

PAPER • OPEN ACCESS

Iconic architecture and sustainability as a tool to attract the global attention

To cite this article: Hawraa M S Aatty and Ghada M R Al Slik 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **518** 022076

View the [article online](#) for updates and enhancements.

Iconic architecture and sustainability as a tool to attract the global attention

Hawraa M S Aatty¹ and Ghada M R Al Slik¹

¹Department of Architecture, Collage of Engineering, University of Baghdad, Al-Jadria St., Baghdad, Iraq

Email: hurryroqa@yahoo.com, ghadamrs@gmail.com

Abstract. The development of sustainable iconic projects is becoming a global phenomenon in recent years. These projects are producing attractive and convincing environmental images which serve globalization goals. Sustainable iconic projects are oriented to become an ecologically friendly tool that supports economy investments and tourism, by using the potential of the cultural, aesthetical and moral meanings. This paper investigates the emergence of a remarkable style of architecture which starts out from purely image-obsession, it emphasizes the importance of symbolic form as well as the use of renewable energies in the world and particularly in Arab Gulf cities (and first local try). The research problem is (The question of sustainability as a strategy that has helped in certain ways to create an iconic building and if so, is this are an advantage or disadvantage for the built environment). The paper suggests that: the implementation of sustainability in these buildings have drawn a false image which is far away from the goals of sustainability in conserving the resources. Also, the paper argues that cooperation among sustainable concepts, iconic designs, and attractive images has a wide acceptance and economic profits which may stay as a trend in the 21st century and in time will more and more be frequent and tend to be ordinary.

1. Introduction

Products of architecture have been long considered a representation of human culture and awareness, which expresses the political, social, cultural, economic and symbolic state. After 2000, Iconic architecture and sustainability are one of these modern practices. Iconic architecture emerged as one of the contemporary architectural trends at the turn of the 21st century. It replaced monumental architecture to represent the symbolic messages conveyed with in cultures which will be kept for generations. It seeks to create the ideal product that becomes a global image relying on different strategies and policies to achieve attraction and fame.

Lately, Sustainability was used as one of those strategies through the formation of environmentally efficient buildings to achieve the ideal situation in terms of maintaining renewable energies and investment, helping to improve the environmental image and make it more attractive. Sustainable iconic buildings are not just the addition of both iconicity and sustainability, but they are also conveying image manifestations of the city's political, social, economic, and also religious elite signs of global lifestyle. They also suggest how this architecture becomes both as a set of cultural icons and as applications of technological advance systems during this period.

This paper argues that: sustainable implementation in iconic buildings have drawn a false image which is far away from the goals of sustainability in conserving the resources. Also, the paper argues that cooperation among sustainable concepts, iconic designs, and attractive images has a wide acceptance and economic profits which may stay as a trend in 21st century. This research is to investigate the regional Arab Gulf cities that witnessed the spread of iconic architecture in last two decades.



Therefore, the research problem is (The question of sustainability as a strategy that has helped in certain ways to create iconic building and if so, is this an advantage or disadvantage for the built environment).

2. Iconic architecture

Studies on the iconic architecture have given a good input to understand how iconic buildings have appeared as a global understanding and practice. The well-known architects or "starchitects"¹ such as Frank Gehry, Santiago Calatrava, Zaha Hadid, Norman Foster... have started to build "buildings as icons of their own individuality" as pure spectacle and that have influenced the field of architecture [1]. Lewis has written that: a new aspiration is being sophisticated with people, they are looking forward to see the spectacle new buildings designed by "starchitects" [2].

Jencks (2005) assumes that Guggenheim Museum in Bilbao by Frank Gehry 1997 (figure 1), opened the door to contemporary trend of the iconic architecture. He argues that this trend challenges the tradition monumental buildings, it is driven by commercial and social forces for fame, and they appeal to be something that attracts audience [3]. He sets an argument of "enigmatic signifiers" which can be used to enhance deeper meaning of the building that makes it succeed [3]. He sees that icon buildings can let the spectator to draw onto it their personal symbols or interpretations. It also stands up to repeated study as one tries to interpret and fathom its various meanings, for instance the metaphorical analysis of some critics for Guggenheim Bilbao museum (Figure 2).



