

博士論文

Gulf Coastal Urbanism; The influential ideas that have shaped the Gulf's
Waterfront with an emphasis on the Metabolist group work in the Gulf

(湾岸のアーバニズム：ウォーター・フロントを形成した着想
～メタボリスト・グループへの着目をふまえて)

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by

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A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Engineering

In

Urban Planning Department

of the

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ABSTRACT

Urbanization on man-made reclaimed islands from the sea in general is increasingly emerging as a global phenomenon that many urban planners and designers aim to achieve while designing new or expanding existing cities. While witnessed worldwide, the phenomenon is particularly used in the Arabian Gulf countries (of the Gulf Cooperation Council). This concept has gained noteworthy attention and recognition in urban design discourse, practice and pedagogy. When new territories are rapidly opening up to development, certain pressures, often political, arise to tap into them for tourism, housing and other development needs, that consequently lead to city expansions including totally new developments into and over the water. How could we balance this phenomenon? What were the challenges to execute such developments? and what are the prevailing forces leading to extensive sea sprawl in the Gulf? What influenced the Gulf countries and cities to change its morphology? Which forces and factors are cultural to the Gulf Region? and why are coastal developments more attractive than developing inlands? Given this background, this research is conducted with the aim of understanding the nature of the emergent cities and developments built on reclaimed land in the Arabian Gulf. This is conducted to identify the strategic urban design approaches anticipated in urban growth and the change employed in urban design practice.

Major coastal cities around the world witnessed several urban paradigm shifts related to the change of waterfront or interface with the sea, to develop marine and port cities to expand their conurbation. Thus, the concept of reclaimed cities gained ground to tackle rapid urbanization growth. Many theorists popularized the concept of man-made cities and artificial islands predominantly in the 1950s and 60s and since then it became a recent trend that shaped many existing and future cities.

While a big body of literature studies reclamation in the Arabian Gulf, the main focus of research has been on the symbolic representations achieved by such developments to relate this phenomena to the never ending image creation, show of power, identity, constant observation and national competition amongst the countries of this region. Moreover, many of those studies delve into environmental impacts of such reclaimed projects and the adverse effects on the

marine ecology and the environment. Other studies analyze the technological advancement that led to dredging and reclamation practices, and why the Gulf recent urbanization entails reclamation, which is leading to iconic and symbolic urban sprawl, technological solutions, and economic and political gains. This research tackles reclamation and Gulf urbanism through a different lens; by looking at the domination of international influence and knowledge transfer that transformed the Gulf's urban fabric including the reasons for the rapid implementation and constant production of additional lands in the Gulf's sea. This dissertation examines the issue of coastal space production in the context of the Gulf region through an investigation of several influential movements; the Japanese Metabolist movement being one of them, which is analyzed in particular to investigate the works of Kenzo Tange, Kiyonori Kikutake and Kisho Kurokawa. All of which have planned and implemented few projects in the Gulf countries during the late 1960s up to the 1980s, with the aim of tracing the avant-garde concepts and intentions of their Metabolism theories within the Gulf.

The dissertation hypothesizes different streams of ideas that influenced waterfront developments within the Gulf; however since the study of all the influences is beyond the domain of the available timeframe of the research, an attempt has been made to trace major influences with an emphasis on the Japanese Metabolists group. Their later connection to the Arabian Gulf as one source of ideas is studied in detail, as it marked a dramatic transition from a period dominated by unified urban expansions through the process of planning and engineering on landfill when expanding sites into the water, to a new era characterized by symbolic forms of city design dominated through conceiving cities in the sea, marking a new application to the design and planning practice in the Gulf region.

The research examines the coastal developments in the Gulf since the 1960s, as the legacy of reclamation was imported through foreign paradigms, in which the Japanese Metabolism principles and theories played an important role. Several case studies of built and un-built projects of the Metabolist members that worked in Gulf are selected for their different ideologies and perspectives on their own theoretical platform; Metabolism. Through a series of interviews with planners, engineers, researchers that witnessed those projects in the Gulf, the author tries to

shed light on the domination of international planners and highlight the thoughts that created the recent artificial islands and reclaimed cities in the Gulf.

Based on this hypothesis, the dissertation examines the morphological, social, economic and political factors behind Metabolism theories, their idealistic strategies and principles related specifically to building cities on the sea and tries to understand what has been transferred to the Gulf through the work carried out or conceptualized in the Gulf by some of its members. The analysis then looks at recent artificial developments within Bahrain as an extreme case on space exploitation over the Gulf Sea, and explores its planning principles using theoretical and common characteristics of the Metabolism ideologies. The study also measures the impact of decision makers in the formation of artificial settlements; the connection between the people, and the eventual form of the city expansion.

This study outlines the trends of waterfront developments in the Gulf and investigates the source of overseas ideas behind their existence during the recent decades by presenting significant urban and architectural projects located in the Gulf region. These projects showcase the approach to the design of waterfront environments in the Arabian Gulf. Moreover, this research tries to contribute to the persistent discussions, theorize and expand the literature available on artificial settlements within the literature on Gulf coastal urbanism and exemplify their spatial, social and sustainability aspects.

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CHAPTERS

1. INTRODUCTION

“The global population was 6 billion in 2005. By 2050 the United Nations predicts it will be 9 billion. While vast areas of land are available throughout the interiors of many countries, the same rule that applied in the ancient times when people settled near seas, oceans and rivers, applies now: coastal areas attract people. Today about half the world’s population lives within 100km of water. And this trend continues to grow.” (Kolman, 2017, p.1)

1.1 Purpose and Rational of Research

This chapter provides the definition of coastal reclamation, artificial cities, and finally a rough lineage of reclaimed cities in different parts of the world and tries to trace general themes, patterns and constituents of reclaimed settlements.

First the creation of spaces and islands in the water has been described by referring to many terminologies; coastal reclamation, artificial settlements, ocean cities and marine cities. According to Choi (2014) “Coastal reclamation is a practice that creates land or water areas by filling in or enclosing shallow coastal space”. “Coastal reclamation is defined here to include creation of land, freshwater reservoir, port and harbor, embanked fish farms, and other forms of enclosed uses of the coastal space” (Choi, 2014, p.426).

Similarly Curtis and Campopiano (2014) defined land reclamation as “the process by which people bring ‘unused’ or ‘waste’ land into ‘productive’ use. In the pre-industrial era, this meant the clearance of woodlands and bushes, the development of irrigation systems, or the drainage of wetlands, in order to create new land for cultivation and settlement” (Curtis and Campopiano, 2014, p.93).

However, there is currently no overall agreement on what exactly constitutes an artificial-city – despite various attempts to define it conceptually. Existing definitions study specific norms and dimensions, quantitatively and qualitatively through evaluative measurement, or in terms of practical guidance for artificial-city planning and implementation. Researchers and governments use it to describe a multitude of ideas and concepts.

Reclaimed islands and settlements emerged across the globe for many reasons; in Egypt, the pharaohs reclaimed lands to increase agricultural output of the region in the twelfth dynasty (Mr. Russler's Classes
we 2015-16, 2018). In the Netherlands, the Dutch have fought against the loss of their land, and historically three development stages of land drainage and reclamation activities took place. The surface of the Netherlands is at or below seawater, which led to technological and engineering advancements in the reclamation process for many centuries. The first stage of reclamation was reclaiming lands and draining lakes in the sixteenth and seventeenth century which was performed to stop the growth of the lakes for safety concerns and to gain

agricultural lands. Second, many other lakes were further reclaimed in the nineteenth century such as Lake Haarlem which was the largest lake drained in Netherlands. Third in the twentieth century the Zuiderzee tidal estuary was drained and reclaimed to add new land for agriculture, recreation and urban expansion (Hoeksema, 2007, p.113). In Crannog, Scotland, artificial islands were built using timber dwellings on piles in the 17th and 18th century along the shore as a symbol of power and to impose ownership of the surrounding landscapes (Dixon, 1984). Nan Madol which was called the Venice of the Pacific, hundred artificial islands, have been constructed of soil off Temwen Island to perform rituals (Wallin and Thomas, 2014). Many other islands were reclaimed expand in size to dominate power, protect their territory from neighboring attacks, to expand ports, and to improve its natural resources i.e. agriculture, water quality, dike building to prevent flooding.

It is worth noting that reclamation in Japan has started during the Edo era in Tokugawa 'Shogunate' or governorate where the tidal lands were easy to reclaim during the time that Japan had a strong influence from the Netherlands. In later years, as was the case of Dejima in Japan, many urban harbors were formed by further reclamation to create isolated immigration centers, or to create a space for an Expo event like in Notre Dame Island in Canada. Land utilization along the coast was long associated with shipping, fishing or oil drilling.

Recent waterfront transformations were made to change land uses from historical shipping needs to spaces holding cultural, tourism and mixed-use amenities. "The large areas of free water and the sea's attributes make possible a spatial value not available inland" (Kuroyanagi and Watanabe, 1991, p.16).

In Japan, religious sites and bathhouse residences were amongst the first uses that had strong ties to the seashore to create a scenic entity and to form a gateway, as some of those sites were mainly approached by the sea. For example, Itsukushima Shrine in Hiroshima prefecture built in 1167 by Taira-no Kiyomori and described by Kuroyanagi and Watanabe "The principal sanctuary and prayer halls are linked by walkways, bridges and corridors, creating a system of spaces over the sea". (Kuroyanagi and Watanabe, 1991, p.16).

Man-made Offshore Islands are not new phenomena in Japan, as mentioned above; Dejima Island was created in 1636 as the base for Dutch trading, and then in the period in between, land

reclamation has been a 'normal' tool for urban expansion, which can be seen when looking at the massive land fillings that took place in Edo from the 16th Century onward. In the 1960s-1970s Japan's economic growth led to harbor expansion i.e. Higashi-Ogishima and Daikoku Pier in Tokyo Bay, and Port Island and Rokko Pier in Osaka Bay and it is within that epoch that the Metabolist group introduced many concepts related to developing cities on artificial terrains in Japan. Reclamation was an effective means of disposing garbage; this method for example was used to create the touristic area of Odaiba in the shores of Tokyo Bay. Moreover, the concept of man-made islands was first mentioned in a report issued in 1977, by the Transportation Technology Council, an advisory organ established by the Minister of Transport. This Report was titled "An Inquiry into the Technological Aspects of the Construction of Structures on the Surface of the Ocean, and Policies Necessary for their Construction" (Matsumoto, 1985, p. 7).

This dissertation seeks to respond to why there is a theoretical and practical interest in developing cities on the sea and great keenness in advancing the theoretical and practical knowledge of such developments. It also seeks to explore the pressing reasons for adapting such strategies in designing and implementing such key projects and how urban designers and planners approached those developments including the factors and distinctive meanings of coastal developments that led to their current formation. Moreover, how have urban designers and planners approached the formation of their artificial city? And what are their main features? Accordingly, the question underlying this dissertation is how overseas ideas informed comprehensive urban master plans in the Gulf Region with a particular emphasis on the implication of thinking about reclamation developments and the dominance of utilizing coastal spaces in the Arabian Gulf.

The theories and principles of the Metabolism movement, for example, exerted new critical influences since the 1960s and contributed to key growth internationally. Also, new types of city on the sea ideas emerged and contributed to the change of conception of the city itself. Although such theories are physically remote, those ideas found their way to other cities and contributed to the morphological transformation of the Gulf. This thesis explores the key drivers of reclaimed cities and the reason why the Gulf Region has shifted its focus to expand through manipulating its coastline.

The investigation of design and planning initiatives that shaped such developments is essential and will be the main focus of this research, to illustrate a potential framework of analytical planning principles, and design for resilient cities. The study also analyses critically the foreign ideas that contributed to the formation of some of the reclaimed settlements in the Gulf. The core objective of this research is to provide an analytic framework for comparative research. Given this background, this research is conducted with the aim of understanding the nature of the emerging reclaimed, marine cities and oceanic developments to identify the strategic urban design approaches anticipated in urban growth and change employed in urban design practice.

1.2 Scope and Limitations

This thesis seeks to address the interrelated approaches in shaping the Gulf coastline with respect to their political, cultural, social, and economic dimensions and in understanding and manipulating the complexities inherent in current and future artificial and reclaimed developments. The proposed research will offer a way of understanding global tendencies in developing such master plans and will derive the prevailing factors that contributed to its coastline transformation.

Geographically, the study is narrowed down to the Arabian Gulf Region with Bahrain being the focus of this study with references made to some other places where required. Tracing the technical complexities of man-made developments clearly surpasses the scope of this research and residues subject of additional research.

Despite my basic knowledge in different fields, I tried to touch upon diverse aspects to form a thorough picture of such developments and show the various, intertwined factors, which determine its configuration.

The research looks at different influential thoughts and projects, which led to the Gulf's urbanism, the ideas of the Metabolists group are one of those stream of thoughts that the research investigates. However, to certain limits, it is difficult to trace the history of the work done, and the discussions held five to six decades ago as many of the key players passed away and many of their work in the Gulf specifically lacked archival materials. Additionally, many of the articles, journals and the books found on this topic were in Japanese language.

1.3 Methods and Material (Research Question and Methodology)

“Just as settlements are diverse and complex, so there are many ways to describe and understand them.” (Kropf, 2009, p. 105)

The questions underlying this dissertation include the following: what were the influences that informed the Arabian Gulf Coastal Planning? is there evidence of new spatial planning regime due to Metabolism theories reaching the Gulf? how did Metabolism affect planning after some projects got implemented in the GCC by some of the Metabolists’ members? and what is the proceeding morphological, sociological and economical impact on the Gulf’s new master plans and mega-projects?

To answer these questions, the research aims to respond to the following:

- When did reclamation start in the Gulf as drawing on the sea to create a city as an outlook over the open sea?
- What are the stages that the Gulf Region went through with regards to reclamation?
- What is the influence of Japanese thinking on the Gulf in general and what have they managed to transfer from their design and planning principles?
- What principles and strategies of Metabolism philosophies and utopias were enforced within the work that was conceptualized or implemented in the Gulf since the 1960s to the 1980s? To what extent these ideas relate to Japanese or the Arabian Gulf culture and context?
- What are the morphological, sociological and economical implications of man-made cities within the Gulf?

To conceptualize reclaimed cities and man made islands, which involve diverse spatial typologies, political and historical dimensions as well as other associated theories, the study attempts to cover a wide spectrum of research to trace the development of man made islands and coastal developments from its early inception in the Gulf. Accordingly, the proceeding chapters will discuss implemented projects and plans, based on the work done by the Metabolists group in the Gulf.

