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Social and Environmental Sustainability for Better Quality of Life in Residential High-Rises

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A B S T R A C T

The quality of life in residential high-rise buildings is an understudied area which is important due to the large proportion of the population inhabiting them. The approaches that link sustainability with the quality of life in residential high-rises is also scarce in the literature despite the fact that implementing sustainability in high-rises is one of the ways to enhance the sustainability of our society by affecting huge structures and a large number of people. This study investigates what sustainable design responses are linked to higher quality of life in residential high-rises. The methodology of the research is relying on 12 interviews with prominent architects of high-rise buildings, carried out in January-June 2016. The architects are chosen according to their experience with sustainable high-rise buildings. The interview is based on an interview protocol with four important questions, dissecting the approaches to social and environmental sustainability. The architects provide a significant insight into the difficult relationship between sustainability and quality of life. They support the implementation of current advances in materials, building systems and amenities for more social interactions and avoidance of weaknesses such as small units, cheap materials and lack of identity. The implications from this study are that design professionals and the public can use this insight for leading the design of residential high-rises into the right direction. The article arguably claims that social and environmental sustainability is achievable by certain design responses such as attention to the public area in the buildings, proper sun and wind orientation and high-efficient skin.

Keywords: architectural practices, quality of life, high-rises, sustainability

1. Introduction

Construction and the built environment have a huge impact on the environment, human health, and the overall economy (Nahmens and Ikuma, 2012). The construction of residential high-rises worldwide is growing rapidly which stresses on the question of the quality of life these buildings provide for their inhabitants. Improving the quality of life is one of the nine principles the sustainable society World Conservation Strategy (1991) has developed on. The quality of life regarding health includes air quality, thermal comfort, aural comfort, visual comfort and in its physical dimension: appropriate flat layouts along with amenities in the building enhancing social interactions such as gardens, pool, gym, sky-lobby, cafés/restaurants and more. Given how much energy the high-rises consume both during construction and exploitation, the enormous amount of materials they use and a large number of residents they shelter, sustainable design is the only responsible answer to the problems the characteristics of the high-rises impose. Good sustainability performance of the individual construction projects through their life cycle is an indispensable aspect in reaching the goal of sustainable development (Shen, Hao, Tam and Yao, 2007). There are many definitions of sustainable architecture: is it environmentally conscious and energy-saving, does it use renewable materials (Newman, 2001). And while the concept of the sustainability is well-known by different construction professionals there is little consideration of the role of the high-rise buildings for the sustainable developments of the cities. Recently, the proliferation of high-rise housing has almost stopped. The widespread use of high flats has been seen as the logical result of improvements in building technology. The recent rapid reduction in numbers built has been connected mainly to the concern arising from the inhuman social conditions which must logically result from such an unnatural form of housing (McCutcheon, 1975). Architects who are specializing in high-rise construction try to give the answers how

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this typology can stay adequate and relevant.

While there are opinions that are not necessarily positive, new forces are reintroducing the high-rises in 21st-century urbanity. High-rise public housing is being criticized, prevented from happening and destroyed in many cities throughout Europe and Australia, there is new proof that high-rises are valued for the impressive views and sensation of height (Haber, 1977; Benson et al., 1998 as cited by as cited by Yuen, et al., 2006), privacy and quietness (see, for example, Conway and Adams, 1977 as cited by Yuen, et al., 2006) and, increasingly, prestige and status (Johnson, 2002 as cited by Yuen, et al., 2006). New ways of life and globalization over the past 10 years have proven that Western cities that once rejected the high-rise reintroducing again this construction (Yuen, et al., 2006).

In many inner-city districts in North America and Europe, urban redevelopment means that dilapidated housing is converted into high-rise elevator apartments. However, the social consequences of high-rise living as well as information on the tenants' satisfaction and dissatisfaction are still largely unknown (Wekerle, Hall, 1972). It is in the scope of this article to examine trough the architectural practices what design intervention increase the residents' satisfaction with their living environment.

The issues with high-density housing have been of interest to many social psychologists and environmental designers. These living arrangements tend to be detrimental to the social relationship within the community (Zito, 1974; Tognoli, 1987; Keane, 1991 as cited by Huang, 2006). Researchers claim that the negative effects of residential crowding are mainly because of the collapse in individuals' social support systems (Evans et al., 1989; Lepore et al., 1991; Evans and Lepore, 1993 as cited by Huang, 2006). Architects give a profound answer how the social circumstances in the high-rise buildings can be improved.