Figure 1. Guggenheim Museum in Bilbao by Frank Gehry 1997 [3].

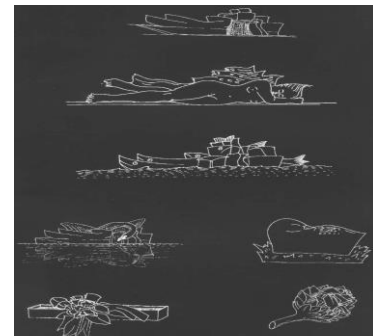


Figure 2. Enigmatic signifiers of Gehry's building [3].

Sklair introduces two unique features of iconic architecture. He argues that they obviously mean "famous" no less than an audience of people. The second it has a "symbolic/aesthetic" decision, and he puts his practical definition: "it is the unique combination of fame and symbolic/ aesthetic significance that creates and sustains the icon" [4]. He considers that icons are famous, and they aren't like the situation of different forms of celebrity fame, but famous for having particular symbolic/aesthetic qualities [5]. That means the architectural icons have a distinctive meaning that is symbolic for culture and time. Also, he distinguishes between two different meanings of iconic status in architecture: (Iconic I)² which is the conventional copy, like the iconic mosque, and (Iconic II) which is something distinctive as a unique art piece [6].

Witold Rybczynski considers the turning point in architecture has been started when Le Corbusier built Ronchamp church in 1955. He considers it as the first iconic building of post-modernism. He argues that the iconic architecture assists the period of needs, when an outstanding significant building develops as a public attraction tool. He adds that this distinctive kind of architecture (and also architect) becomes

¹ The term "Starchitect" refers to union of the two words (star) and (architect). Starchitect designs "Starchitecture" which refers to union of the two words (star) and (architecture). This matter is similar to movies use of stars to give attention, fame, and unique to the spectator.

² Sklair renames these two terms of different meanings in his new book (The Icon Projects) 2017. The (Iconic I) becomes (Typical Icons) and the (Iconic II) becomes (Unique icons).

required and famous after the success of Bilbao. Therefore, other cities, decision makers, and developers, are now interested in tracking and repeating that success [7].

In summary, iconic architecture is a contemporary architectural trend, branded by a significant formulation and symbolic form, designed by starchitect, planned to seek attraction and fame, and appealing popularity. Yet they have specific cultural aesthetic.

3. Iconic architecture and sustainability

Certain studies about iconic architecture mention how sustainability is taken in new iconic projects in its application to achieve eco-building and also extend to erect eco-city projects. After analysis about sustainable\eco iconic building with relationship of eco-city, iconic design specially in Arab Gulf cities will be taken as case studies.

3.1. Sustainable/eco iconic building studies

Sayigh (2014) refers to the rise of icons with multi-storey office buildings since the late 19th century. they reflected the changing of technological promotions, business and corporate needs, and the initiation of new construction techniques. They developed the appreciation about how they could make them a powerful visual message, which helps to attract outside receptors as well as its inside inhabitant. That matter based on developing the corporate image as well as its sustainability aspirations. But the products were not as much as its desired values. For instance, Empire States Building (Figure 3), The Seagram building (Figure 4), and the Sears towers (Figure 5) (among others) were considered as isolation icons from their surroundings. In 1958, the Seagram Corporation considered The Seagram building as a symbolic image for their corporate. However, the glazed facade style intended to create reflections of the building monumentality on the external experience. In fact, it was merely a decorative, unsustainable treatment, and lavish usage of resources. Sayigh also refers to the impact of this misinterpretation image in the Arabian Gulf cities such as illogical transportation of glass curtain walls into hot regions [8]. The least consideration in these projects is environmental sustainability and designed in trendy glass covers which ignored climatic performance and energy saving [9].



Figure 3. Empire States Building [10].



Figure 4. The Seagram building [11].



Figure 5. the Sears towers (The Willis Tower) [12].

