key concepts can be implemented on every ‘tall building’ with different architectural and environmental considerations.

With an observation platform which introduces a comparison ‘tool’, highlighted design strategies in order to define better the negative/positive nature of the impacts of tall buildings. It is important to maintain an objective and unbiased approach when studying the negative and positive influences of tall buildings on the urban environment. Every tall building could be designed through varied sustainability concepts. Instead perhaps designers should use a platform that evaluates the tall building from an all-around perspective, satisfying the needs of all stakeholders including city dwellers. Furthermore designers should not only concentrate on physical sustainability considerations, as social integration in living urban complexity is just as (or sometimes even more) important in securing the sustainability of tall buildings. Providing the users with suitable interaction facilities can enable the people themselves to unknowingly integrate the tall building into the urban livability.

This study enabled users to transform their perception of a building as a ‘solid structure’ to an active city element.

The selected key sustainability concepts within this research study can be implemented through different ‘tall buildings’ from every part of the world and also more key concepts can be selected and applied depending on the case building. The study and implementation of these key concepts on different cases would no doubt expand the library of key concepts used to evaluate tall buildings and hence make the system even more robust. Turkey is an interesting example of a country with this type of rapid growth in the number of tall building constructions, particularly in big cities Ankara and Istanbul. Rapid city growth can sometimes have negative impact on the city, as tall building design can begin to focus on the immediate requirements such as mechanistic features and function in the location, rather than focusing on the long term sustainability criteria. Having a ready tool to more easily and efficiently evaluate sustainability can make it easier to integrate sustainability concerns in design projects in an environment of rapid development, such as Turkey. Therefore, this study could be of much benefit to areas such as Turkey, particularly for the much needed initial site analysis. Perhaps also for countries like Turkey, this platform could also act as a guideline reference for related departments within municipalities of each city.

In a world with developing future of social technology that virtually integrates us with each other socially and with our physical surroundings, it will no doubt make us to evolve and adapt the way that people integrated the buildings with the urban environment. Furthermore, with rapid development and population growth people face future challenges to maintain a cultivated social interaction between people to keep the urban environment alive and interconnected. With well-developed suitability design practices, tall buildings can no doubt play an important role to satisfy both of the needs of this expansion and while strengthening the harmonic urban vitality.
Bibliography