In order to fulfill the aims and objectives of this research, qualitative research is used to examine the overseas ideas that traveled to the Gulf and to provide an analytical framework for comparative research, with a combination of methods using; mainly documents, archives analysis and interviews with people whom were involved in those projects during the relevant

timeframe. This dissertation argues that a key component of the methodology is fieldwork to build on-the-ground knowledge with critical review of literature, any available reliable and relevant research studies and official documentation, information and public debates shared in newspapers about sea sprawl as a mechanism to city expansion. The comparative study is used therefore to analyze the factors and constraints related to coastal developments in the Gulf. Interviews with planners and architects that were working on seashore developments, and site visits in the Gulf were made to rationalize the reclaimed developments and to examine the main drivers behind their form of development based on their relevance to the research at hand. Hence, a qualitative research method using primary and secondary data will be adopted. According to Naoum (2007) qualitative research primarily relies on subjective qualitative information encompassing experiences, descriptions and interpretations on a given topic (Naoum, 2007).

1.4 Approach and Theoretical Framework of Research

Specific planning influences will be theorized to highlight the dominance of international planning regime in the Gulf and to explain the principles used while planning projects along the Gulf's coastline.

This process follows the approach proposed by Naoum (2007) to narrow down the research, which started with general key words "Metabolism", "Ocean Cities", "Marine Cities", "Reclaimed Islands" and "Artificial Platforms" based on an initial idea of the topic at hand. Then, the sources were narrowed down to specific aspects identified through review and analysis of the literature pertaining to formation of the ideas adopted while designing cities on the water to guide the comparative analysis between the views of the Metabolists in the debate as a final focus of the research, as illustrated in figure 1 below.

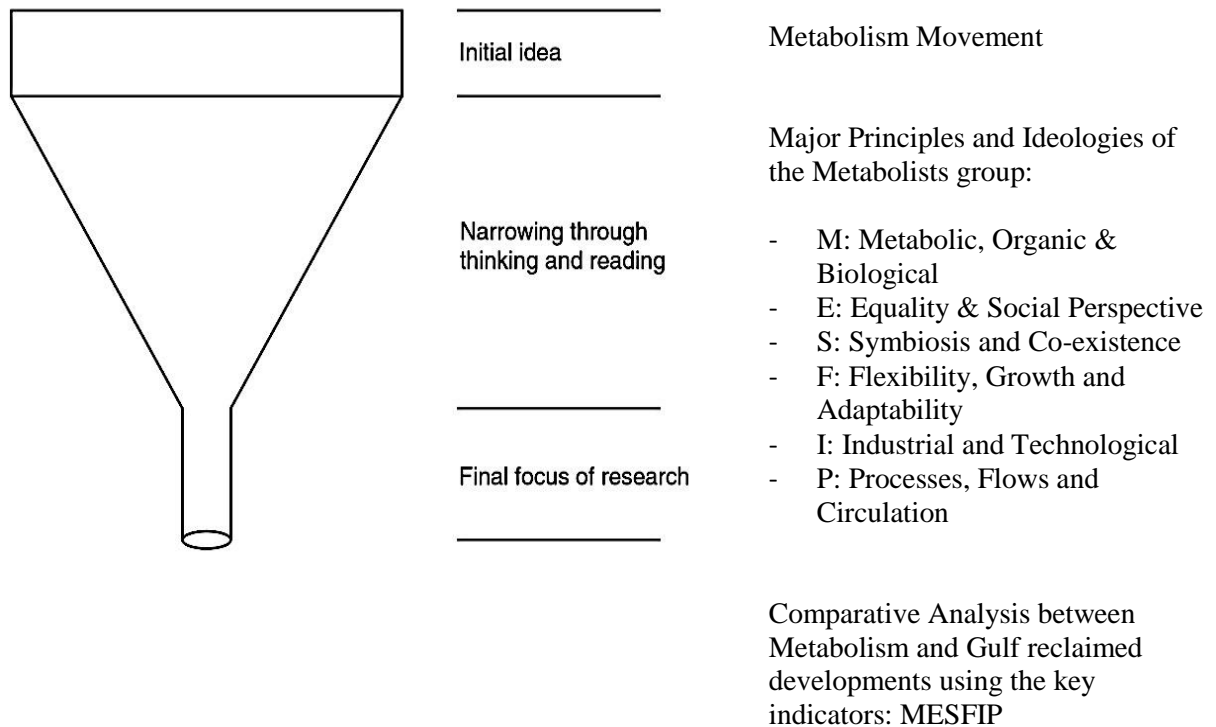


Figure 1.1- Narrowing down of research (Naoum, 2007)

The study adopts empirical analysis based on theories rationalized by the Metabolism Movement; the first part identifies their strategies and principles in building cities on the sea as a formation of new cities or expanding existing ones. The second part inverts those measures, identifying strategies and principles and attempts to investigate their applicability to recent projects in the coast of the Arabian Gulf.

1.5 Thematic Structure of Dissertation

Research Content & Structure

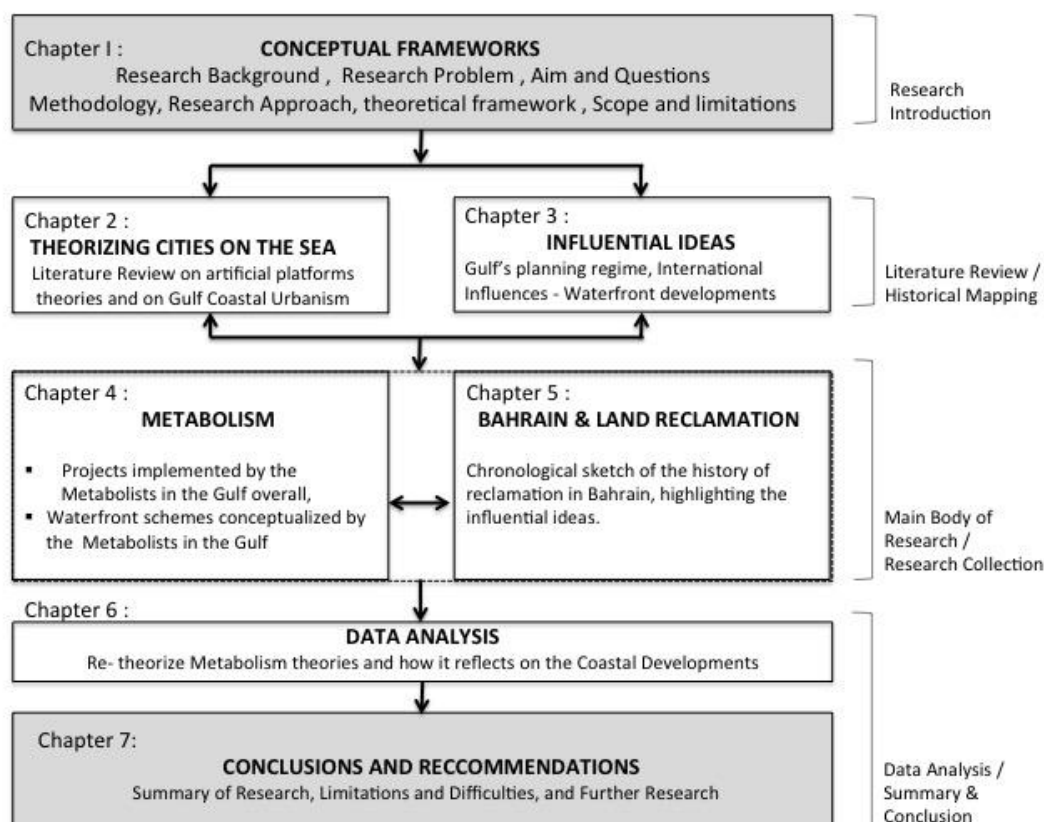


Figure 1.1 - Dissertation Structure

The research is formed in seven chapters; the first chapter defines the purpose and rationale of the research through the research objectives and provides elaboration on the methodology which examines a variety of literature and sources that were closely studied and interpreted to draw attention to the themes and methodologies pertaining these reclaimed developments.

The second chapter is multi-disciplinary in focus; firstly it will explore global trends, typologies, urban development methods and tendencies in urban growth on artificial terrains. Secondly it will examine strategies used in shaping a number of existing reclaimed cities by giving an overview of the existing researchers that wrote about cities on the sea and provided a theory of artificial platforms and reclaimed cities which in turn translated into the new built urban environment. After reviewing those concepts, an in depth analytical framework is proposed to look into the diverse principles and philosophies that informed the physical and spatial production of such settlements which are illustrated by different precedents in the consequent chapters of this

dissertation. This chapter then highlights the emerging discourses on Gulf coastal urbanism; to portray the recent discussions on man made islands in the Gulf.

Chapter three outlines the influential overseas ideas by examining the historical processes and studies artificial developments around the Gulf, identified through a series of case studies, set of projects, trends or experiences that formed the Gulf's seashores. This chapter emphasizes the historical background and the evolution of Gulf urban expansion and coastal developments, and outlines in detail the strategies employed in those developments to have a clear understanding of current and historic reclaimed sites. It investigates the various local projects and substantial cases to discuss the typologies developed by local and external experts, the related institutions and planning tools used.

Chapter four defines the diverse spatial typologies, political and historical dimensions as well as other associated principles related to works of the Metabolists team in the Gulf. Based on the works of the Metabolists group in the Gulf, the Japanese planners introduced their ideas of planning cities in the water through many of their schemes in Qatar, UAE and Saudi. Though the only reclaimed development that was implemented was the King's palace in Jeddah, those ideas provoked further reclamation in the Gulf as witnessed presently. Thus, this chapter attempts to cover a wide spectrum of literature and interviews to trace the projects envisioned by the Japanese group with specific interest in the projects and developments of reclaimed cities from its early inception in the Gulf. This includes their proposed and completed projects, associated plans and details found through different journals, books, publications, and discussions held with some of the planners that were involved in those projects.

Chapter five provides a rough chronological sketch of reclamation and planning in Bahrain; describes the work done during the fieldwork as a first step to understand the reclaimed developments genealogy, geography and correlated planning issues within the context of Bahrain; through the analysis of some of the master plans and existing manmade islands, with the underlying concern of reclamation as a key driver for such tabula-rasa schemes. This chapter additionally investigates the local planning system and planning visions that led to the creation of such development patterns in Bahrain.

Chapter Six synthesizes the discoveries of the Metabolism philosophies, creates a framework to test those thoughts and analyzes them through the recent developments within case studies in Bahrain; to look into the extent of such ideas and whether they are still relevant today to manifest themselves across the Gulf region.

Chapter Seven summarizes the discoveries of the preceding chapters and underlines the works of the Metabolist group in the Gulf showcased through over 20 projects that were carried out by some of its members from the 1960s till the 1980s, with at least 7 projects that entailed reclamation and proposed a linkage to the Gulf's waterfront.

2. THEORIZING CITIES ON THE SEA AND ASSOCIATED PLANNING THEORIES (THEORITICAL FOUNDATION)

“Man is fast running out of living space. Only a quarter of our planet is dry land; the rest is ocean. And our growing numbers are filling that quarter to bursting-point. We have to find a new place to live if we are to survive. There are three choices: on other planets, underground, and on the sea. The last of these seems the easiest choice. With this in mind, the idea of Sea City has been born - and what a fantastic idea it is! The architects who have planned this amazing place have built beautiful scale models to show what they have in mind. Looking at the models, our thoughts catapult us into the future - to the day when Sea City could be a reality.” (Aiai.ed.ac.uk, 2017)

2.1 Introduction

The growing interest in the expanding urban territories influenced many literature and burgeoning discourses on man-made settlements. Since the artificial-city term is not mature yet and the geography of each city is different, the overarching imagery of those cities differs given their political, historical and socio-cultural backgrounds. Despite all ambiguities, the practice of these ideas has evolved with discursive experimentations.

The 'Process: Architecture, Composition of Oceanic Architecture No.96', published in 1991 displays various explorations of projects designed globally close to the water, over, on and under the water debating at that time that waterfront developments came to the "forefront of public attention" (Kuroyanagi and Watanabe, 1991, p.16) and that the "demand for waterfront and ocean space will increase in the future" (Kuroyanagi and Watanabe, 1991, p.18).

On another note, three categories were classified by Akio Kuroyanagi for the way sea is used in oceanic architecture from the viewpoint of spatial utilization: plane, volume and multi-dimensional utilization. The first being of the water surface by storing it in the form of a water body – this type only relates to water but commonly doesn't require reclamation. Secondly by spanning or crossing the water and the last category embraces and draws in the water. (Kuroyanagi and Watanabe, 1991, p.18). Fishing piers, Marizon City Resort in Fukuoka, a complex of sea based facilities built on reclaimed land with artificial beaches (Kuroyanagi and Watanabe, 1991, p.48), Nagasaki Holland Village – theme park completed in the 1980s and Huis Ten Bosch resort in Sasebo area influenced by Holland are all exemplars of volume utilization in Japan. It is worth noting that a large number of pleasure piers with amusement and retail facilities were built in England, the first of them was constructed in 1823 in Brighton. In 1910, thirty piers were built all over England. (Kuroyanagi and Watanabe, 1991, p.56). Whereby, examples of multi-dimensional utilization includes Teradomari Aquarium completed in 1983 that holds as an aquarium 'strong ties to the sea' (Kuroyanagi and Watanabe, 1991, p.144), Tokyo sea Life Park in Kasai Marine Park which was completed in 1989 with buildings designed to create a morphological expression relating to the sea, the ring of fire aquarium concluded in 1990 in Osaka, where its 'exhibit content presents the vast pacific using the powerful metaphor of the

ring of fire – a linear zone of volcanic and tectonic activity outlining the Pacific basin.’
(Kuroyanagi and Watanabe, 1991, p.116)

This chapter pursues to study the ideas, concepts, visions and key theorists who inspired the planning, design and production of reclaimed cities and when and why such concepts emerged globally. Additionally it proceeds to compare these concepts with other existing planning theories and practices and showcases how these ideas were perceived in those times. A second body of literature reviewed in this chapter investigates the discourses on reclamation within the context of the Arabian Gulf to provide a rough lineage of what has been published on reclaimed developments in different parts of the Gulf’s coastline and tries to trace general themes, patterns and underlying assumptions in projects that entailed reclamation.

2.2 Theoretical Concepts and Ideologies behind Oceanic Space and coastal developments

Expanding cities through reclamation is not a singular body of thought but an amalgamation of various planning modes and theories that have arisen in response to the benefit of their formation, also to the side effects of landfill developments during the past decades.