In the late of 20th century and later, this case literally improved and developed to another level. Kibert (2016) refers to technology companies that are guiding the way with investments in architectural tools, high-performance green buildings, and hired the famous architect to design promising buildings for their projects. Performance of these tech companies follows the pattern that start-up companies track, which often begin in small projects and gradually relocate as they develop. Then, when they reach successfulness cash-flush, they tend to build iconic buildings. Despite, the aspiration to make attraction and economic growth through building an iconic project designed by famous architect, the tech companies have persisted to be eco-awareness and push society in the direction of more sustainable

performances, especially the respect of the built environment and constructing for environmentally friendly buildings [13]. Corporate objectives encourage from 'no location' into its 'genius loci' architecture reproducing sustainability in the iconography of its facades throughout scientific innovations support and use more sophisticated tools to check building performance and human relief which can be confirmed in the project inception step [8].

Al-Kodmany (2014) analysed some projects, and he suggests that iconicity does not essentially mean creating provocative spectacular forms full of symbolic/aesthetic qualities in order to compete for attention. Instead, he suggests that there are ecological principles and genuine concepts that determine these forms and shapes; which leads to create exciting and eye-catching forms [14].

Gültekin (2017) refers to the tools that globalisation power uses to homogenize architecture. It legitimizes for global identity by using of nation-based signs on the façades of these iconic projects. These signs aim to provide public support for globalisation and prevent reactions about global dominance. Also, he adds that iconic trend of design is an efficient usage and protection of energy (environmental, sustainable architecture), unconventional construction technology (high-tech), and advances in erection material like using of nanotechnology materials [15].

Jencks (2005) discussed the applications of green agenda and the whole ecological issue in the iconic buildings and he attributes that designers associated with high-tech and (super power) efficiency like Norman Foster on his Swiss Re headquarters (Figure 6 and 7) [3]. He argues that there are many architects following similar goals. For instance, they may be ecologically inspired, use biomimicry as a tool of design, and follow a "Zoomorphic or Biomorphic" architecture. Also, he refers that there are more than hundred biomimetic iconic landmarks several of them are "zany or unconvincing", but sufficient to be a noticeable movement and he considers that this is the most important point. He regards these metaphors as revealing and not merely a double crisis in iconography and ecology, but as an ecology effective designer, are all attractive goals of new architecture [3].



Figure 6. The Swiss Re building (the Gherkin tower), London's most iconic landmarks [16].

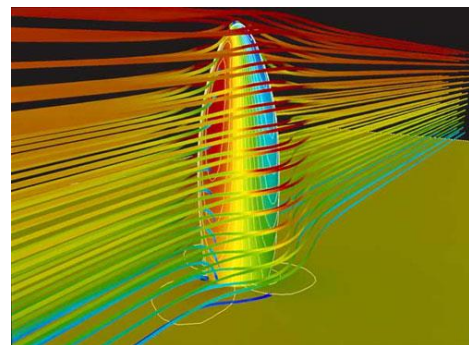


Figure 7. A model of air analysis flowing around the Gherkin [17].

Sklair (2017) theorized about the importance of sustainability for iconic projects in globalisation cities, he referred to the firms (like Gensler and Fosters) that focus on leadership of green strategy. He considered that these buildings carryout commercial messages for eco-friendly, ecological green production and it penetrates the high-performance of building skills. It will seize in achieving economic profits by reducing waste power and increasing energy efficiency. He gave an argument that the competition prizes and energy certifications proved the importance of sustainability. therefore, he submitted sustainability as a competitive and large market and (LEED)³ as the brand leader [4].

Locally particularly in Iraq, there are no existing iconic sustainable buildings, but there are buildings proposed and under construction and they follow the same global way. The General Directorate of the Central Bank of Iraq directly commissioned the Iraqi architect Zaha Hadid to put the basic designs of the new Central Bank of Iraq building, located in the city of Baghdad overlooking the Tigris River as a landmark tower and financial icon (Figure 8). the basic idea of design is dominated by the organic nature

³ (LEED) mention to certification of Leadership in Energy and Environmental Design program.

of the waveforms, draft in the lines, flexibility, and formal flow. the main feature of the project Is taking into account sustainability, intellectual, and philosophical aspects. The design of the base building takes the form of containment and stability with a central Skylight and spread of green areas on the top surface to add comfortable and healthy environment and application of the vocabulary of sustainability. It is a modern design by using mimic light and elegant building methods and smart materials in a contemporary cost-effective manner (Figure 8) [18].