Very high densities, fast trips to work, free access to services, well-developed transit use, the creation of self-contained new towns and settlements, and considerate spread of public space are perceived as the most environmentally and socially sustainable solutions (Burgess, 2000). High-rises have a particularly important role in the delivery of the compact city, as they contribute to amenities and energy efficiency to the sustainability and quality of life of the place.

The quality of life has been largely researched in all of its aspects. However, its relations with sustainability have been understudied and deserve researchers' particular attention. The architectural practice is a valuable resource in order to determine the approaches to improve the quality of life with sustainable design responses. Buildings already provide improved comfort and higher levels of sustainability by taking advantage of exemplary façade, glazing and ventilation designs. The technology to reduce the future vulnerability of citizens' to thermal discomfort is largely in use nowadays (Smith and Levermore, 2008). The phenomenon of increased air-conditioning leads to the conclusion that there is a margin to reduce the energy consumption and consequent greenhouse gas emissions by reducing the need for air-conditioning in apartment buildings by comprehensive design (Cheung, Fuller and Luther, 2005). Natural ventilation is an approach that can increase the environmental sustainability of residential high-rise buildings while providing thermal comfort for the inhabitants. The study of natural ventilation in residential buildings is very important since natural ventilation has a direct effect on human health, comfort, and well-being (Priyadarsini, Cheong and Wong, 2004). There are other measures that also can reduce the energy consumption while providing high-quality of life. Application of simple passive cooling measure is an effective method for reducing the cooling demand of buildings in hot and humid climates. Forty-three percent reductions can be reached using a combination of well-established approaches such as appropriate glazing, shading, and insulation (Omer, 2008).

The aim of the study is to analyze the sustainable solution available for high-rise buildings through the point of view of 12 architects on the sustainable design responses for a better quality of life in residential high-rise buildings. The study achieves this goal through four research questions:

1. What design features ensure the social sustainability of the high-rise buildings?
2. What design features ensure the environmental sustainability of high-rise buildings?
3. What design features provide the residents of high-rise buildings with the high quality of life?
4. Are there some weaknesses designers can learn from?

2. Methodology and materials

Interviews with 12 leading high-rise architects were carried out in January-June 2016. Different aspects of sustainability are investigated, along with ways to increase social interaction, reduce energy consumption and improve the quality of life. The architects all have designed pivotal high-rise buildings and have been selected based on their pool of knowledge, demonstrated in their design practice. The number of respondents is defined according to guidance from the literature. If the interview respondents form a homogenous group, for a particular group, saturation often occurs between 12 and 15 (Guest, Bunce, and Johnson, 2006).

The participants: 12 architects, designers of prominent high-rise buildings in England and USA have been invited to take part in the interview. They have been chosen on the basis of their experience and knowledge. The architects names are Ralph Cunningham from Cunningham | Quill Architects, Ashton Allan from Studios Architecture, Sherief Elfar from Torti Gallas and Partners, Inc., Brian Kidd from Pappageorge Haymes Partners, Brian Nichols from Pfeiffer Partners Architects Inc., Duane Carter from Solomon Cordwell Buenz, Frances Gannon from Make Architects, Lyndon Lewis from Jestico+Whiles, Lee Rubenstein from R2L architects, Scott Erdy, from Erdy McHenry Architecture, Mr. Sieger, from Sieger-Suarez Architects,, and Anthony Markese, from PICKARD CHILTON.

The interviews: The interview consists of four questions, each addressing different aspects of sustainability in connection with the quality of life in residential high-rise buildings. On some of the questions, some of the architects had no opinion.

Storage: The digital copies of the interviews are stored in personal computers.

3. Results

The data from 12 interviews with prominent high-rise architects is presented in this section. On the first question, Ashton Allan replies that it is really the point where you get into that building and where that public space is established. And at the end of the day, that interaction with the ground plain, and the role of the building in the skyline as a landmark tend to be the most important civic and ultimately social sustainability role.

Brian Nichols talks about the residence in the Colburn that is a part of a school and the towers with the resident halls kind of grow out of the school, the school is the first couple of floors of the building, and then on top of that you have the towers, the towers kind of float around. So you already have the sort of the connections and the social things that happen, because everybody are going to the school, they are taking classes together, so there are no necessarily these separate people like in an apartment complex, and then in an addition to that there is kind of a social space on each floor and interconnected staircases. The rooms are arranged around the open area on each floor, that open area has a staircase, a space dedicated to each cluster of rooms and then all the rooms serve the school and in addition, there is a game room, there is a lobby.