The German jurist, philosopher and political theorist Carl Schmitt published his text in 1942 on ‘Land and Sea’, which tries to render the geo-political history of humankind and the endless tension between land and marine civilization. He verifies through his text the ‘thesis of opposition’ between land and sea by referring to historical cities such as Athens, Rome, Byzantine empire and Venice and characterizes Venice as “a highly developed, coastal and lagoon civilization” (Tavadze, 2013, p.46). He emphasized through his essay on the historical collective existence of people and their shift from land towards the sea. In ‘Land and Sea’, Schmitt analyzed “factors which were responsible for the spatial revolution and which were the reason for the choice of a new element (sea)” (Tavadze, 2013, p.46). He also praised the ‘sea-roamers’, whale-hunters, courageous travelers and discoverers who were frontiersmen in the great process of spatial revolution’ (Tavadze, 2013, p.51). In addition, he refers to the Internet and the digital communications as

fundamental tools that rapidly globalized the world and “made humans more and more aspire to move from the earth to the infinite spaces of our universe” (Tavadze, 2013, p.51).

Elizabeth Mancke examines in her article “Early Modern Expansion and the Politicization of Oceanic Space” the power and the control that happened throughout the world as new empires accessed oceanic space for oceanic trade and subsequently acquired colonies. This territorial control led to many contests for oceanic space in the last five centuries making oceanic space “a central arena of imperial struggle” (Mancke, 1999, p.234)

Reclamation and coastal development opened the horizon for city expansion in many countries, and led many city planners and architects to explore building on the sea and deriving utopian visions for the future cities. As the term is broad it is therefore approached differently in the United States, Europe and Japan and the concept is tackled from different perspectives.

In Japan specifically, the geographical morphology and topography of the island led to massive reclamation activities to gain land for inhabitation. International discourses centered on planning on the sea originated predominantly from Japan and Europe. The scholars of the Avant-garde Metabolism movement throughout the 1950s and 1960s envisioned a futuristic floating city, though many of their plans remained mainly a concept, a collection of ideas and propositions about their critical view and solutions to urban planning, transportation and housing issues.

Japanese call reclaimed lands “Umetate-chi” which refers to floating structure or reclaimed city; “Umetate” is fill in and build, “Chi” is land or earth. Also, the term “Kaijo” refers to reclamation as “Kai” is sea and “Jo” is above. In Japan many terminologies were associated with building cities on the water and used throughout the metabolism movement such as artificial platform, floating city, marine city, ocean city, and sea city. Thus, many alternative terms and synonyms are used interchangeably to describe reclaimed waterfront developments, Kenzo Tange and Kiyonori Kikutake in particular both insisted on those concepts. One reason for the emergence of such projects was the disproportionate urban growth joint with fragmented property patterns that didn't allow for an appropriate and timely planning response in Tokyo on existing lands.

Furthermore, because of the conceptual complexity of artificial developments, other theories, inspirations and concepts are closely related to the creation of those ideas, such as post war urban expansion strategies, the garden city movement and tabula rasa in city planning.

In Japan, several planning reasons led to reclamation particularly in Tokyo, which includes traffic congestion, shortage of land for new buildings, the lack of good urban facilities and poor quality of the public housing construction. Other than that, numerous economic factors led to reclamation such as cost of natural lands in the urban fabric of the city, the weakness of the expropriation laws and the strategic importance of the sites close to the sea. These areas close to the ports were most suitable places for new industrial factories for ease of trade routes, and import by sea of raw materials i.e. oil and coal.

Artificial Human Settlements arose as a method to deal with a specific set of problems; A British Scholar M.F. Richards during his survey in Japan identified three main factors of fast and uncontrolled reconstruction which produced urbanization at high pace, first economic growth accomplished without any effort to improve the layout of already existing cities, second, the lack of efficient planning legislation (laws of land expropriation), and third, urban design and planning were activated in a Japanese University just after 1962 (absence of a corpus of professionals). (Pernice, 2007, p.260)

Ports along the Pacific coast (Metropolitan areas of Tokyo-Yokohama , Osaka-Kobe and Nagoya) were the economic spine of the nation and centers of all main industrial and commercial activities. Thus, all those areas went through massive reclamation and coastal transformation.

The process of growth of land surface had already started since Edo Epoch, but due to 1940 scheduled as the year for Tokyo Olympics and Tokyo international Exposition, a greater emphasis was given to infrastructure and city growth.

The Foreword written by the American architect Bertrand Goldberg who designed the Marina City in Chicago in the 1960s as direct inspiration of - one of the members of the Metabolist Group - Kikutake's Tower-shaped community stated "To build on the water is to affect our living in three ways: **aesthetically, sociologically and economically**". The aesthetic agenda is very evident and is a common argument that led to such initiatives, as claimed by Goldberg, buildings on water have a "kinetic relationship with its site, constantly in motion and infinitely deep and wide". From a

sociological perspective, he argues that living on water offers “a new perspective of openness, a new sensitivity to human relationships which are not defined by earth’s boundaries”, and from an economic point of view, there is no cost associated to lands on water at that time, and that buildings on water attract people to pay more as they tend to use “more than the building itself” (Kuroyanagi and Watanabe, 1991, p.13).

2.4 Metabolism theory and the work of its members– 1950s to 1960s

Metabolism as defined by Ken Tadashi Oshima in conversation with Daniel Ibanez and Nikos Katsikis:

“The concept of metabolism emerged in the nineteenth century as a metaphor for the exchange of matter between an organism and its environment. In biology, the term metabolism is mostly used to describe the process that occurs in individual cells and organisms that allows organisms to grow and reproduce and respond to their environments. In the social sciences, the concept was issued by Marx to characterize the relationship between humans and nature, as derived from the work of the German soil chemist Justus Von Liebig.” (Ibanez and Katsikis, 2014, p.99). He elaborated further by saying that “In the context of Japan, metabolism can be understood by the term *shinchintaisha*, which literally translates as “renewal, replacement, metabolism”. This term is often used within Architecture in reference to using wood-frame structures, with rotten portions replaced as required. It also implies that a building is constantly evolving as a living entity.” (Ibanez and Katsikis, 2014, p.99)

Metabolism “proposals for a new urbanism manifesto” presented at the World Design Conference in Tokyo in 1960, promoted reconfiguration of the modern city, as a response to entering into the postindustrial age in the 1960s. The manifesto started with a group of young architects, namely the critic Noboru Kawazoe, Fumihiko Maki, Kisho Noriaki Kurakawa, Kiyonori Kikutake, Masato Otaka, the industrial designer Kenji Ekuan and the graphic designer Awazu Kiyoshi. Kenzo Tange is associated with this group and is considered that father of the Metabolism movement given that he taught, mentored or had some of those members working in his office. Arata Isozaki was a student of Tange and worked in his office and therefore can be regarded close to this theoretical movement as well. The theories of the Metabolist Group were linked to the Japanese culture and tradition, which relates to their Buddhist beliefs of transmigration; their thoughts were thus linked to the ideas of temporariness, metabolic and organic forms with flexible and mobile elements. Accordingly, the group exposed their thoughts for a new urbanism which ranged from floating city ideas, to futuristic lifestyle living, prefabricated housing, sky cities, capsule buildings and industrial architecture.

Influenced by Le Corbusier, Paul Rudolph and Louis Kahn, as well as Alison and Peter Smithson of England, Aldo van Eyck of Holland and others of the Team X group and Congrès Internationaux d'Architecture Moderne (CIAM), and supported by Kenzo Tange, the Metabolist group envisioned futuristic projects, which saw the city as a mirror of the far reaching transformation that occurred in society during the postwar period, and sought to introduce into the city a new structural order based on an organic and balanced development by means of technological devices (Figure 2.1). This movement had been captured and exhibited at the Mori Art Museum held in Tokyo in 2012 with the title 'Metabolism – the City of the Future' which displayed a survey of the Metabolist influence around the world.

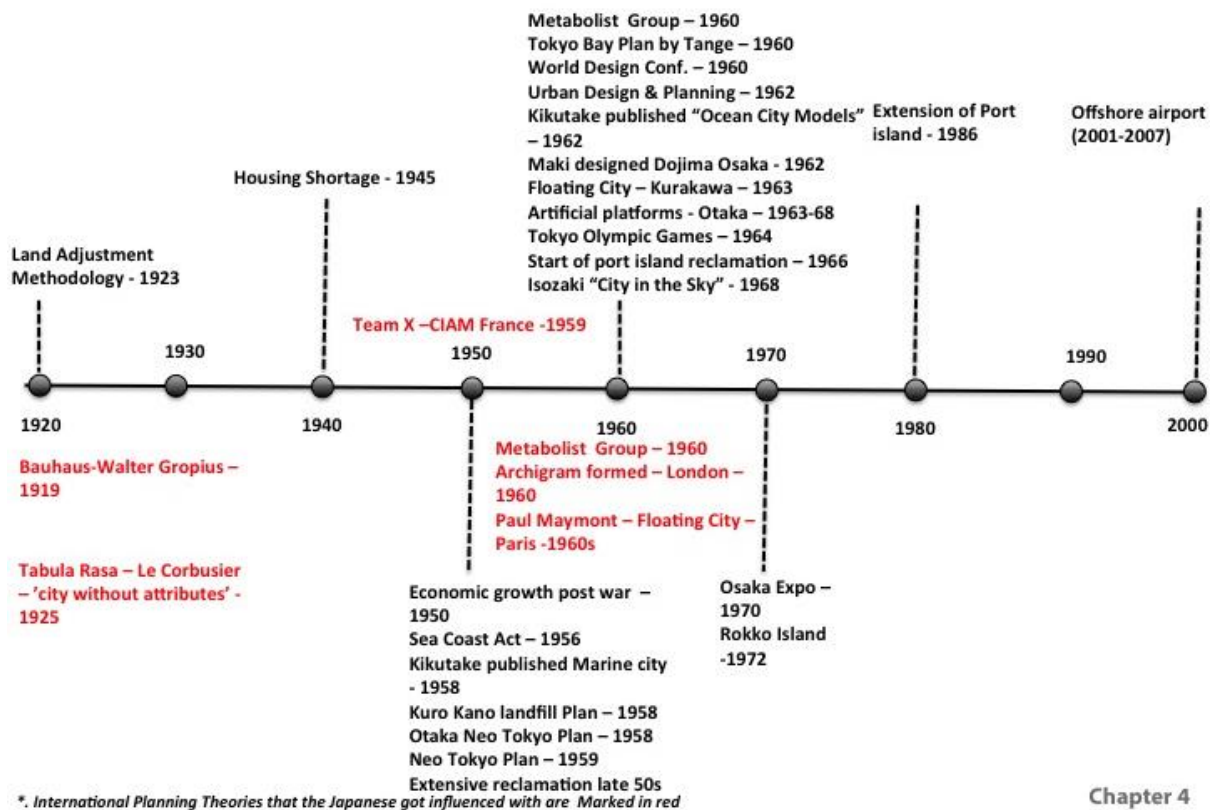


Figure 2.1 – Timeline of events and international movements that led to the emergence of Metabolism (done by the author)

The continuous population growth and development of industry suggested reclamation of the waterfront in the port of Tokyo. This reclaimed area became the most favorable site for larger factories, gas plants, central markets, sewerage facilities and power stations, all of which would be situated outside the older part of the center of the city. Most of these projects were reclaimed on waters with an average depth of 20 meters (Figure 2.2). The Metabolists group reacted to the

extensive exploitation of natural sites in Japan by creatively suggesting technological techniques in the field of port construction and oceanic engineering to mitigate the damage caused by such unprecedented scale of development.

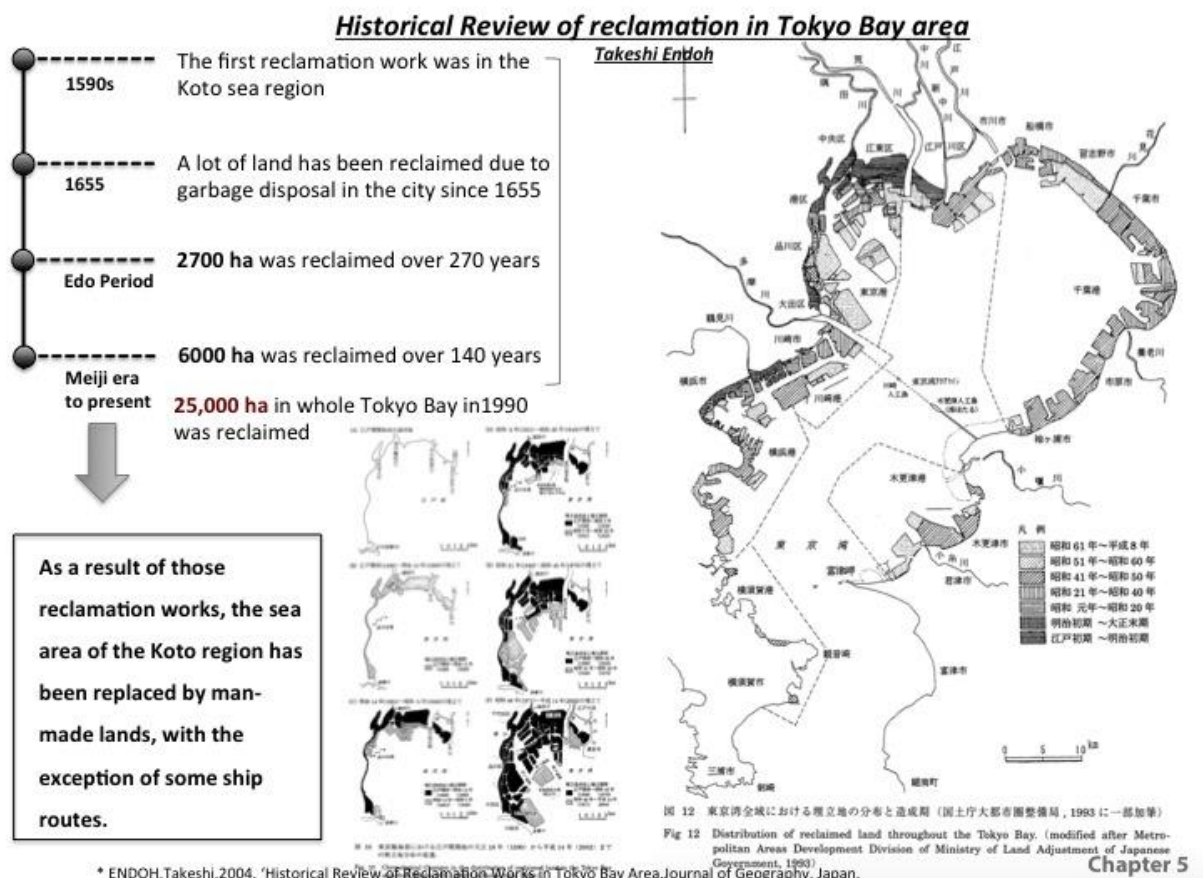


Figure 2.2 – Historical Review of Reclamation Works in the Tokyo Bay Area (ENDO, 2004)

Although the members were often meeting to discuss Japanese direction in urbanism and their ideas for the Metabolism movement, each had distinct philosophies and design concepts that enriched the overall vision of building an ideal society. Highlights of each member within the Metabolism group will be illustrated below:

Noboru Kawazoe

The name Metabolism promoted by Kawazoe first appeared in his introduction to the pamphlet ‘Metabolism 1960’ (Tamari, 2014, p.206) which refers to metamorphosis, endless change, flexibility and industrial design methodology. Kawazoe was the former editor of the magazine Shinken-chiku and

had published many Japanese books pertinent to Japanese architecture and the urban issues that Japan was facing at that time such as rapid population increase, megacities and the search for new sites and spaces for urbanization in the ocean and the sky which were amongst the issues he explored. He was considered the theoretical head of the metabolism group and promoted through his ideas the unity of man and nature to create a single living organism. His essay 'Material and Man' was one of the essays published in the Metabolist Manifesto and he later coordinated the architectural program for Osaka's Expo in 1970 (Taylor, 1999, p.317).