Figure 8. the new Central Bank of Iraq building [18].

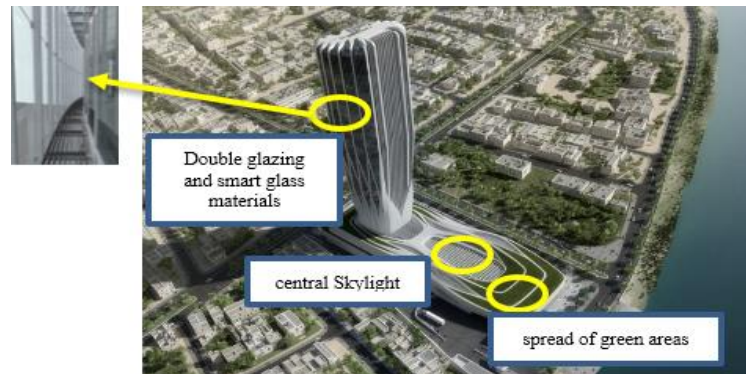


Figure 9. the sustainable features of the new Central Bank of Iraq building (with author comments) [18].

3.2. Sustainable/eco iconic city studies

Eco-city paradigm has been applied widely, especially to manufacture new cities. Sustainable iconic buildings are one of the main features of eco-cities. For instance, the new eco-city projects that we witnessed in the Arab Gulf [19].

Cugurullo (2017) argued that these cities seek to distinguish themselves by following the architectural solutions depending on the strategy of starchitects concepts and international firms, such as Bjarke Ingels and Foster+Partners. The nature of these cities must be iconic first, and then famous, creative, and has aesthetical character. This will define the unique and outstanding features to become eye-catching by refer to ideal ecological goals [20]. These cities symbolize specific concept, represent sustainable visions, and provide renewable energy. For example, the situation of Masdar City when the main concept was designed to be car-free, zero-carbon, and driverless for public busses through activated pedestrian streets of the city [21].

Montgomery (2013) in his discussion of happy city concept referred to sustainable city that should provide happiness through being healthier, more enjoyable, more promising than the ordinary city, and it should bring us together instead of being apart. He argues that the happy city planned to be an energy, a climate, an economic, and a jobs plan. He considered it as a flexible plan to be in the happiest state [22].

4. Case studies

the following paper will show a wide collection of features, strategies, and techniques of eco-friendly design in Arab Gulf cities. Examples of sustainable iconic projects in different cases among buildings that are on-hold, under-construction, and constructed. For the purpose of capturing various cases of sustainable iconic buildings and their innovative concepts.

4.1. Dubai

As critics say Dubai achieves the state of being one of the most impressive skylines horizon in the world which indicate for how Emirate can form itself Power on the world map. Iconic design language tends to create icons that represent the vision of Dubai's government for its current and future projects (figure 10).



Figure 10. The skyline of Dubai with the Burj Khalifa (L) [23].

Alraouf (2010) discussed the argument that Dubai established essentially on icons and Image production rather than eco-sustainable ideas to stand as a model of modern contemporary Arab city. Dubai's buildings are representing brands that exported Dubai to the outside world and inspired other Gulf and Arab cities. It intends to struggle for becoming a global paradigm, so we can see the urban impact of Dubai on Gulf cities development, through noticeable impact of Dubai on Durrat Al-Bahrain and Qatar's Pearle projects (Figure 11,12,13). Therefore, some people considered that (Dubai's spirit) has been lost [24]. Dubai has become a landmark destination by focusing on making iconic modern architecture which describes its identity and its implication of sustainability to serve its future goal as a global city. That make today's Arab cities copy the experience of Dubai which fail to consider local feature privacy.



Figure 11. Dubai's islands urban development [25].



Figure 12. The relevant impact of Dubai on Arab Gulf cities development: Durrat Al-Bahrain [26].