Brian Kidd said that there are a couple of different answers. One is for the condominium buildings that they do and the other one is for the apartment buildings that they do. In Chicago, the tendency is to have smaller apartment sizes, mainly for cost reasons. And in exchange for doing that they have a lot of amenities space within the building and so people tend to use those amenities spaces more often because the apartments are so small. Duane Carter also shares that they do work in all of the United States but mainly in Chicago and San Francisco, and what happened in both places is that units have gotten smaller, so the amenities space is more important, and people are actually spending more time outside their units in coffee area, party room or dining room, social spaces, fitness room, that enhance the social sustainability. Scott Erdy shares that a in a lot of their projects they work very hard to create social spaces where people can interact and he gives, for example, the EVO building in Philadelphia with a lounge, a two-storey space and there are eleven of them in that building And so, they looked at where the building sat in terms of the city, so they draw circles where the building is so they looked at all the different locations where it might be affiliated, and they mapped down where the walking distances were, in public transportation by terms how close you were by train, for instance, because it is right by a train station, and only two hours to New York city, so it was actually in terms of housing a very flexible location. The building has a number of spaces where the idea of community is reinforced. You can see these lounges, they exist around the building, and those are spaces which enhance interaction. Also, adjacent to that we have a social space which is a green roof, immediately adjacent to it, so this here can you see the lounge

spaces, there is a primary lounge space on the roof that overlooks the city of Philadelphia and this is connected directly to this outdoor green space, so this is the public space, a little bit over an acre, that is, therefore, this idea is creating community.

Frances Gannon gives for example The Cube, with its mixed use, it is not just residential, but it is shops, restaurants, hotel, a featured sky restaurant. Mixed use ensures that the building can respond to changing economic situation, that it serves a lot of different aspects for the community, it also means we should plan for flexibility, between the different uses, so, for example, the top level of retail to be converted into office and it has happened, so there have been three levels of retail and the top level has been converted into offices. The boundary between an apartment and the hotel, she thinks is another place where the hotel could expand, into the apartment, whether it is serviced apartment or some kind of hotel room. They are not saying it is good to convert the hotel into the apartment, but it is definitely possible because the structure is already there. So the building does not become redundant if the society suddenly changes. It will have a longer life. There are also advantages in supplying the building because apartments need water morning and evenings, and the offices do in the day time so the service is easier for everything, including the heating and hot water. It is shared benefit and efficiency in demand.

Lee Rubenstein says they do a number of things, they focus on projects that are located in transit and urban centres. Thus they locate people near jobs, near things to do, get them out of their cars. A lot of the sites that they work on are targeted in places where there is good transit options and good jobs nearby, neighbourhoods for shopping and living. Typically, there is a mix of uses in their larger projects, the retail is usually at the base along with streetscape like restaurants, stores.

Anthony Markese shares that their first mission or one of their objectives is to have the building fit appropriately in the context. It means to study the context both in terms of social settings, programmatic requirements for the building, appropriate layout of the units so they work culturally within the environment they are planned for. Secondly, the buildings that they fit within the environmental context, the general topography, the general climate, etc. Ralph Cunningham also replies that the first is taking care of the site So, in terms of having the building fit into the environmental context, it has primarily to do with how they orient the building for proper solar orientation, how they create the right proportion and dimension, within the building plan configuration, how they create spaces that allow the inhabitants to have access to outer doors, the balconies or terraces gardens, sky gardens, etc. Ralph Cunningham says they carefully place the building so that, the landscape always comes first, the building becomes second and he would also say that they are very strong believers in lovable buildings, the greatest building is the building that people love and take care of. And they are also interested in the technical ways to make building sustainable, solar wind, geothermal power, these sorts of things. Mr. Sieger shares that social sustainability has to do with where the high-rise is. You ensure it by not doing high-rises in the middle of nowhere. You are doing a high-rise in aggregated urban situation where the infrastructure is sustainable as well and where people will have their social interactions that occur not only in the high-rise but obviously within pedestrian distance. And he thinks there are a lot of high-rises built in the world which do not have this social structure built around them, or near it, and they don't get near as viable as high-rise built near Manhattan or London.