Kawazoe criticized modern architecture by stating: "...the linkage between architecture and city is related to the issue of interaction between order and disorder. The disorder of social activities is the basis for the vitality of the modern cities. The philosophy of Metabolism must, concerning this reality, balance the disorder of the city" (Pernice, 2004, p.359)

As stated by him referring to the form of the city of the future in 1960: "...What will be the final form? There is no fixed form in the ever-developing world. We hope to create something, which, even in destruction will cause subsequent new creation. This "something" must be found in the form of the cities we are going to make-city constantly undergoing the process of metabolism" (Pernice, 2015, p.621).

Fumihiko Maki

Fumihiko Maki was a graduate of Tange's lab; he published along with Masato Otaka in 1960 an essay in the Metabolist Manifesto called 'Toward Group Form' which was inspired by observing villages and cities in different countries. The notion of grouping forms was his interest to establish grouping of buildings and to create repetitive patterns with intricate order. His mode of investigation revolved around urbanism and the delicacy of the urban fabric. Despite the fact that he was the first to publish the term 'megastructure' in his book "Investigation in Collective Form" in 1964, he focused in his work on small scale to provide rich spatial experiences and to approach urban planning from the human oriented vision, unlike the other members of the group such as Tange where they focused on mega scale developments and technological expression.

Furthermore, Maki did not believe in iconic images and focused on less powerful imagery with functional design. He maintained a civic attitude with no intention to create symbolic architecture,

which limited his exposure in Asian countries. His proposals for urban projects focused on metabolic and open-ended planning approach to accommodate for the changing city dynamics.

He published two books while teaching in Washington University “Collective form – three paradigm” on 1963 and published in Harvard University Graduate School of Design “Movement Systems in the City” in 1964, this concept and theory came as an inspiration of the works of Aldo Van Eyck and Hermann Hertzberg, the members of CIAM and Team 10.

His theory as highlighted in figure 2.3 below comprises of three types of collective form: Compositional form of city plan which is the modernist space, Mega form similar to the Tokyo Bay project by Tange for example, and Group form which differs from compositional in the way elements relate to the totality. (Schalk, 2014, p.291) Group form was noticeably his favored approach in city planning (Figure 2.3). One of the examples of this type is the Shinjuku Station Proposal (Figure 2.4), which was designed as a total group embracing smaller groups of different buildings, all created on a raised artificial platform (Taylor, 1999, p.318). “Maki envisioned a program of “city rooms” within the artificial city-in-miniature a discrete, incomplete, and sensitive matrix of porous enclaves.” (Xue and Xiao, 2014, p.230). Both Maki and Otaka criticized the inflexibility and monotony of cities and promoted flexible group form, which allows flexibility in the planning of the individual and the collective within any changing context while maintaining unity. The collective form and the assemblage of elements aim to group buildings that have synergy together or have a reason to be grouped.



Figure 2.3 –Collective Form Theory , Fumihiko Maki – 1964
(Kara Michelle Moore, 2018)

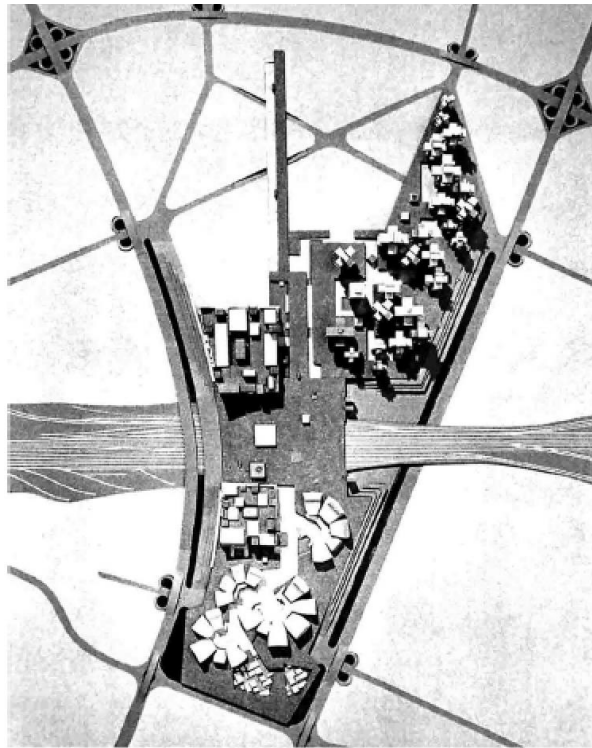


Figure 2.4 – Shinjuku Station Project in Tokyo, 1960. Courtesy by Maki and Associates.
(Xue and Xiao, 2014, p.234)

“Oku” is a Japanese word that was initially used by Fumihiko Maki; it can be roughly translated as ‘space lying somewhere deep inside’ (Li and Shelton, 2011, p.270). It describes the particular sensory depth, which appears in three-dimensional architectural spaces and Japanese cities. “The “Oku” concept is one where there is always something in front of us, which encourages people to keep moving forward and search deeper.” (Li and Shelton, 2011, p.270). This concept has been explored in Maki’s designs to create invisible layered spaces throughout his buildings designs to establish hidden spaces that enriches the design experience. It is evident in his design of the Daikanyama Hillside Terrace where he utilized the rich hidden spaces within the surrounding context of his project as elements of investigation and to showcase the sequence and linkages of historical events. The project is constructed over the span of 25 years over 6 phases as shown in figure 2.5. This project reinforces his idea of promoting the shift in terminology from a “master-plan” to a “master program”, which entails a time dimension.

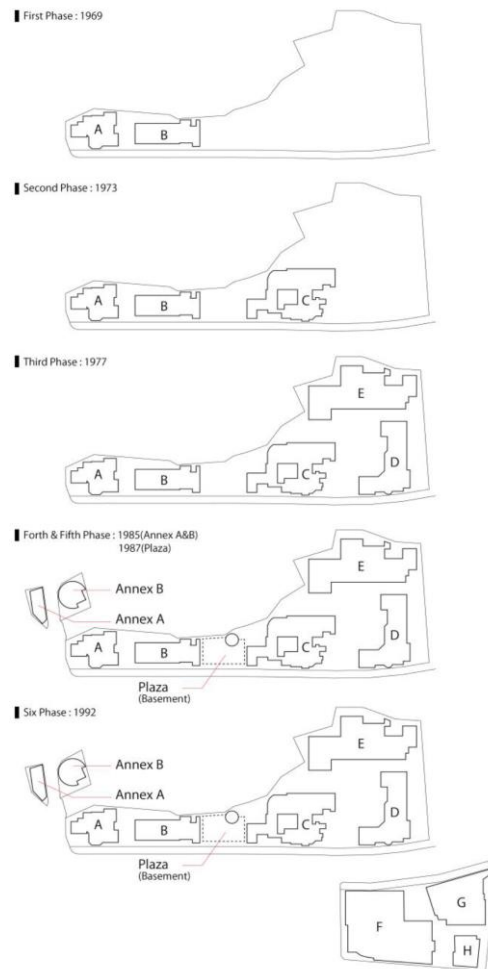


Figure 2.5 – Daikanyama Hillside Terrace – Development over six phases
(Ono, 2017, p.393)

“Master Form” was another term which was “introduced as an “ideal” which can move into ever-new states of equilibrium and yet maintain visual consistency and a sense of continuing order in the long run...The vital image of Group-form derives from a dynamic equilibrium of generative, not a composition of stylized and finished objects.” (Taylor, 1999, p.318). Both ideas of “group-form” and “master-form” were developed in Maki’s two stage built design of Rissho University Kumagaya Campus in 1965, which underlines the beauty of imperfection and permits penetration and change as required. The Campus was designed in accordance with his ‘Group form’ theory, which made him spatially organize the campus in two building clusters “along two primary axes set at thirty degrees to each other, and a defining major exterior space with several ancillary spaces.” (Taylor, 1999, p.318).

Kenzo Tange

In an interview with Paul Tange in January 2016 he described Kenzo Tange's fascination with projects close or over the water. He stated that Tange came from an island country, he was born in Osaka, but his family came from Shikoku that is Japan's smallest major island. He grew up in Hiroshima and went to school there. He stated that (瀬戸内海, Seto Naikai) refers to inland sea in Japanese, the water channel between **shinkoku** and **apunshu** was very important for Kenzo Tange. Hiroshima is one side of the inland sea and Shikoku is on the other side. That Channel was the route to the outside world in the old days. Many ships from China, Portugal came through this waterway, therefore, Tange valued waterfront sites and marked his new idea which revolved around designing and building on artificial lands. He always said, he will only work under two people, Michael Angelo and Le Corbusier; and since Michael Angelo was long gone, Tange established good relations with Le Corbusier and worked for Kunio Mayekawa whom worked with Le Corbusier in Paris till 1930.

Kenzo Tange presented the Metabolist work in C.I.A.M meeting in 1959 in Otterlo, which exposed the Metabolism ideas internationally and to international architects in Netherlands including the Team 10 members, Louis I. Khan and Ernesto Rogers (Lin, 2006, p.39). Later, in 1960 at the World Design Conference in Tokyo, the Metabolists presented their ideologies as a collective group and officially named themselves. Tange invited the Smithsons to attend this conference. "The presentation Kenzo Tange did at Otterlo set the tone for the future of Metabolism, and the ideas were rooted, all of them very closely related to structuralism; the different growth rate of the city, offering an overarching structure that guides development without constraining it and creating a biological growth of the city in a pattern, adaptability and modularity and finally the use of new technologies." (Serra, 2018, p.5)

After that, Tange taught at the MIT where he further developed his ideas with his students. There he started working on a project for the Boston Bay, which established the basis for his well-known Tokyo Bay Project designed a year later (Figure 2.6).

Tange's appeal was related to his approach to national and city planning and advocated a radical approach to structure the modern city. He integrated in his ideas urban mobility, city as a process, linear civic axis and "Pivotal Cities" which are cities expanding by means of pilotis and core systems in his urban schemes. He attempted to create a new physical order in the linear design of Tokyo bay

plan, which allowed for future expansion and controlled urban sprawl. Tange was considered the leader and father of the Metabolism movement, because of his three-dimensional thinking, vertical movement and horizontal expansion possibilities, and with Le Corbusier's influence inspired him to think of freeing the ground level to create open landscaped spaces.

The most famous marine city was (Tokyo Bay Plan - 1960) by Tange. It represented the first paradigms of theoretical approach to urbanism. His famous plan was for a city of 10 million people, a plan that rejected the conventional satellite-town systems, and announced the theme of a new large dimensional urban settlement, the 'megalopolis', as a new key urban entity of the second half of the 20th century. Tange's and Metabolists urban schemes weren't put in act for several years, but they became the first prototypes for a "megalopolis" and megastructures in the last few decades.

The Tokyo Bay plan aimed to generate new land values by moving out into the sea. "Tange's conception of change as process identified three phases the first was continual inner agitation (metabolic regeneration), the second was constant outward movement (growth), and the third was abrupt transformation (metamorphic change)" (Antoinette Middleton, 2009, p.24). Tange's postwar projects were an exploration of a new scale of design with an adaptation of new technologies.

Paul Tange described Tange's approach to the plan of Tokyo by saying that it was based on a clear axis, and proposed a linear city in Tokyo Bay as Japan's land is scarce, and as Tokyo bay is not deep, he thought it could start as reclamation and then on piles, to create floating islands as illustrated in Figure 2.6 below. This futuristic city plan stretches as a backbone linking the metabolic scheme over the waters of Tokyo Bay.

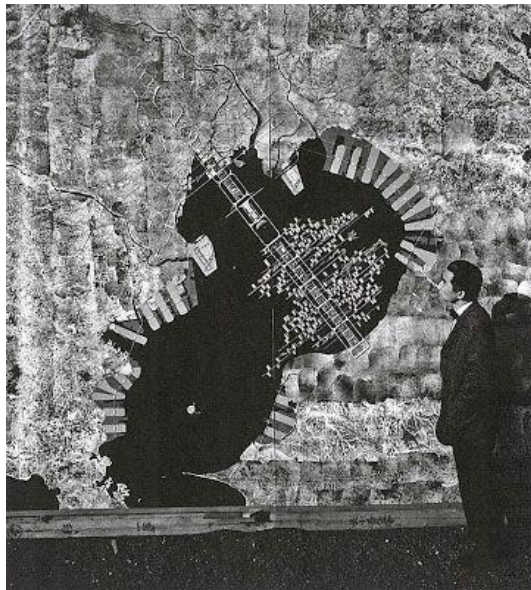


Figure 2.6 – Kenzo Tange in front of his Tokyo Bay Plan - 1960 (Zeballos, 2018)

Kisho Noriaki Kurokawa

Kurokawa was a student of Tange, and published ‘Space City’ essay in the Matabolist Manifesto in 1960. He was influenced by ‘team X’ concepts of clusters and movement networks. He had designed over 35 buildings and written over 17 books (Urban, 2013, p.91). Kurokawa’s philosophy revolved around coexistence, and symbiosis. His urban planning methodology bases on the idea of creating a “patchwork-like” city, by adding side by side new blocks on the ground in a somewhat random way, and creating thus the whole urban fabric letting the city itself leads its process of growth and development. He has many theories in urban planning and was the reporter for the magazine “international Architecture” Kokusai Kentiku. He developed in 1960 the concept of a 500m by 500m grid forming the basic unit of community. The scheme is called ‘Agricultural city’ (Figure 2.7) which was proposed to be elevated from ground to deal with future flooding. He also proposed ‘Wall city- Neo Tokyo Plan’, which was published by the magazine “Kenchiku Bunka” in 1959. The proposal tries to strengthen the relationship between work and dwelling spaces. Using the wall as the basic frame that could be used to attach individual houses.