Figure 13. The relevant impact of Dubai on Arab Gulf cities development: Qatar's Pearle [27].

Acuto (2010) studied Dubai's ambition of climbing to be in the "world urban hierarchy" and its seeking for "symbolic power" to establish its image as the image of the 21st century global city. He considered this city constructing for users and not for residents, and he considered it as "socially unsustainable strategy". It has mastered the iconicity art of symbolic power and the implication of technology in enhancement of its image [28].

On the other hand, Dubai Government initiations refer to their concern of sustainability and sustainable growth. They have announced in 2007 a green building policy strategy to manifest a plan which controls energy consumption and water in emirates. They have considered green building concept

on the top of agenda program [8]. Since March 2014, the Green Building Specifications has been required for all new buildings. Later, they developed (the Al-Safat) a rating system in 2016 to supplement the previously launched Specifications [29]. Also, they are planning to build the sustainable city in Dubai, which has two stages (the first stage is already operational – the second stage is probably to be operational by 2020). As cited in Baharash Architecture⁴ website, with 2020 approaching, Dubai will be racing to become one of the smartest in the world (Figure 14 and 15).

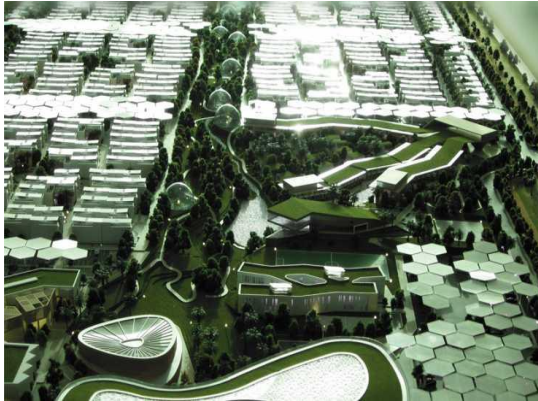


Figure 14. The Sustainable City in Dubai [30].



Figure 15. Dubai smart city by Baharash Architecture [30].

4.2. Abu Dhabi / Masdar city

Masdar City was developed to become the model of sustainable urban environment [31]. It has been planned as an ecological city built in an ideal square which depends just on renewable energies, No CO₂, no waste products, and no cars. One of the main aims of Masdar city is to show how a high quality of life can be achieved by sustainable concepts. These concepts will promise to provide clean energy which will turn Abu Dhabi into a pioneer of renewable energies [32].

Masdar seeks to become the first laboratory city in the middle east by having a specialized institute for ecological researches and sciences. This institution is considered the first one that deals exclusively with researches about sustainability. It enables scientific researchers to do their studies about renewable energies and produce a new tool for economic growth apart of oil energy [31]. Also, this institution is designed to be in contrast with modern forms of its surrounding buildings and illustrated by iconic form (Figure 16). While the design language of the whole city depends on Foster's approach. This approach always treats design as a problem, and it searches for a solution. So, in Masdar case the problem is environmental, technical, cultural and symbolic. The treatment of each side is based on Arab features which appears on facade elements and also based on eco-environmental concepts (figure 17).

⁴ Baharash Architecture is an international award-winning design studio Recent projects include the Oasis Eco Resort in Liwa and phase 2 of The Sustainable City in Dubai.

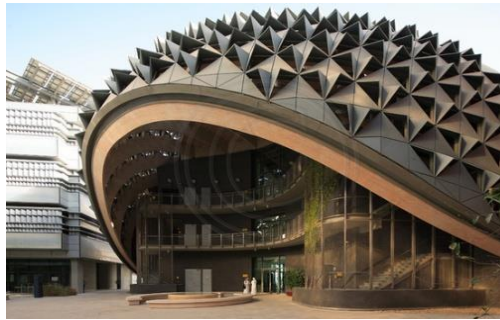


Figure 16. the Knowledge Center at the Masdar Institute [33].



Figure 17. Buildings blend technology with screens based on Islamic mashrabiya (icon) to reduce energy consumption [34].