Sherief Elfar is talking about a building, called City Vista. He stresses on two things: one, this building has one of those transformative structures. Meaning, it came into that neighbourhood as one of those very first large developments. And since this building has come to life, it actually accelerated the rest of the development around. The area was not a popular area, crime, kind of a neglected area, nobody really wanted to go there, when this building came in, it provided several things that relate to what you called social justice, social equality within the neighbourhood. The building in a way became to a large degree a centre of employment, it's a large building so it have the staff that is running the building from leasing to maintenance, to attendance, building managers, the building itself is about 680 units, you also created the opportunity with the grocery store, for example, restaurants, the house club, they are mentor of the activities and businesses there, so it became a centre for employment providing employment opportunities downtown which was less because a lot of the opportunities tended to be out in the suburbs, and one of the reasons people started to be attracted back into the cities is because now there are more job opportunities. The second thing is what the mixed use building creates. It creates a neighbourhood, activates other places around them, extends the centre of the employment, within an area once you build something like that, once this building is

successful, others come next to it because people like to share success. And if you see the neighbourhood today you'll see multiple buildings. And another thing it has to create in terms of housing justice basically, 8% of the units for rental or for sale are affordable units.

Lyndon Lewis thinks in the past tall buildings are often not seen as socially sustainable, particularly in the UK, where after the war lots of areas in the big cities, particularly London and particularly East London, terraced streets were replaced with high rise buildings. There is plenty of good and bad examples, and often the architecture is blamed, for a poor level of social sustainability. He thinks a lot of it has come down to a kind of social mix, and management and maintenance, so after the war a lot of big estates were put up with a lot of high-rise buildings, and often they were used as kind of social vent, and often kind of poor people were put in them, and often the level of maintenance of those buildings was very irregular and infrequent. Security was a big problem, and as a result of this, some of these places become slightly ghettoized. So he thinks that is part of it, how these things are managed, is critical to it. 2-12 in Stratford, is a mix of uses, s ground, and the first floor they have commercial uses, so he thinks that allows a certain level of social sustainability, as potential people to work near where they live, the gym, as a leisure, but there is also mix of tenancy, there is a mix of affordable and private dwellings.

On the second question Ashton Allan replies that obviously, it is a very case by case element. Now, he thinks that the real answers are going to come from technologies that people haven't quite seen yet. They really moved the focus from buildings that require lots of mechanical systems to cool, to buildings that really use the heat energy through microwave antennas which don't really exist yet absorbing ultraviolet light from heat and actually turning that into usable electricity. So you actually directly transforming heat to energy in a way that now in order to absorb energy. Nowadays you have to do something like air-conditioning where there is a compressive element and you have to add a lot of energy and then you are dumping that energy somewhere else.

Brian Nichols says their firm tend to build LEED certified buildings. They try to use water wisely, they try to reduce the energy consumption and they try to, if they can, to harvest energy by solar cells. They put a lot of thought in building orientation, shades, facades facing south, to reduce the gain, there are a lot of things one can do. Brian Kidd says that in Chicago if you are doing a very large project, the city requires you to meet a certain level of sustainability for projects. This can be either by meeting LEED rating, or Green Globes, or some of these other sustainable levels that you have to achieve. That is just part of it, the city requires that. In addition to that and part of it comes with things about saving energy and how energy efficient the envelope is, how energy-efficient your windows are, the low flow faucets, landscaping that doesn't utilize a lot of water, they have car sharing programs within the buildings, there are electric charging stations, there are premium parking spaces for energy efficient vehicles, all of these sorts of things are part of these requirements. As well as green roofs and ways in which they can recycle rainwater for landscaping, other things like that. So that is an important component of the design. Lee Rubenstein says they do a few things, building and energy codes have actually got more stringent here, although not as stringent as in other countries. So LEED is actually now a design requirement. But on top of that they tend to seek out newer technologies, better insulation, better equipment, long service life equipment, things like that, they are trying to source materials locally where we can, to cut down on fuel cost and shipping, things like that. And they locate projects again near transit and urban centres, so people are less reliant on their cars all the time. There is also a big push in a lot of places we worked to provide facilities for the cyclists, so a lot of their projects have pretty large bicycle storage facilities. Sherief Elfar talks about CityVista, this building that is a little old, before LEED or requirement for sustainability was a requirement, now there is a code watching that you need to provide LEED certified buildings or green buildings, however, what they did it as for LEED certification for the building because they wanted to create an efficient building, if we submitted this building for certification he believes it will achieve silver at least. Firstly, the amount of green space, there is the large courtyard in the middle of the building, and that is a green courtyard. It has large trees it's basically an oasis in the middle of the city. Efficient heating and cooling systems were used throughout the building, the buildings all of them have individual wall units, efficient wall units for cooling and heating, and they are gas based.