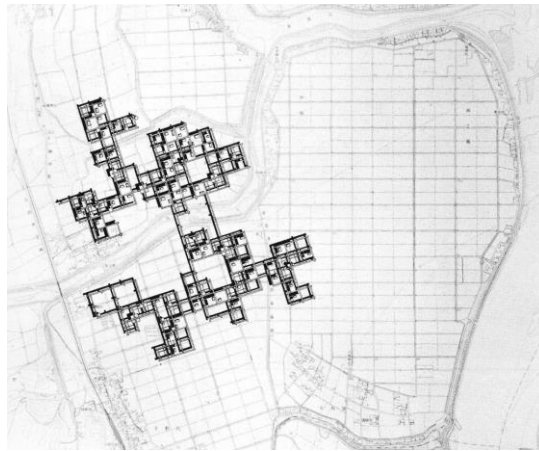


Figure 2.7 – Kurokawa - Agricultural City – 1960
(ArchEyes, 2018)

He also worked on Tokyo Ginza project and ‘Helix City’ in 1961 (a three dimensional cluster system forming dwellings and communities in the air), the “Floating city- Kasumigaura” in 1961 (Figure 2.8 – 2.9), the ‘Floating city’ in 1963, and industrial architecture; city grows as a system of clusters and the linear city “Metamorphosis” in 1965. Moreover, he designed Hishno New Town in 1966, Fujisawa New Town in 1967 and Nakagin Capsule Tower (a residential building consisting of 140 cell apartments on a vertical shaft) in 1973.

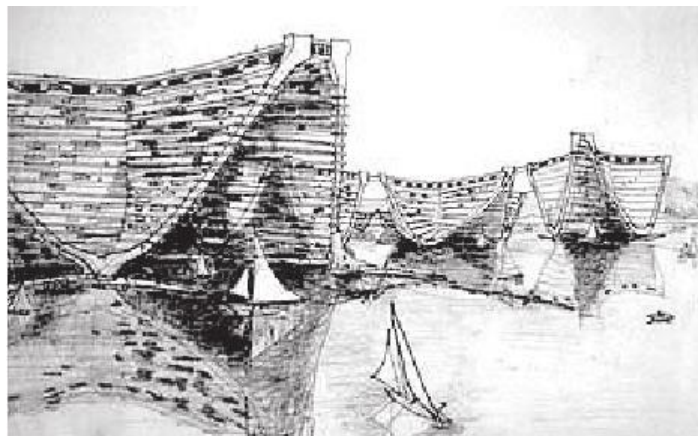


Figure 2.8 – Kurokawa - Floating City – 1961
(PERNICE, 2009)

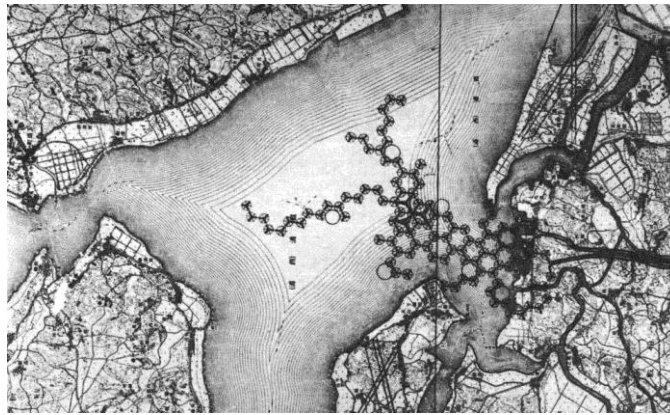


Figure 2.9 – Kurokawa - Floating City on Lake Kasumigaura
(dpr-barcelona, 2018)

Kikutake Kiyonori

Kikutake one of the scholars of the Metabolist group was inspired by Le Corbusier's ideas and published 'Ocean City' essay in the Metabolist Manifesto in 1960. His theories in urban planning started with his "interest and studies of new artificial environment in the sea" (Pernice, 2004, p.359), as illustrated in his projects explored on land, sea and air which he refers to as "artificial ground" specifically "Marina City", "Sea city Unabara" and "Ocean City" developed during the years 1958-1961. His design proposals involve ocean living on concrete slabs positioned in the sea as base for high-rise towers and gigantic colonies in the air such as the marine city concept (Figure 2.10 - 2.11). His marine city ideas and floating structures influenced many architects and planners in Japan and abroad. As suggested by Kikutake himself "*the marine civilization will eventually reach a kind of supremacy over the continental civilization*" (Pernice, 2007, p.244). He later developed a concept of a system composed of functional links within cores that can grow and adapt to any change in the urban morphology called "Channel Development System". He introduced interesting insights such as the cycles of life of architectural elements, the linkage with industry and the flexibility of the space and posing the base for the ideological theory of the Metabolist group. In 1958, Kikutake published 'Marine city', 'and Tower shape city', with his research efforts concentrated on developing urban communities as totally artificial habitats built into the sea. Kikutake defines 'Megastructure' as "a structure to integrate architecture with the scale of the city, which is, at the same time, an environmental system that perceive city as a living space system on the human level (Kikutake (1995))." (Nyilas, 2016, p.105)



Figure 2.10 – Iterations of the Marine City
(Koolhaas et al., 2011, p.150)

Kikutaki was following a three-step principle in architecture called in Japanese Ka, Kata, Katachi, which means essence, substance and phenomenon. He referred to these surfaces as “artificial ground” (Pecina, 2018).



Figure 2.11 – Kikutake’s Marine City Proposal (Cluster of floating platforms)- 1963
(Polinice, 2018)

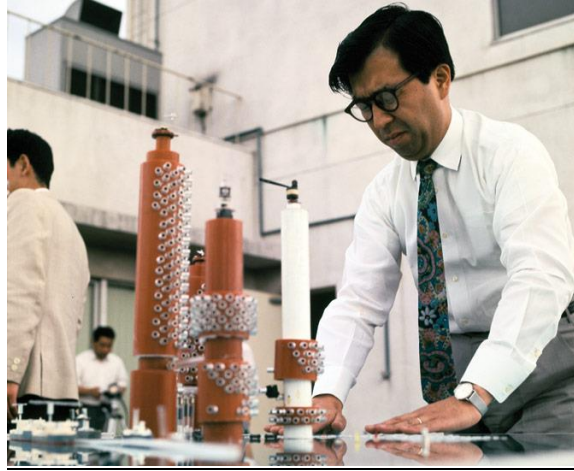


Figure 2.12 – Kikutake’s Ocean City Model - 1968
(Wescott, 2012)

Kikutake conceptualized the Aquapolis, an experimentation that evolved to realization in the Okinawa International Ocean Expo in 1975. The expo was planned on 1 million square meters of land and sea. Aquapolis, a floating machine was a 10,000 square meter experimentation completed in 1975 and demolished in 2000 (Figure 2.13). The technology embedded in the Aquapolis made it considered a high tech and self-sufficient building at that time; it floated with the tides movement, had the world’s first water recycling system, and was sustainable in terms of its energy consumption. Kikutake viewed this building as “one prototypical module of a larger metabolic floating urban structure to be composed of other floating and detachable modules linked together on the surface of the sea.” (Blaxell, 2010).



Figure 2.13 – Kikutake’s Aquapolis Floating structure in Okinawa Expo - 1977
(Blaxell, 2010)

Kikutake also designed his personal house ‘Sky house’ in 1958 which was elevated 7 meters from the ground occupying multiple functions in one large living space. The house had movable and detachable units that adapts to the changing requirements of his family over time (Figure 2.14).



Figure 2.14 – Kikutake’s Sky House – 1962
(Koolhaas et al., 2011, p.140)

Masato Otaka

Masato Otaka was the chief architect in Kunio Maekawa studio in 1957 (Urban, 2012, p.96). He proposed in the 1950s the (Kombinatots) theme. The theme entails reclamation of the coast in the big Japanese metropolises to develop industrial and residential complexes on artificial land. He developed his design approach and philosophy called PAU (Prefabrication /Art &Architecture/ Urbanism), which illustrates his design intentions of tackling multiple scales.

Otaka’s Proposal “Neo Tokyo Plan” in 1958 was the first project that encompasses a system of expressways and ring roads in the water. Then two years later, Kenzo Tange designed the same area. Otaka’s 1959 plan proposed the creation of a system of integrated concrete slabs along the coasts of

the Tokyo Bay as urban platforms of floating decks. Otaka and Maki worked together in the Metabolist Manifesto and on the redevelopment of Shinjuku commercial District in 1960.

Moreover, Otaka worked on ‘Harumi Apartments’ – inspired by Le Corbusier “Unite”, a mass housing project, which was built on reclaimed area of Minato Ward in 1958 by Japan Housing Corporation, he also worked on Ohtemachi project in 1963 and Sakaide City on artificial ground in 1963-1968.

Kenji Ekuan

A Japanese industrial designer, whom was known as the “creator of things” (Ricuperati, 2018) and stimulated projects from furniture design to city planning. He designed “Plastic Sky Lodge” in 1962, “Furniture House” which was composed of modular furniture as per figure 2.15, “Pumpkin House” and “Tortoise House” in 1964. He also designed the “Dwelling City” in the same year, which illustrates his metabolism views in defining a city that is formed by modular superstructures, and collective clusters that are movable and act as living creatures that can adapt to constant change (Figure 2.16).

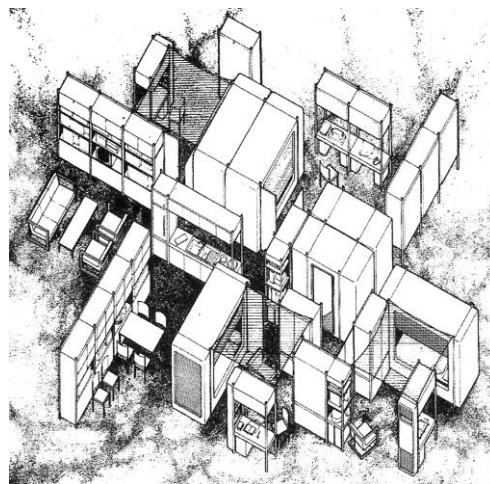


Figure 2.15 – Ekuan’s Furniture House- 1964
(ArchEyes, 2016)

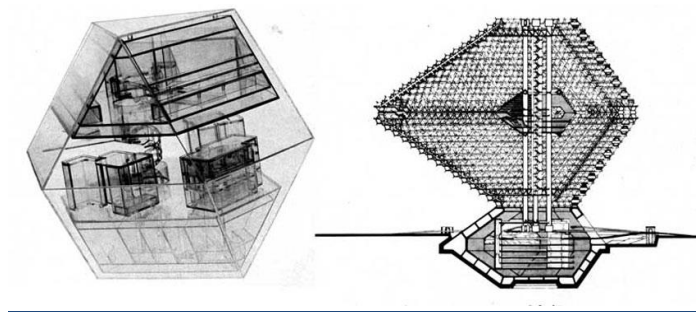


Figure 2.16 – Ekuan's Dwelling City
(ArchEyes, 2016)

Awazu Kiyoshi

A Japanese artist and a graphic designer that was famous for poster and signage designs, painting, film and photography related to architecture and urban design. He participated in the Metabolism Manifesto in 1960 and in the concept plan for Osaka '70 Expo.

Arata Isozaki

Arata Isozaki graduated in 1954 from Tokyo University where he was supervised by Tange and worked later in his office 'Kenzo Tange and URTEC' till he established his firm in 1963. The origins of Metabolism as described by Arata Isozaki in his interview for the 'Project Japan, Metabolism talks' states that this movement is inseparable of Japan's post war situation; "Japanese architects were thus faced with an unprecedented scale of urban redevelopment" (Koolhaas et al., 2011). Isozaki's planning ideas thus reacted to the Japanese situation of the cities destruction and the flux of generation.

Although Isozaki was not a member of the Metabolist group and claimed that he always tried to make clear distinction between himself and the technological orientation (Koshalek and Stewart, 1998), he also worked in the 1960s on futuristic city proposals that expand vertically as per "City in the Sky", "Clusters in the air" and the "Joint Core System", which were essential to the metabolism movement. His ideas revolved around the metaphoric interpretation of space, time and matter (architecture and cities) (Koshalek and Stewart, 1998).

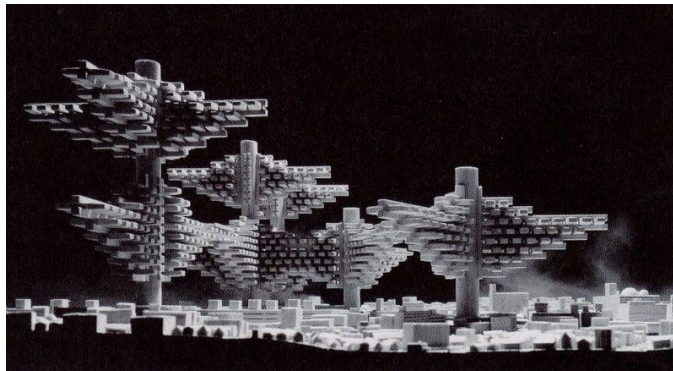


Figure 2.17 – City in the air
(Jarzombek, 2018)

Furthermore, Isozaki designed a bold technical innovation called the “Demonstration Robot” at Expo 1970 (Figure 2.18), a three-story high performing robot (Jarzombek, 2018, p.510). He also proposed a utopian city for the 21st century called the “Mirage City” that is positioned distantly from the mainland necessitating transportation via bridges and electronic information system to connect this enclosed island to the outer world. The island is an exploration of new material, energy and advanced technology.