Masdar has a clear vision as a sustainable initiation as shown in (figure 18) [21]. Abu Dhabi government has made its name as a brand for the place of the "World Future Energy Summit" which it considered one of the world's largest Clean Tech conferences. These achievements make Abu Dhabi capable to attract companies from worldwide particularly companies that are active on the field of clean tech and facilities [24].

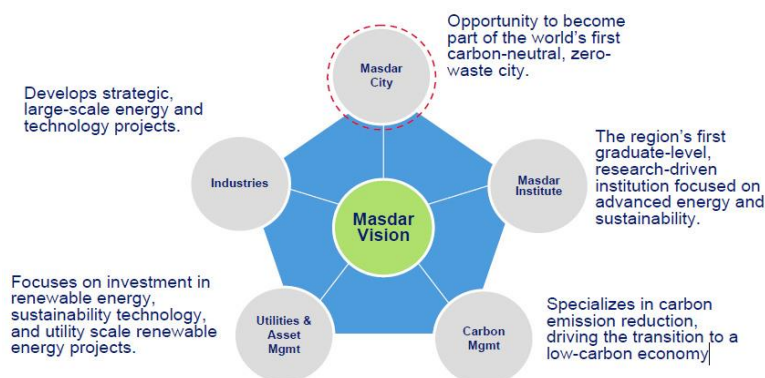


Figure 18. Masdar initiative objectives [21].

Some other studies discussed the disadvantages that were recognized from Masdar city project. The report of this planning process has been done for the government benefits, so it doesn't provide local community concerns and needs. Also, the city is suffering from social exclusion and isolation state which makes it unlikely to be integrate with other communities. This is because it is surrounded by deserts from each side. The nature of the design depends on the base of high concrete may avoid the city to be united with nearby neighborhoods in the future [32].

4.3. Abu- Dhabi / Saadiyat Island

Saadiyat Island (literally the "Island of Happiness") has a great deal to build cultural district destination depending on number of cultural projects designed by starchitects. For instance, the Louvre by Jean Nouvel, the Guggenheim by Frank Gehry, Zayed National Museum by Norman Foster and Performing Arts Centre by Zaha Hadid. Therefore, the Saadiyat Island plays as outstanding cultural destination in the world. It includes also hotels, retail and housing zones (figure 19). The four architects are the winner of international award of the coveted (Pritzker Prize) which considers as the most honor in architectural discipline. These Practices tend to shed some light on the new approach where Arab cities and particularly Gulf cities are working on.



Figure 19. Saadiyat Island, Abu Dhabi (with author comments) [35].

In 2007 France made decision to give the Louvre Museum brand for a new branch in Abu Dhabi in order to globally promotion of French culture and in the same time this initiation will help to attract attention of global world toward Abu Dhabi prosperity [24]. Ponzini (2011) argues that the megaproject of Saadiyat Island seeks to rise the desert value of this area in unprecedented way and also, it tests what never been tested anywhere which is the creating of cultural district in the desert. He considered the requirement of this cultural district for media contact shows the enormous struggle that is needed to match global intentions with identity of local society [36]. Sustainability thoughts are illustrated by iconic composition as a tool to give attention to the main concept of the project design. Also, put justification of the provocative spectacular forms, like the iconic design of the Zayed National Museum by Norman Foster which its so-called Jewels of Saadiyat (Figure 20 and 21).

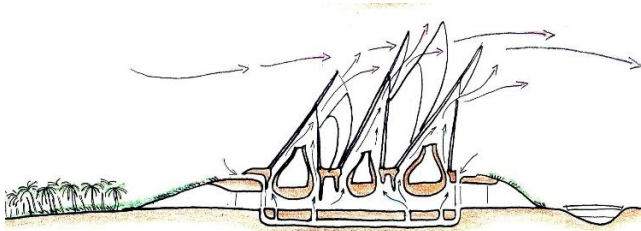


Figure 20. Foster's first sketch of Zayed National Museum [37].



Figure 21. Zayed National Museum [37].