Duane Carter shares that there are a lot of inefficiencies in the process, it's not new technologies, but in fact just as doing early energy modelling, and talking about energy use, and working more closely with the engineer, those kinds of things are usually done in their projects, and they find that that's where the ability to improve the inefficiency are, looking at it more critically and start earlier, but doing a really good efficient mechanical design, good envelope.

Frances Gannon gives, for example, The Cube, where they have very well build envelope, a large number of insulated panels. The needs of office and residential are quite different so they came with an envelope that serves both, have more glazing in the North façade and less glazing on the South façade, in the office so you can control the solar gain, and then in the apartment you can have more windows, and more light and fresh air, and the view. But it all fits in one façade grid, so the idea is creating more unity, they divided the façade so different uses and requirements can be served through the same facade. It is a way to reduce energy consumption through passive strategies. The courtyard is interesting because uses shading that minimizes energy use. They really investigated the canal including, but they did not take advantage of it, which they can do in the future.

Anthony Markese thinks that environmental sustainability really encompasses a very broad spectrum of design decisions. On the far end, it starts with how the building is situated on the site, relative to natural features or elements in the city or solar and wind orientation, in terms of the massing of the building. And then on a more fine level, the distribution of the program within the building to respond to light, air, views, breezes, etc. and then decisions relative to construction methodology, whether the structure is concrete or steel, often depends upon where the building is located, whether these resources are easily accessible, certainly the design in details, enclosure to create a high-performance perimeter skin, whether incorporating sun shades, high-performance glass, balconies for shading. They are always looking at ways to bring landscaping and greenery into the building, up into the tower, be it sky gardens or elevated terraces. And also, a selection of the materials, looking for materials that can be either repurposed, or harvested locally or located locally.

Ralph Cunningham says paying attention to the lifespan of materials has a lot to do with environmental sustainability. There has been a lot of discussion in the United States of cradle to cradle design which means that you understand how to put together a building with recyclable materials and then how to take it apart later. Designing buildings to have proper solar orientation, take advantage of the breeze or whatever else the site is giving.

Scott Erdy says that with EVO, there is a group of green spaces on top that is actually part of storm water management. In cities, Philadelphia particularly has this shared storm water system when it rains all the water is channeled to underground pipes, which also take it to the river after it is filtered. So, the problem with this and other cities is that sewage from the toilets for instance also goes into the same system so all the water, both storm water, and sewage water is all treated as if it is all sewage water, so that is a huge amount of water and the problem is when it rains a lot, all this water comes through and it is too much for the sewer system so it overflows and goes right into the river untreated.

Mr. Sieger shares that there are a lot of obvious things they have been doing for a long time which is in all those issues that have to do with thermal efficiency, etc. So they have been designing a building with that for many years, so environmental sustainability has more to do with the nature of where you are putting these buildings. A lot of these high-rises again are not in urban situations. And for environmental standpoint, when you are talking about carbon footprint, building buildings within the existing infrastructure has proven to be much lower in overall carbon footprint because of nature where is it and all the infrastructure, already there.

Lyndon Lewis says when they designed buildings, it is designed for sustainable homes level four, so it is reasonably energy efficient, but it is not pushing any boundaries, it is not going to break any records. They did look at wind generation, but for Stratfort High Street it was not feasible because there were worries of vibration through the structure, they originally designed it with photovoltaic, which will feed into the landlord supply for electricity, they did look at heat pumps, linked to the river, but it wasn't seen as financially viable solution. He thinks a lot of it is thermal performance, airtightness, and also dealing with things like overheating, so there is solar control glazing, but they are all mechanically ventilated, with heat recovery ventilation as well.