Figure 2.18 – Demonstration Robot, Arata Isozaki
(Jarzombek, 2018, p.510)

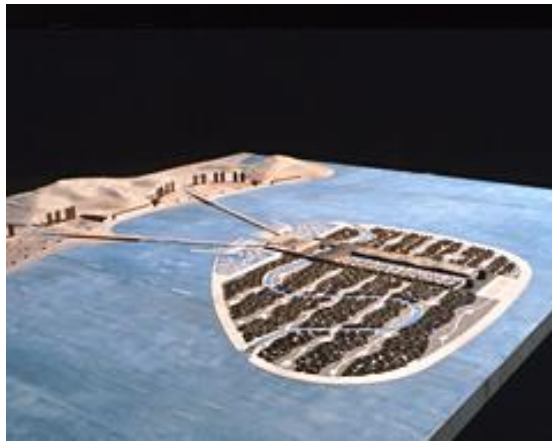


Figure 2.19 –Man made island “Mirage City” Model, by Arata Isozaki - 1996
 (Photo by TAKASE Yoshio) (Ntticc.or.jp, 1996)

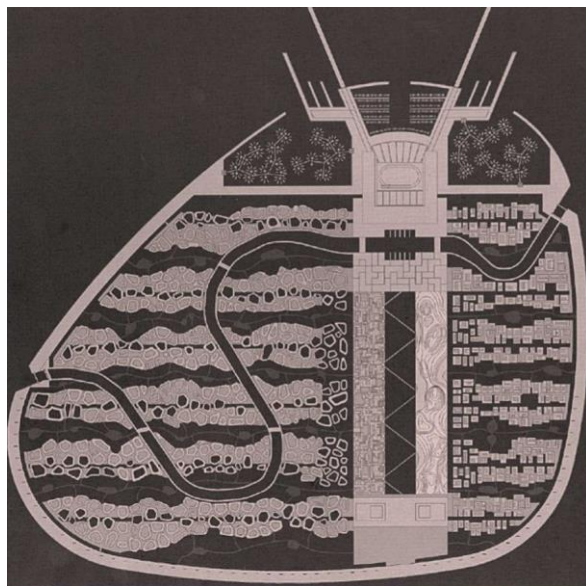


Figure 2.20 – Arata Isozaki’s Man made island “Mirage City” Model- 1996
 (Photo by TAKASE Yoshio) (Vasulka.org, 1997)

For Isozaki himself, the conceptual base of the project is an update of 1960s Metabolism. Indeed, Mirage City has obvious similarities to Kenzo Tange’s Metabolist urban plan for Tokyo Bay – an intense, dynamic programmatic mixture placed on reclaimed land and connected to the mainland by bridge infrastructure. (Daniell, 2008, p.29)

2.4 Key Principles and Characteristics of the Metabolism Movement

As explained by NG, the emergence of the Metabolists group was tied to a number of factors; the post war period, post nuclear period, the scarcity of land due to demographic pressures, the geographic complexity of Japan’s archipelago, the ecological fragility and the development of modern

technologies ‘that helped blur regional boundaries’. (Ibanez and Katsikis, 2014, p.100) therefore, the work of the Metabolists suggest “a particular set of material and territorial forces” and questioned the “implications of accepting Japan as ground zero, denying time and place and forcing a decontextualization of territory in order to develop projects, ideas and visions.”(Ibanez and Katsikis, 2014, p.100) that led them to develop solutions in every direction “on the land, on the sea, in the air _ to escape from society in the form of geographic isolation, originating several hinterland utopias on territories typically left apart and unexplored.” (Ibanez and Katsikis, 2014, p.104).

The Metabolists members shared many commonalities in their urban design and planning approach, in the same time, each member had developed their own distinct and particular theories and methodologies, which are evident in their work and design approach. Generally their concepts and philosophy has revealed a modern movement in architecture within the epoch of the 1960s in Japan. This movement has not only altered the form of the city, it has created a futuristic utopian city. Thus, as elaborated by Oliveira in describing this movement “The persistent belief in progress and technology is coupled with an interest in Japanese traditions and biological processes” (Oliveira, 2011, p.77). In face of that, the Metabolist project sought synthesis of tradition, technology, man and nature. (Oliveira, 2011, p.79)

When Kawazoe described architecture, he referred to it by maintaining its basic structure but regularly replacing its materials; ‘in a manner similar to the metabolic processes of a living creature and adding or subtracting parts as needed, this was a clear expression of the core principles of metabolist theory’. (Daniell, 2008, p.25)

Based on the key philosophies of the Metabolism movement and its members, the below six principles are identified through the review and analysis of various resources and literature related to this topic, each is explained separately to define its notion and to illustrate the key members behind those reflections:

- **M: Metabolic, Organic and Biological**

The process of organic growth replaced the traditional and conventional ideas of building structures and forms. “The term Metabolism (metaborisumu) was used as the group’s name to express the basic idea of architectural design and city planning. They believed that the city was an organic entity which has the function of metabolism (shinchintaisha). This meant ‘regeneration’ or ‘replacement of the old

with the new' and was seen as 'one of the most essential features of living things' (Koolhaas et al.,2011, p. 235). Hence, the Metabolists advocated for metamorphosis and the evolution of the city like a living organism. "As the name of the movement reveals, they took the metabolism of organic creatures as the model of the kind of change they posited." (Koshalek and Stewart, 1998).

Metabolists advocated building forms that could fluctuate and expand in response to their environments and replaced depending on their lifecycle; "The Metabolists extended the concept of megastructure, proposing buildings in which every element was to be replaced at longer or shorter intervals – that is to say, at differing metabolic rates." (Daniell, 2008, p.23).

Kawazoe believed that cities should not be static but rather be consistently growing, changing and renewing to form the organic, natural and metabolic processes of life, which overcomes any environment changes. Similarly, "Kikutake had argued in 1965 "contemporary architecture must be metabolic" (Abley, 2006, p.11). Moreover, Maki in 2012 at the memorial service for Kikutake described the Metabolists team as if they have come together to serve a common cause, which is "to address rapidly transforming Japan through an organic architectural/urban strategy" (Ibanez and Katsikis, 2014, p.100).

- **E: Equality and Social perspective (Nature and Society)**

The socio-cultural role was crucial for the Japanese Metabolists since the 1960s whom have embraced the role of social architects and engineers; "The Metabolists followed the modern utopian architectural assumptions in believing that architects could change society and people's habits for the good: in effect, they saw their mission as 'social architects'" (Tamari, 2014, p.202). They also "believed that freedom from the land led to greater freedom and mobility for the people. Thus, they proclaimed that the land should be owned and organized by a public institution, not by individuals. The total city system should also be controlled and governed by a central administration" (Tamari, 2014, p.209). Hence, as stated by Tamari: "the Metabolists pursued the goal of egalitarian and democratic living environments for as many people as possible" (Tamari, 2014, p.203).

Metabolists' idea of urbanism claimed to pursue the realization of people's autonomy, freedom and democratic lives, they clearly embraced technocratic principles in line with classic utopian idealism. Kenzo Tange was particularly aware of the new opportunity for architects to become powerful social

engineers, and so he called himself a 'social architect'. "Tange was arguably the most influential mentor for the Metabolists as the leading Japanese architect. He was devoted to reconstructing the national image through his architectural vocabulary and practice in the decades before and after the war. Given the new social environment, he embraced technological progress, along with the megastructure city planning supposed to help re-create a new image of post-war Japan. The Metabolists were strongly inspired by Tange's architectural practices, theoretical articulation of city planning and professional identity as a social architect." (Tamari, 2014, p.214).

The "ambitious intention of the Metabolists to change social life, to influence human habitus and to change everyday lifestyles (the classic idea that humans should follow structure and system)" (Tamari, 2014, p.215). They believed that communal spaces in the ideal future city would permit greater respect for people's autonomy and help establish democratic relationships. The communal space was often represented as 'artificial land'. Their megastructure on 'artificial land' often contained individual living spaces. (Tamari, 2014, p.209) . "According to Kikutake, people had been tied to the land, which was the origin of many evils and distortions in the human society. The Marine City would liberate people from their reliance on land, and thus create a new type of society." (Lin, 2006, p.40).

In the Metabolism schemes, the projects are designed to house a fixed population and assume that the artificial lands are all publicly owned. "By putting land into public ownership, the Metabolists rejected the other models of ideal society such as the society of democratic individuality exemplified by Frank Lloyd Wright's Broadacre City and the society of cooperative socialism seen in Ebenezer Howard's Garden City. For the Japanese architects, public land ownership would prevent any speculation and guarantee the true equality within the society." (Lin, 2006, p.107).

In summary, the Metabolist Group considered the relationship between society and the individual at the heart of the Metabolist thinking, and stressed on comprehensive planning to provide freedom to the people. "The dissolution of the city into 'cells' corresponded to the breaking away from patriarchal family structures and the strengthening of the position of the individual in Japanese society." (Schalk, 2014, p.284). The Metabolist Group embarked on those ideologies, which were emerging universal models. Nonetheless, Isozaki remarked on the social principle of the Metabolism movement by stating that the Metabolists' "naïve pragmatism which allowed them to believe that a social revolution could be achieved by means of new technology." (Koshalek and Stewart, 1998).

- **S: Symbiosis and Co-existence**

Kurokawa's philosophy revolved around coexistence, and symbiosis, which both relate to modern Japanese Buddhism and the belief that life exists in a cycle. Symbiosis is "a term borrowed from biology, formulating the existence of heterogeneity in a flexible open order. According to Kurokawa we can apply this to all aspects of our life, i.e. equally to question in international politics and multilateral trade relations and to current problems of architecture." (Kurokawa and Cachola Schmal, 2005, p.7). He believed that different beliefs can co-exist harmoniously; moreover co-existence can be practiced amongst people, animals, plants, nature and environment (Kurokawa and Cachola Schmal, 2005, p.151).

- **F: Flexibility, Growth and Adaptability**

Metabolism planning theories are adaptable to change and allow change to take place when its outside the capacity of human control reacting to the unforeseeable coincidences as portrayed by Isozaki. He stated that "On the drawing board, the piece of architecture is allowed to grow and change until it reaches its ultimate point in time, its termination, then it is cut off at the juncture called the present. It is then fixed and leaves the architect's hands. It may change thereafter, but it is meaningless to try, as the Metabolists did, to foresee its future alterations. It is not for the architect to speak for its future." (Koshalek and Stewart, 1998).

One of the distinguishing features of the Metabolists proposals is repetition of some of the elements of variable sizes to resemble a naturally formed beauty, visually they appeared like fractals or trees. Moreover, the city's growth and regeneration was envisioned as a series of prefabricated parts that once they become obsolete they get replaced according to their life cycles.

The Metabolists intention was to design a whole city rather than designing single and isolated buildings. Therefore, their concepts emphasized on the city as a mega-structure that is composed of the core framework that is jointed by modules or units such as movable capsules. "The projects of the Metabolist group explored the translation of an organicist interpretation of circulation and adaptation into megastructural formations that organized and colonized territories." (Ibanez and Katsikis, 2014, p.4). "The Metabolists believed that the city is a process and changeable, thus it is formless and 'non-plan'" (Hughes and Sadler, 2000). Also, forming the city through a system of architectural elements

that are standardized to target mass production and reduce unit cost is one of the main principles of this movement. Such modularity and systematic alteration is illustrated in Tange's Boston Bay plan and the plan for Tokyo Bay.

Ken Tadashi Oshima argued that Tange's work "could be seen to be discussing dispersed "architectural elements (as) the basic structure of the city" as per his proposal for Tokyo Bay 1960, where he tried to address the population growth by creating a linear spine that connected the various architectural elements. Kenzo Tange's Tokyo Bay "a project containing all of the Metabolists ideologies for a temporal, structured and adaptable growth for the city of Tokyo. The Tokyo Bay Project would later become a reference for Metabolist architecture." (Serra, 2018, p.5)

Ken Tadashi Oshima also described the architectural work of Kikutake as a 'system of settlements' that generated an "expandable framework and a conceptual model for urban expansion", those architectural projects include the Pacific Hotel Chigasaki (1966) and the Aquapolis Pavilion (1975). (Ibanez and Katsikis, 2014, p.104). Modularity and flexibility is also evident in Kikutake's personal house, the 'Sky House'. Similar ideas were present there, with the house being made to be adaptable and offering enlargement possibilities by adding to it capsules underneath the core of the building (Figure 2.14). It is interesting to note that this was eventually done by the architect when he had children and needed more space_(Serra, 2018, p.5).

Moreover, NG emphasized that the 'structural approach' of the Metabolists "had the quality of being implemented on various configurations of terrain, from an infrastructural landscape to megastructures isolated in the landscape, to big shed architecture in the suburbs." (Ibanez and Katsikis, 2014, p.104) which can be demonstrated in the 'Agricultural City' of Kurokawa that has not only developed a megastructure to organize the territory but also found ways to adapt and grow to the diverse conditions of ecological and social flows. (Ibanez and Katsikis, 2014, p.104).

In terms of scalability, as noted by NG "Kenzo Tange was in search of a general system that would consistently govern urban constructions at all scales. He illustrated this approach by showcasing figure 2.21 taken from Tange's notebook from his time as a professor at MIT "which tries to position the Metabolists' urban and planning approach as part of an evolutionary lineage starting with the Egyptian pyramids and passing through the Ville Radieuse of Le Corbusier or the Garden City of Howard" (Ibanez and Katsikis, 2014, p.102). The same figure "appear to span the scales of

S/M/L/XL, with the addition of “scale of speed.” While Tange’s sketches seem to link “speed” to “urbanization” in general sense, it was particularly relevant in Japan during this time of skyrocketing growth.” (Ibanez and Katsikis, 2014, p.103)

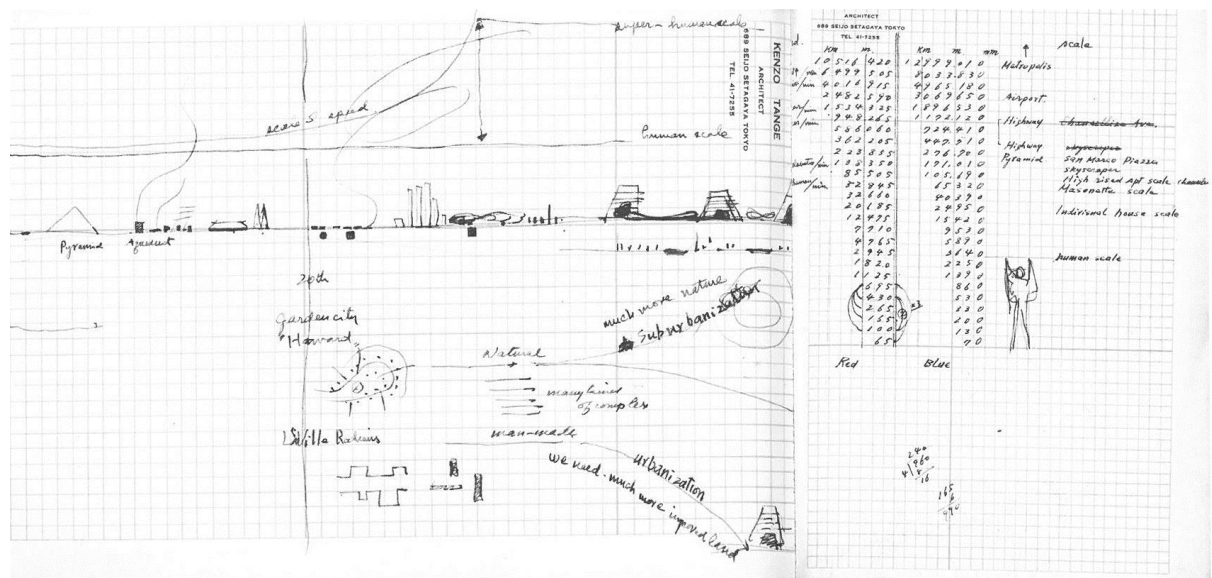


Figure 2.21- Kenzo Tange’s notes from his notebook while a professor at MIT

Kurokawa illustrated flexibility in his design of Kasumigaura floating city in 1961 by proposing freedom in the use of building material for the residential units of the manmade island with vertical separation of the different transportation modes. Whereas Kikutake addressed flow and adaptability in his work by exploring in his ‘Marine City idea growth beyond Tokyo Bay, from Okinawa to Hawaii and beyond. ‘Kikutake’s “Ideas for the Reorganization of Tokyo City”, which multiplied his own Sky House living unit to urban scale of his “Marine City” and “Tower City”, could be seen as extending the garden city ideal into the sea.” (Ibanez and Katsikis, 2014, p.101). His Tower Shaped Community was a series of drawings that would later become his Marine City project. New technologies made possible the occupation of new spaces, such as the sky and the ocean. Most of the buildings were also modular, with a permanent core where capsules could be attached to, and changed if necessary. The rationale behind it being that a city grows at different rates, with different temporalities, therefore planning should be done accordingly. (Serra, 2018, p.5)

Ken Tadashi Oshima noted, “for Kikutake, the ocean offered such infinitely expandable possibilities.” Which he demonstrated in his Unabara plan 1960 that adopts his urban vision of expanding vertically through the notions of cell division. (Ibanez and Katsikis, 2014, p.104).