5. Conclusions

Within the limited theoretical framework and discussion about case studies, we can conclude that:

- Iconic architecture is a contemporary architectural trend, depended on many strategies, branded by a significant formulation and symbolic form, designed by a famous architect (starchitect), planned to seek attraction and fame in the global level, and appealing popularity.
- There are wide differences among the iconic buildings before and after the spread of sustainable design strategies. We can notice in the differences of materials, power saving, pollutions, human comfortable sense, as well as costs....
- Among iconic buildings, the most significant sustainable buildings are considered iconic, although iconicity was not the goal. Therefore, Iconic buildings tend to apply the strategy of being sustainable and ecologically friendly among many strategies and in an intelligent way.

- The use of sustainability as a strategy in iconic architecture has an advantages and disadvantages for the city. This matter is based on how much the building and site improve the value of life quality. In time the sustainable design will more and more be frequent and tend to be ordinary.
- One of the iconic architecture objectives has drawn to attract tourists. Nowadays, the act of attracting tourists be able to become the key objective for a new iconic building. This new model of business seeks to transform someplace into to the global place in the world map. It improves the city as competitive destination; it often builds a new provocative architecture and establishes heavy investment increasingly.
- The corporate reputation and iconic characters are important. They are used as a tool to help in stabilizing new markets.
- After comparing among the three examples we can conclude that: Iconicity of Dubai is more of an image of technological vibes. While, Iconicity of Abu Dhabi in its two major projects is oriented with different ways. Masdar city meant to be Sustainable yet, it is considered day by day as an iconic city. Saadiyat Island tends to employ the name of most important famous brand like the Louver as a cultural effect and feature for attraction. Yet, they don't ignore the cultural character of the identity and place.
- Recommendations are oriented to architects and designers to focus on the advantages of depending on environmentally friendly materials, increase green areas, and as much possible go to Smart passive ways to enhance comfortable spaces for the human. In the same time, it important to be careful about the image-obsession and focus on the real effective image.

References

- [1] Winkenweder B 1999 Pitching charrettes: Architectural experimentation in the 90's *Art Criticism* **14**(2) 34-52 as cited in Godfrey A N and Gretzel U 2016 The use of modern architecture in city marketing *Tourism Travel and Research Association: Advancing Tourism Research Globally* **33** <http://scholarworks.umass.edu/ttra/2010/Visual/33>
- [2] Lewis M J 2007 The rise of the "starchitect": On the ungainly fusion of architecture and celebrity *New Criterion-New York* **26**(4) 4-9 as cited in Godfrey A N and Gretzel U 2016 The use of modern architecture in city marketing *Tourism Travel and Research Association: Advancing Tourism Research Globally* **33** <http://scholarworks.umass.edu/ttra/2010/Visual/33>
- [3] Jenkes C 2005 *The Iconic Building* (New York: Rizzoli International Publication) pp 7-208
- [4] Skliar L 2017 *The Icon Project: Architecture, cities, and Capitalist Globalization* (New York: Oxford University Press) pp 17-222
- [5] Sklair L 2010 Iconic architecture and the culture-ideology of consumerism *Theory Culture & Society* **27**(5) 135-159 DOI: 10.1177/0263276410374634
- [6] Sklair L 2006 Iconic architecture and capitalist globalization *CITY* **10**(1) 21-47 doi: 10.1080/13604810600594613
- [7] Rybczynski w 2010 *Makeshift metropolis: Ideas about cities* ed 1st Scribner hardcover (New York: Scribner) pp 132-133
- [8] Sayigh A 2014 *Sustainability Energy and Architecture: Case Studies in Realizing Green Buildings* (UK, USA: Elsevier Inc) pp 94-135
- [9] Elsheshtawy Y 2008 *The evolving Arab city: tradition, modernity and urban development* (New York: Routledge) p 212
- [10] Empire States Building <http://www.designbookmag.com/empirestatebuilding.htm>
- [11] The Seagram building <https://www.alamy.com/stock-photo-seagram-building-philip-johnson-mies-van-der-rohe-international-style-26706830.html>
- [12] Sears Tower https://en.wikipedia.org/wiki/Willis_Tower#/media/File:Sears_Tower_ss.jpg
- [13] Kibert C J 2016 *Sustainable Construction: Green Building Design and Delivery*. (Hoboken, New Jersey: John Wiley & Sons) p 4