On the third question, Ashton Allan replies I think that the challenge of the high-rise building, particularly for a residence, is to create that kind of environment that finds the balance between public and private, where somebody feels like that they can be social but doesn't feel like they are threatened. One of the interesting things observed in residential high-rise buildings today is that the long hallways are on the inside had no windows. They are completely closed off and one of the things that they learned in the city, although the Europe world is an exception of this but in the West windows and the perception that there are eyes on the street create a certain level of safety and comfort and

security. Sky garden is nice, but is it better than a park? They tried to have a park around every high-rise building and it turned out ending in even more isolation because each building was kind of on its own in this park. Roof terraces are great amenity as well as winter gardens, they can be fabulous sustainability features, it helps the building breath and recycle air, but are they a solution for creating the informal neighbourhood feel that you get stepping outside in a neighbourhood. Obviously not.

Brian Nichols shares that the most residences they do are for school or university so the quality of life is a part of the institution, you go to a school there, you go in a residence hall, a lot of these projects that they build have a service component, cafeteria down on the bottom, indoor dining room, making the residents feel like home, rather than feeling you are staying in an institution, bathroom have home like quality, the materials are really high-quality. Living in those spaces you want to feel comfortable, to have attachments, friendships.

Frances Gannon says that they are really interested in how people accessed the building, the journey of each person to his front door. So how this all is going to work overlap with someone going to the hotel, or the apartment. In the case of the Cube, they have two different parts called apartments buildings. The apartments on the west you can rent out. The apartments to the East you need to live in it. So, what they did, they had two different entrances, and the east is really the hotel lobby which we tried to make very luxurious, where the west has a lobby on the other side.

Lee Rubenstein says there are several things, now they focus on the view of exposures, views, and lights, and try to maximize windows where the cost will let us do it. They used to do a lot of the ventilation of the apartments, used to be above the norm, now the code has caught up with them so now it is a pretty standard for kitchens. Everyone wants flexibility for every sort of new technology, that comes by, so everyone wants to be able to control their systems with their phone, so in one of our projects you will be able to control your thermostat with a telephone app, they have one project where instead of shades on the windows there are electrochromic glass so those windows if you have an app on your phone you can darken the glass. And if you don't do it manually, the building will take over and optimize it, so if you are on a sunny side of the building in the afternoon and you are not home, and you do not control with your app, the building will take over to darken the window and save energy.

Anthony Markese mentions balconies or sky gardens, or public spaces that allow the inhabitants of the building and even the inhabitants of the surrounding environment to have access to light, air, and views, so maybe balconies, sky gardens.

Scott Erdy thinks that materials have to be warm, friendly but that spaces that exist in that building are very important in terms of how people get along, so the most interesting thing is really how people live together, so from a standpoint of that, which is very important. So for instance, EVO have spaces that anyone can go up to, at the very top, so when you cut away that façade you see this is a public area that has television and lounge furniture. There is a fitness centre, so promoting fitness is important, it has a double height space which looks back towards the city or towards the university. And then on the other side there is a swimming pool, so that swimming pool is a very social space, it has a bar there, and it looks at the city, so there is the social space inside the building, so there is a great view from these amenities. So you can see how those spaces make for a lot of interactions, so in terms of comfort of residents, lifestyle of young persons, is really changing in terms of not necessarily have a big house, a big apartment, it's really about where you live and the things that are connected near you, so the idea the city itself be your living room, and when you go out you meet up with people, things like that are very important, so location of the building plus the idea of supporting certain lifestyle that gets more young people into the centre of the city.

Lyndon Lewis gives, for example, Strafort High Street, with spacious flats and terraces, and the creshe area, and then there is the big roof terrace at the top which looks west.

Brian Kidd replies that there are a number of features that characterize high quality of life within a high rise building: access to light and views are critical, amenities for social interaction, exercise, and entertainment, well-designed units that can accommodate different lifestyles, location is extremely important, access to transportation, work, green spaces, groceries, entertainment, cultural activities, etc., concierge services, providing a c connection with nature with exterior spaces and landscape elements.

Sherief Elfar says A- Building Amenities, depending on the location of the building, if it is an In-Fill and in a busy

part of town, the Amenity becomes the surrounding neighbourhood.

If in a suburban area or in an area that is not very active, then including amenities that are specific to the building are important. They help create a sense of community.

B- Units amenities, Such as Views, Privacy, Sufficient storage and closets, Interiors that are defined as traditional or contemporary and not a Hybrid.