- **I: Industrial and Technological**

The Metabolists team was on a mission to build the nation as a whole after the Second World War; therefore, the role of technology in constructing the Metabolists city was fundamental. Architects interested in technology like Archigram and the young Richard Rogers, were inspired by the design approach of the Metabolists and, notably, Kurokawa. (Abley, 2006, p.11)

As described by Lin (2010) “ Architects and urbanists in the 1960s were inspired by dramatic technological advances, such as new developments in genetics and life sciences, explorations of the moon and space, the inventions of robots and computers, and communication technologies, and developed a can-do mentality in conceiving an urban future”. (Lin, 2010, p.7) The Metabolists interest in technology was to demonstrate the potential of technological advancement in changing the social structure in their envisioned utopian cities. Furthermore, NG pointed that the Metabolists “group was dominated by a technocratic organizational ambition _ that is to control the development of the entire nation by means of modern technology, management and planning” (Ibanez and Katsikis, 2014, p.105). The Metabolists had the ambition to create a new Japanese society through technoutopian city planning as described by Tomoko Tamari.

Moreover, “members of the Metabolists also believed that with modern technology and design, modern architecture could change society and people’s everyday lives.” (Tamari, 2014, p.206) “Metabolists can also be positioned in continuity with those visions which were based on trust in the independence of humanity from nature and the belief that human beings could live in an artificial world produced by advanced technology.” (Tamari, 2014, p.212)

In contrast to ‘the age of the machine’, the Metabolists advocated ‘the age of life’. As one of the renowned Metabolists, Kisho Kurokawa remarks: “Machines do not grow, change or metabolise of their own accord. “Metabolism” was indeed an excellent choice for a key word to announce the beginning of “the age of life”” (Tamari, 2014, p.203). “Kikutake and Kurokawa gave great importance in the use of new technology as an indispensable tool to manage the modern city, Otaka and Maki gave more consideration in the relationship between the buildings and the surrounding urban environment” (Pernice, 2004, p.360)

The Metabolists architects witnessed an industrial society and believed that “architecture was a durable consumer item” (Koshalek and Stewart, 1998). Thus, they explored mass produced elements such as panels, units and exterior capsules that can be changed and replaced as required.

Tange also explored the use of technology in his proposals; for example, his Boston Bay plan designed in 1959 was formed as a gigantic triangular shaped frame that had layers of uses and human activities in different heights. It starts at the top with technology which he referred to as the ‘super-human scale’ then the scale of humans and human interactions and lastly the scale of individual (Campli, 2018).

- **P: Processes, Flows and Circulation**

One of the issues that confronted the Metabolists Group in Japan was the lack of a comprehensive infrastructure network, which hindered urbanization. Mobility was a critical issue for them and considered a form of individual freedom, which was reflected in their design proposals. They did not envision infill infrastructure, but rather focused on creating new cities and forms that spanned beyond the existing city network. The megacities that they had envisioned hierarchically branched from large transportation lanes and traffic arteries to streets and pedestrian lanes. This flow was regarded as a process to reorganize space into a one unified living organism and to change the common urban planning principles of that period and was their way of response to the lack of infrastructure and the absence of city and urban planning. The Tokyo Bay plan designed by Tange for example had multiple levels of transportation projecting 40 meters above Tokyo grounds and only touching the ground at interchanges, connecting the proposed civic axis to the rest of the expandable grid subdivision. The transportation system clearly separates the pedestrian from the traffic flow and has a clear hierarchy of the land-uses proposed within the loops designed along the civic axis. (Campli, 2018).

The notion of “city as a process” is considered at the root of the Metabolists urban utopian approaches. This utopian concept relied on shaping regional developments with huge awareness of technological progress (Lin, 2006, p.99).

Ken Tadashi Oshima related the fluidity and transportation ideas embedded in the work of the Metabolists group to the Le Corbusier’s 1932 plan Obus for Algiers “that integrated an elevated highway with housing along the waterfront” and described the flows of transport integrated in the work of the Metabolists as a “necessary circulatory systems to maintain “human vitality” _ like blood

vessels in the human body.” (Ibanez and Katsikis, 2014, p.106). Furthermore, he illustrated this concept, which is clearly visualized in Kikutake’s vision of Japan as a linear urban network; Ocean City Unabara, as it connects to the expanding transportation network proposed and that his approach was to connect actual buildings to the realized transportation infrastructure and network across scales (Ibanez and Katsikis, 2014, p.107).

NG emphasized that the concept of circulation is a constant principle in spatial structures across scales; providing linkages, traffic patterns, movement and connections are all evident in the work of the Metabolists. This notion is articulated in the Metamorphosis project of Kisho Kurokawa and some of Kiyoshi Awazu projects. (Ibanez and Katsikis, 2014, p.106). Furthermore, Kurokawa believed that “European beauty is based on the concept of eternity, while Japanese beauty is based on the concept of dismantling.”(Kurokawa and Cachola Schmal, 2005, p.147). Therefore, Kurokawa believed in circulation, recycling and dismantling as it allows Japan to express its identity by dismantling wooden houses and shrines when required and reusing its timber.

2.5 Gulf Urbanism - Expanding Cities on Artificial Grounds

‘Over 70% of the largest cities on earth are associated with seashores (Duarte et al. 2008), and two thirds of the human population lives within 100 km of a coast (UNEP 2002). The Gulf is no exception, with most major urban centers directly adjacent to coasts, with its people both culturally and economically tied to marine resources. Coastal development has rapidly expanded in the Gulf since the 1950s, leading to an increase in the exploitation of coastal marine resources and the degradation of coastal habitats.’ (Al-Madani et al. 1991; Mohammed and Al-Sadh 1996)

While many literature looks at reclamation in the Arabian Gulf, the main tendency in researching about coastal reclamation, has been through concentrating on the symbolic representations achieved by such developments, to relate this phenomena to the never ending image creation, city branding and to show of power, identity and constant observation and national competition amongst the countries of this region. This is described in the works of Farah Al Nakib as she relates Kuwait planning as ‘image driven’ planning approach to oil and urbanization (Al-Nakib, 2013, p.25). Also, Yasser Al Sheshtawy argues that the ‘Dubai Model’ is a new mode of urbanism that he refers to as the ‘urbanity of excess’ (Al-Sheshtawy, 2010, p.53), El Hadi Jazairy talks about Dubai urbanism as using ‘iconic satellite imagery’ (Jazairy, 2010), ‘Brand Dubai’ Gulf cities creating their own ‘brand Urbanism’

(Jazairy, 2010), 'Super fast urbanism' (Bagaeen, 2007, p.174); "from the air, the palm projects already create a highly visible impression" (Bagaeen, 2007, p.187); Samer also explained that the developments within the Gulf are changing both city maps and skyline and that the city is now becoming viewable from space as well. "Cities are thriving to create a 'brand image' 'Iconic rivalries and brand settings of cities in the Gulf states" (Adham, 2009, p.84), "a tool for city image creation, status symbolization" (Abdella, 2012, p.8). Recent developments have been criticized as they form an 'endless portrayal of processes of urban growth as the product of ego'. (Fraser and Golzari, 2016, p.12).

Most of those discourses argue that those reclaimed islands are out of limit, out of control, an imaginary society, and unobstructed by our institutions and laws where we can imagine a better society. As stated by Rem Koolhaas (2007) "Sand and sea along the Gulf, like an untainted canvas, provide the ultimate tabula rasa on which new identities can be inscribed: palms, world maps, cultural capitals, financial centers, sports cities...." (Bouman, Khoubrou and Koolhaas, 2007, p.7)

Moreover, many of those studies delve into environmental impacts of such reclaimed projects; the adverse effects on the marine ecology and the environment. As described in the study of Al Madany, Abdalla and Abdu: "Coastal developments have rapidly expanded in the Gulf since the 1950s, leading to an increase in the exploitation of coastal marine resources and the degradation of coastal habitats" (Al-Madany, Abdalla and Abdu, 1991).

On the other hand, many narratives describe the technological advancement that led to dredging and reclamation practice, and why the Gulf recent urbanization entails reclamation, which is leading to iconic and symbolic urban sprawl, technological solutions, and to describe the economic and political gains.

2.6 Intermediary Conclusion

The shortfall in housing, infrastructure and industrial requirements worldwide, led to the development of new cities and new human settlements, which led to new theoretical movements to build cities on the sea. Literatures that refer to city in the sea ideas often imply creating a new imaginary. Even if

Metabolist projects were not hugely implemented, they were all about reimagining a new society and creating a new image of what a new order could bring. It responds to specific questions and situations and to a disciplinary conversation grounded on the imagination of a new societal order. As elaborated by Ibanez and Katsikis, the geography appreciation of Metabolism gradually dissolved; however, it fueled many architectural utopias in the second part of the 20th century. (Ibanez and Katsikis, 2014)

Moreover, “more territorial approach has engaged with specific functional sites of metabolic activity, such as landfills, mines, agricultural fields, and ports” (Ibanez and Katsikis, 2014, p.4-6). The “reorganization of material and resources that have often been relocated from distant lands” imply “longer-term geo-metabolic alteration of the earth”. (Ibanez and Katsikis, 2014, p.6)

The Metabolism movement set forward a new way of thinking the city as a process, and not as a rigid entity. The Metabolists saw their society change in a dramatic way and they had to express it architecturally, “ Metabolism’s ideas and methods accurately reflected prevailing circumstances, making it the leading architectural ideology of the time.” (Koshalek and Stewart, 1998). They didn't seek to change the status quo through architecture, but rather have architecture follow and integrate what was happening all around them. Architecture here had no power of influence, but it should change itself to adapt to the new paradigm.

The weakness of the original Metabolist projects laid in their reliance on megastructural principles – that is, the requirement for an enormous (size, cost, risk) with a fixed framework into which the various flexible components were to be plugged in. The initial investment could never be returned, as technological advances would eliminate the benefits of modifying the existing architecture as with Kurokawa’s Nagakin Capsule Tower for example. Attempts at biological complexity were frustrated by the near impossibility of conscious design activity replicating natural processes of growth and evolution, a point convincingly argued in Christopher Alexander’s 1965 essay ‘A City is not a Tree’. At a diagrammatic level, Metabolist designs were limited to essentially treelike structures. “While metabolism intended to radicalize function, its structural model was the organic whole, based on a hierarchy – stem (or spinal cord), branch, leaf, organ, cell. No matter how complex Metabolist projects seem, this hierarchical schema of the organic whole can be easily detected behind that complexity.” (Asada and Isozaki, 1997, p. 64-65).

The Metabolist movement developed and culminated in the peak of the early 1970s but began to decline in the changing economic climate of the mid 1970s. Given greater business competitiveness and the increase of people's financial capacities along with the development of modern consumer culture, the projects of the Metabolists became more intertwined with commercial interests. A good example was the 1970 Osaka Expo, which was supposed to be a good opportunity for the Metabolists to display their architecture, especially their image of the utopian future city. Although their buildings (pavilions) were supposed to express their utopian idealistic city concepts, based on modern architectural technology and the drive to represent a new image of Japan, their designs turned into eye-catching billboards forcefully driven by sponsors' commercial interests.

The Italian architect and critic Manfredo Tafuri in 1964 "remarked as the development in Japan of an "Academy of Utopia" during the 60s was the logical consequence of the powerlessness of the Japanese architects, so that their only escape was the creation of artificial worlds." (Pernice, 2004, p.362)

Metabolism almost lost its autonomy to express a distinctive era and become a slave to commercialism. They had to shift gradually their philosophical orientation from utopian modernism to neoliberal capitalism. Another factor was the economic recession after the oil crisis of 1973, given that the Japanese economy mainly relied on imported oil from the Middle East. The declining economic growth and the increasing instability of the architectural industry meant that many aspects of the Japanese economy had to be reconsidered and, therefore, the mega-scale of urban development became problematic.

More importantly, they had a fundamental methodological and theoretical problem. The Metabolists' urban theory largely depended on megascale urban design and technological development along with super-utopian optimism in order to pursue the organic system of the future city. However, there was always the doubt that megastructures could be realized with limited technological progress coupled with suspicion about the optimistic utopian vision itself. (Tamari, 2014, p.211)

Although Isozaki was sympathetic yet the Metabolists started to become aware that the artificial world they lived in caused negative side-effects, such as pollution and the deterioration of the ecosystem, including humans. (Tamari, 2014, p.212). Accordingly, there has been a gradual shift away from naive techno-optimism since the 1960s. Furthermore, their city was modeled on biology

but focused on the buildings, city structure and system and, therefore, neglected the living organic entities, the human beings, which are not passive but active and living inside the city. (Tamari, 2014, p.215)

Despite the rise of Metabolism as a response to Japan's situation after World War 2, which caused political, social and economic disruption, the radical urban visions of the Metabolists that envisioned the future city promoting social progress, people's freedom, technological innovations, modern structures, networks and international planning ideals, it was criticized afterwards in Japan due to its environmental implications and the vast infrastructure requirements in implementing such megacities with gigantic urban framework. Add to that, the deteriorating urban conditions of inner cities in response to people's shift from the existing to the new proposed artificial cities. The stimulation encouraged by Tange and the Metabolists to rethink urbanization and to propose massive transformations to the physical environment due to the exceptional scale of urban interventions were opposed by other urbanists such as Christopher Alexander, Aldo Rossi and Jane Jacobs, whom rejected the symbolic image of the city and the techno-utopian dimension.