- [14] Al-Kodmany K 2014 Green towers and iconic design: Cases from three continents *ArchNet-IJAR* **8**(1) 13-28 DOI: <http://dx.doi.org/10.26687/archnet-ijar.v8i1.336>
- [15] Gültekin A T 2017 Globalisation reflected onto architecture: Tall buildings of Ankara-Turkey *IOP Conf. Ser.: Mater. Sci. Eng.* **245** doi:10.1088/1757-899X/245/7/072035
- [16] Gherkin tower <https://www.alamy.es/foto-ciudad-de-londres-al-anohecer-el-pepinillo-londres-reino-unido-arquitecto-foster-partners-2004-121932612.html>
- [17] Gherkin tower air analysis <https://www.pinterest.com/pin/59672763789015165/?lp=true>
- [18] the new Central Bank of Iraq building, <http://www.urukia.com/central-bank-iraq-landmark-tower-baghdad-zaha-hadid-architects/>
- [19] Caprotti F and Yu L 2017 *Sustainable Cities in Asia* (new york: Routledge) p 135
- [20] Cugurullo F 2017 The Story does not remain the same: multi-scalar perspectives on sustainable urban development in Asia and Hong Kong *Sustainable Cities in Asia* ed F Caprotti and L Yu (New York: Routledge) chapter 2 pp 23-31
- [21] Ibrahim I 2016 Livable eco-architecture: masdar city arabian Sustainable city *Procedia - Social and Behavioral Sciences* **216** 46–55 doi: 10.1016/j.sbspro.2015.12.070
- [22] Montgomery C 2013 *Happy city: transforming our lives through urban design* (Canada: Doubleday Canada) p 101-102
- [23] The skyline of Dubai, <http://www.makel.com.tr/ru/electricity-meters-ru/gprs-ethernet-modem-ru>
- [24] Alraouf A A 2010 From sand to silicon one decade: Three paradigms from iconic developments to sustainable bubbles: Gulf cities transformed *Proc. Conf. on Technology and Sustainability in the Built Environment* (Riyadh: College of Architecture and Planning-King Saud University) pp 581-602
- [25] Dubai's islands <https://imgur.com/gallery/8LSyWaP>
- [26] Durrat Al-Bahrain <https://www.visathing.com/country/bahrain/>
- [27] Qatar's Pearle <https://rideonblog.wordpress.com/tag/team-time-trial/>
- [28] Acuto M 2010 High-rise Dubai urban entrepreneurialism and the technology of symbolic power *Cities* **27** 272–284 doi:10.1016/j.cities.2010.01.003
- [29] Bagherian B 2018 <https://www.baharash.com/how-dubai-will-become-the-worlds-most-sustainable-city/>
- [30] Dubai Sustainable and smart city <https://www.baharash.com/how-dubai-will-become-the-worlds-most-sustainable-city/>
- [31] Lau A 2012 Masdar city: A model of urban environmental sustainability *Social Sciences* (Accessed 22 February 2013) 77-82 https://web.stanford.edu/group/journal/cgi-bin/wordpress/wp-content/uploads/2012/09/Lau_SocSci_2012.pdf
- [32] Buletti N and Noisetiers C d 2011 *An Analysis of Masdar City's Communication Strategy* (Friburg: Universitas Friiburgensis) pp 21-30 http://www.unifr.ch/geoscience/geographie/assets/files/bachelor-theses/buletti_tpg_2011avril.pdf
- [33] Masdar city Abu- Dhabi the knowledge center <https://edenison.zenfolio.com/p247253823/h2A7551BF#h2a7551bf>
- [34] Masdar city Abu- Dhabi <https://www.pinterest.com/pin/170785010854347817/>
- [35] Saadiyat Island Abu Dhabi <http://www.tdic.ae/ar/project/saadiyat/pages/saadiyat-cultural-district.aspx>
- [36] Ponzini D 2011 Large scale development projects and star architecture in the absence of democratic politics: The case of Abu Dhabi UAE *Cities* **28** 251-259 doi:10.1016/j.cities.2011.02.002

- [37] Zayed National Museum <http://museumsofarchistars.altervista.org/zayed-national-museum-norman-foster/>