On the fourth question, Ashton Allan replies that one problem is corridors with no windows. There is a solution to that, it's called direct access building. In the garden apartments in Queens, New York, where there is basically an elevator and a stair off that elevator and a stair for four apartments that go around in a circle so that eliminates the hallway altogether. There is a challenge within creating good civic architecture, not every building wants to be a squiggle, people want to have a certain rhythm and fabric to a city, but everybody still want to be able to identify where they are and have a sense of place, and he thinks that with most of the high-rise residential today in particular there is a real challenge to be able to have these landmarks within the architecture or within the experience that lets somebody point and say that particular group of windows are my windows. And he thinks that that would help, being able to do that, having the architecture respond that kind of way would help somebody to feel more connected with the architecture, with the environment, to be able to understand their relationship from the inside and the outside. He doesn't know if it is a huge problem but it is a fun problem to solve.

Frances Gannon says the apartments in the Cube are quite small and it was designed just before the recession and it was the market, what the agencies said the people wanted. Also, the city centre does not have many infrastructures for families, so it would be unrealistic to imagine that we could have families living there, but definitely they do not have any family units and the apartments are quite small. So it is limited to single professionals and people retiring.

Lee Rubenstein thinks they find two things: one, is after the buildings are turned over, so after they are constructed and the owner takes over and manages, there is always a strong team to manage the building, so everything starts very efficient and very clean but then over time there is really a push to minimize the maintenance cost. The other lessons is buildings are just like other products, they are commodities, and over time systems become outdated, fashions and tastes change and how people live, whether what kind of flooring, what kind of appliances, and so there are selections in the beginning or during the design, that are made to save cost, otherwise they cannot afford to build the building, in a first place. So cutting down on cost like that and choosing the cheaper roof, cheaper windows or less expensive mechanical systems, just has a long-term cost for the value of the building, for the environmental performance, for liveability. And when people are so sort of driven by the market and what is important in order to make people rent or buy and live there you can rip out flooring and replace finishes just to keep up with fashion. And that's a little bit wasteful.

Anthony Markese points out that if you are analysing practices globally, one of the things that you are aware immediately is different locals have different code requirements. One thing that is very encouraging in European community is there are certain mandates, codes and building laws that dictate access to views. And when is mandated that means all the buildings that are built in that environment have to follow those rules. There is a sort of even playfield if you will. So if all the buildings and all the architects have a clear set of rules that they look at and that encourages sustainability and healthier building. It's tougher when you are working in environment that doesn't have clear codes because if you are trying to do a more high-performance, environmentally sensitive building, you are always competing against other projects that don't necessarily have all those things, setting high level of quality or aspirations, and it makes the basic phases of the project much tougher because other sites and other developers can build less expensive, less sensitive buildings and have an advantage in the market because their rental rate or their purchase rate for the housing is a lot less expensive.

Ralph Cunningham says that high-rises are not terribly different from any other building, building placement really matters. And a very careful design of the ground plain, it is always important for any building, how does it the people approach the entry.

Scott Erdy, thinks a problem in a lot of high-rise buildings is that a lot of floors stack one on top of another and typically very small hallways and you don't really interact with your neighbours very much. So in many times even

though you are living with 800 other people, you don't see them very often because circulation is always minimized and shared spaces are always minimized.

Sherief Elfar finds out that the only weakness for CityVista and other buildings is, at the time this building was built, there is an excess of parking. It is a lot of parking, each unit gets something like 1.2 spaces, every unit will have a parking spot, but if you wanted two you will get two because not everybody had to park. There are ways to encourage walkability. Sometimes you can adjust the regulations, for example, a petition for increasing the height or reducing the parking, so that was not something that was not excepted, and often they find now, especially in certain locations, that for marketability reasons they would like to have more parking than required.

Mr. Sieger shares that most of the weaknesses are caused by either no building codes or too much building codes. In their experience over the years that in America we have an excessive amount of codes that are based on preventing lawsuits and not necessarily in favour of the buildings. But on the other hand in America, we have so many rules that you find it harder to integrate new ideas because of those rules. And it takes a long time to create something here that is a new idea. For example, their Porsche Building, it took them seven years to make and get the elevators for the robotic parking and that kind of durations of time are not what more people would expect. So that would be one of the main weaknesses. Many years ago they created the first building in the world that people had private elevators to their apartments, it changed the nature of towers so we eliminated corridors which eliminated a large portion of internal circulation of the buildings. So it has basically two effects: it allows for more privacy within the building and the units, the residential units, and in the same time it makes the buildings more efficient allowing to have more common area and more social area on the floors.

Lyndon Lewis thinks security is an important one, because of the number of people living in a small area, things like acoustics, become very critical, and those on-site facilities, allowing people to mix with their neighbours, are quite important.

Brian Kidd says that they are constantly learning not only from their mistakes but from mistakes that others make. They are always touring and examining other people's work with a critical eye, learning about what works and what is unsuccessful.

4. Discussions

Sustainability models suggest that quality of life encompasses health, physical environment, natural resources, personal development and security (Kamp, et al., 2003). Architects talk about the point where the building meets the ground, special spaces on each floor, because experience states that most social interaction occurs among residents of the same floor; if this is true, then buildings with many floors will include a few friends and acquaintances for the typical resident, and many strangers from other floors (Gifford, 2007). The architects also discuss the mixed use, location near mass transit, building according to the context, affordability. Building sustainable communities in apartment complexes demand sustainable development plans on the basis of a comprehending the community characteristics and general features of apartments (Cho and Lee, 2011).

For the parties connected to planning, developing and managing buildings, the environmental impact regarding energy use and the quality of the indoor environment are both very important. (Malmqvist and Glaumann, 2009). However, to achieve a great reduction in energy consumption besides the standard energy-efficiency methods, new technologies should be used, including renewable energy (Chwieduk, 2003). Building scientists now largely agree that high-quality energy services do not necessarily incur a high energy use, and that good environment quality can be obtained with a reasonable amount of energy and power, and with a low environmental impact (Roulet, 2001). The architects talk about meeting environmental sustainability by highly efficient HVAC systems and building's skin. Current achievement in materials, information technology, intelligent building systems, and sustainability are changing the built environment. Smart materials, innovative structural systems, new technologies in HVAC systems, and other advancements will without a doubt affect the design process and integration of future skyscrapers. A great emphasis will occur on providing safe, healthy, and comfortable living and working conditions in large skyscrapers accommodating thousands of people (Al-Kodmany, 2011). The architects argue that people living in high-rises should be encouraged to have more social interactions by being provided with proper spaces for this purpose. This will

mitigate the effect of small units and enhance their quality of life. Considering the current energy-economic crises, the importance of passive controls in reducing the need for high-energy solutions have become increasingly obvious. Natural ventilation is known to be an energy-efficient alternative to reduce the running costs in buildings, achieve thermal comfort as well as provide a healthy indoor environment (Wong, et.al, 2002). Humanity is also on the edge of a significant change in ventilation design. In the past, thermal properties of air within a zone limited heating, ventilating, and air-conditioning specifications. In the future, occupant-specific and highly responsive systems will be a common solution (Spengler, 2000). The architects talk about future technologies when the energy excess from the heating will be used to produce electricity and is going to be simply discharged into the air.

Architects also talk about finding a balance between public and private space, for a better quality of life, amenities, environment that fosters attachments, views, exposures, warm materials. This is an important aspect of the quality of life pursuit. It makes an impression that the means to achieve social sustainability are firmly related to the means to provide a high quality of life.

Finally, there are some weaknesses: lack of identity, small units, cutting down costs by cheap materials, inadequate placement, small corridors, acoustic problems and excess of parking spaces. These are all points professionals can learn from and improve on future designs.

5. Conclusion

The article creates awareness about the important questions of sustainability (social and environmental) and quality of life. Twelve prominent architects discuss the topics related to the sustainability and draw connections to the quality of life. They describe buildings with efficient skin, mechanical systems, and materials, but equally important: places with designated areas for intense social life. There are some weaknesses in the design of contemporary high-rises that are also commented. The article provides greater understanding what design features directly influence the quality of life. It can be of use for professionals but also to the general reader trying to comprehend the complicated process through which building shape the life of its inhabitants. Based on the results, several design criteria to enhance the sustainability of high-rise buildings are proposed:

Table 1. Design criteria for social and environmental sustainability

Social	Environmental
Active ground floor	Reduced energy consumption
Amenities to reduce the impact of small units	Proper orientation to sun and the wind
Mixed use: residential and commercial	Meeting LEED criteria by HVAC systems and energy-efficient building envelope
	Shipping the materials locally
	Selection of materials that can be reused
	Harvest wind, solar and geothermal energy
	Proper water use management and efficiency
	Bringing the landscape into the building: elevated terraces, roof garden, courtyard

Even though many important questions are answered, a further research on the role of the residential high-rises for the quality of life via placemaking is viable and necessary.

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