In summary, despite the noble attempts that the Metabolist members introduced internationally, this movement was tied to the post war situation in Japan, which required massive redevelopment initiatives. This movement however had diminished in Japan, as architects and planners are in favor of introducing smaller scale developments that are tackled within the existing city fabric and do not require a mega-scale artificial environments that are isolated from the available city network and infrastructure. Moreover, the shortcoming of the Metabolism movement from its indigenous Japanese phenomenon to a globalized approach is its rejection to connect to the existing city fabric which has been the recent trend in Japan with great emphasis on community building and participatory planning led to planners in Japan widely practicing 'Machizukuri' a Japanese term that means establishing a dialogue between the government and the community and calls for participation not only from architects and planners but also the community dwellers. This process was lacking in the Metabolists schemes as the individual or the inhabitant of a megascale metabolic city will not be able to address urban issues on a community scale.

On the other end, while studying Gulf Urbanism literature that investigates urbanism as a result of the massive urbanization and the population influx within this region, the excessive reclamation works is

looked at to a testimony of power, economic thrive, and the creation of a new identity and a brand for the Gulf cities. Artificial cities within the Gulf are studied to investigate the environmental and marine implications and to explore the latest methodologies in reclamation technologies.

3. THE INFLUENTIAL IDEAS THAT SHAPED THE ARABIAN GULF COAST

“We are witnessing an unprecedented growth of population, an unprecedented influx of population into urban areas, which is leading to a much greater growth of their population than in the past, an unprecedented mechanization of the means of transportation which means an explosion of our cities into space and furthermore, a change in social structure, a change in economy, a change in technology. Because of all of these reasons the urban settlements of the present are changing at a rate that is so fast, that on many occasions humanity has not been able to understand that we have entered into a new era, into the era of dynamically growing settlements.”(Doxiadis, 1963)

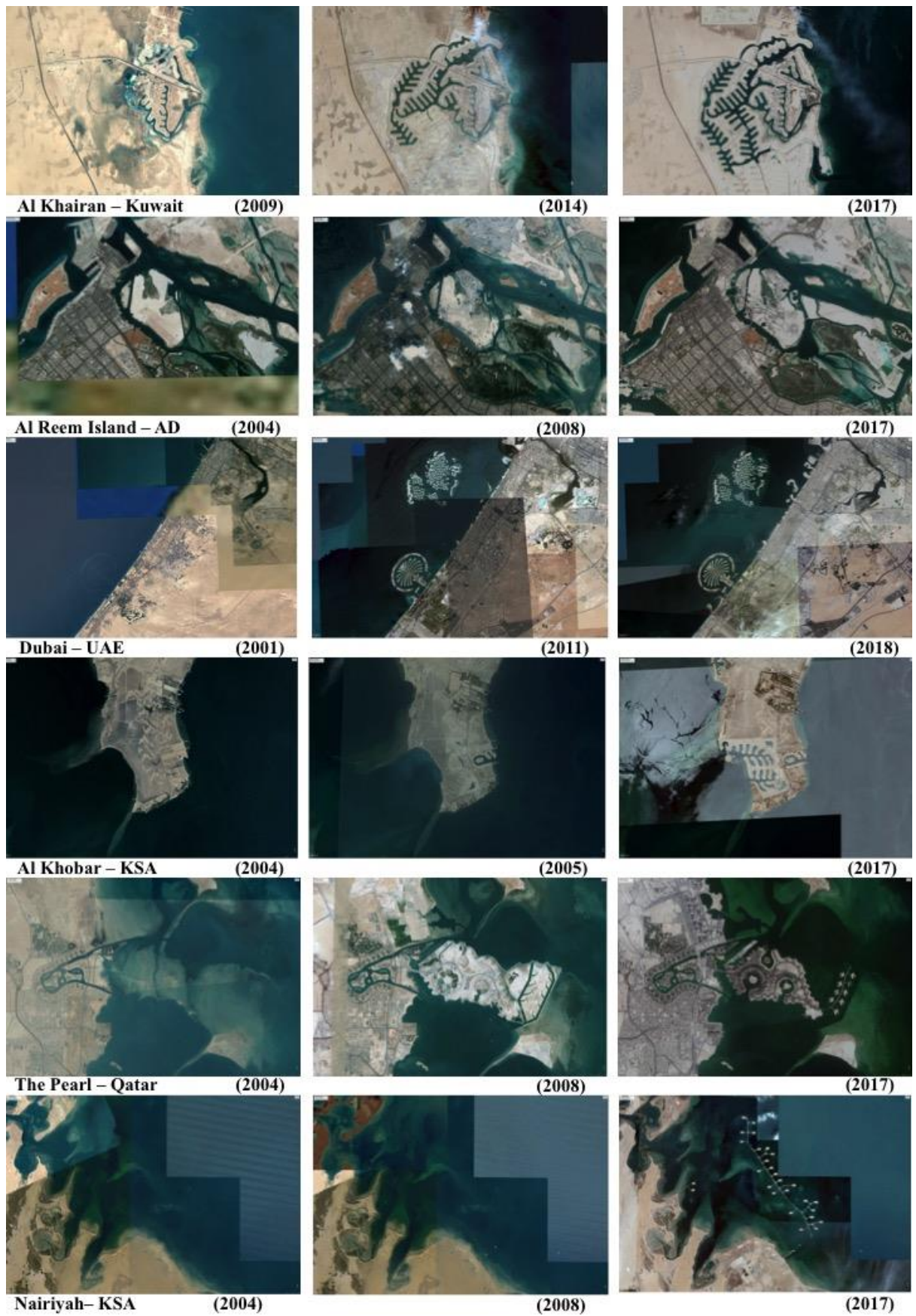


Figure 3.1- Seashore changes and reclamation patterns in the Gulf – done by the author

3.1 Introduction (Gulf , Oil , and its economy shift)

This section of the dissertation looks at man-made waterfronts and islands within the Gulf Cooperation Council (GCC), as those six member state countries, namely– Bahrain, Kuwait, Saudi Arabia, Oman, Qatar and the United Arab Emirates (UAE) share many commonalities that unite them together; they all have high reliance on oil and natural gas revenues which facilitated these countries to build modern infrastructure and to evolve rapidly since their independence, all of the six GCC countries currently rank within the top countries with highest carbon emissions per capita in the world (Data.worldbank.org, 2018). They also share similar cultural, political, and religious backgrounds.

Therefore, many planners and architects have described Gulf urbanization instead of referring to one of its countries as significant ideas and projects that take place in one of those countries soon get to be developed in one way or the other in the rest, as their leaders are strongly connected and in some cases collective GCC funds contribute to the development of major infrastructure projects as it is in the instance of Bahrain. Consequently, development challenges and the emergence of diverse planning practices do face those countries jointly. Moreover, future studies aim to create a transportation network to link those countries to form a borderless GCC and to unite their currencies.

Those countries shared the sea without questioning its borders. “It wasn’t until 1929, when the question of ownership was raised by the agencies of the British government. Until then, Kuwait, Saudi Arabia, and Iran all claimed possession. These islands are particularly significant due to their location in a zone that is rich in natural resources” (Figure 3.2).

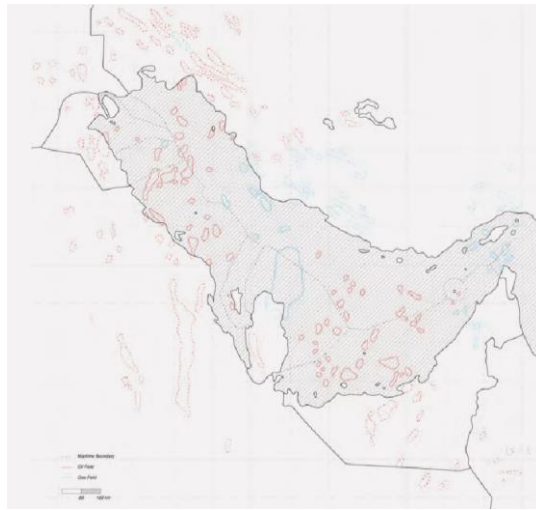


Figure 3.2- Map of the vast oil and gas reserves spread across the Arabian Gulf.
 Drawn by Studio Bound (Ali Baba et al., 2016. p.20).

After oil boom, land reclamation and exploitation is one of the eminent results of globalization. “The construction boom of the early 2000s. The Gulf Cooperation Council (GCC) countries want to continue their development and ensure that they have a working economy when their resources of fossil fuels run out.” (Abdel Raouf and Luomi, 2016, p.147). The oil wealth concentrated in the GCC, benefited the development of its cities and resulted landfill spaces mediated through the forces of oil, wealth and power. As described by George Katodrytis and Kevin Mitchel in their ‘Introduction: The Gulf Urbanisation’ article: “the desire for differentiation to attract foreign direct investment, multinational businesses and tourism is evident in ever-higher high-rises, new urban districts, artificial islands.” (Katodrytis and Mitchell, 2015, p.11)

“The Gulf and its islands are part of one consistent landscape in which the edge condition and the notion of the limit are in flux.” (Ali Baba et al., 2016. p.8). Thus the creation of artificial islands for different land uses proven in this region to be more economical and achievable in a faster pace than developing inland, due to the complexity of the landownerships and the vast open spaces in the sea that can be urbanized. This has resulted many architectural and urban projects such as the Palm island and the World islands in Dubai, Yas island in Abu Dhabi, and Durrat Al Bahrain to name a few.

3.2 Overseas ideas that informed Gulf's shorelines

All the main Gulf countries capitals' are on the coast; the rulers all wanted to get early wins and challenged the international consultants that were brought in to assist and to give them visions for the future. The political will at the 60s and 70s was concentrated in the hands of a few people, therefore developments became an "Act of Will" – for example Sheikh Rashid in the 1970s took consultants to a site in the desert somewhat close to the sea, stuck his stick in the ground and said: This is where I want you to build my new port. As a result, that was the beginning of Jebel Ali reclaimed port site in the UAE.

The constraints to rulers achieving the elegant new developments they wanted were often the ownership of land adjacent to existing urban areas by different influential people and the lack of clear accurate land surveys and records of ownership. Yet most capitals had shallow water lapping their shores which, using Dutch and others reclamation technology, could quickly be turned into development land giving an early win, without all the problems of unraveling the convoluted private ownership issues on the land side. Thus reclamation very quickly became the way to go.

3.2.1 Influences post the discovery of oil until the 1950s

Bahrain is the smallest country and the only archipelago amongst the GCC countries. It has a pivotal role within the GCC because of its strategic location and for it being the first country in the Arabian Gulf where oil was discovered in 1932. Prior to oil finding, its economy was contingent on fishing and pearl industry. On that basis, the British colonized the Gulf and Bahrain remained under the British protection till 1971 when it declared its independence.

With oil discovery in the Gulf, Bahrain in 1932, Oman in 1937, Saudi in 1938, Kuwait in 1938 and exported the first barrel in 1946 (Al Nakib, 2016, p.91), Qatar in 1940, and 1950s in the UAE and 1969 in Dubai, the economic growth led to massive urbanization.

As described by Farah Al Nakib, Kuwait couldn't accommodate the country's growing demographic, which resulted more traffic and the introduction of cars, buses and trucks, all of

which started ‘Modernist project’ and the introduction of British Planning principles in the 1940s (Al Nakib, 2016, p.96-97).

The First step in this transformation for example in Kuwait was the state’s commissioning of a master plan in 1951, with the aim of making Kuwait City “the best planned and most socially progressive city in the Middle East.” (al-Nakib, 2013, p.9). By connecting urban planning with social progress, the Kuwaiti ruler echoed the city-planning discourse of the high modernist avant-garde led by Le Corbusier and the Congress International d’Architecture Moderne (CIAM).’ (Al-Nakib, 2016, p.5). The first master plan was designed by the British firm Monoprio, Spencely and Macfarlane in 1952.

3.2.2 Influences between the 1960 and 1970 (Independence)

Kuwait gained independence from the British in 1961, Oman in 1970, where UAE, Bahrain and Qatar were under the British protectorate till 1971. Hence, that period brought many British advisors and planners to the Gulf.

This period marked the beginning of many international and western planners entering the Gulf, and its within this period, Kenzo Tange was approached to work on many schemes in Saudi Arabia and Kuwait.

The political nature of the decision making of the Gulf rulers during the boom years following the Oil Crisis (Western term) of 1973 – OPEC standing together saw a huge increase in oil prices which filled the coffers of the emerging Arabian Gulf countries – yes Kuwait and Saudi had money but all became significantly better off as oil prices went up – countries could now really spend on solving their social and housing problems and gear up for the future.

The second master plan of Kuwait was done by British planners; Colin Buchanan and Partners in 1968 (Mahgoub, 2018. P.35). This plan has suggested reclamation and formed the beginning of seashore alteration to the city of Kuwait. Kuwait’s second masterplan was followed by a first review of the second master plan by Shankland Cox Partnership in 1977. (Mahgoub, 2018. P.35)

Qatar's government appointed in early 1975 William L. Pereira Associates (WLPA) to prepare the master plan for the new Doha, a new community to be built north of the capital city Doha. This concept plan was considered as the framework to develop priority projects within this area due to extreme pressures for developments in that period, these key developments include the airport, the port, the university, the hotel and conference centre, the Diplomatic area and the extension of the Corniche. Doha up to this period was growing with a controlled ring road and radial road system, which was proposed to be reoriented to a linear pattern to respond to the new development requirements. The plan proposed entails landfill to extend the corniche and redirect traffic. On that basis reclamation was derived from the physical and environmental factors, the required land area, the amount of fill available for this new land requirement, the location of major current movements within the fill area and the location of reefs. Thus the area considered for landfill was in the range of 500-600 hectares (Pereira, 1975, p.58-59)

In 1974 a landfill program started in New Doha, it was initiated for four major reasons as described in Pereira report, those reasons are: "To resolve the increasing demand for developable land owned by the government to support housing, community development, and special governmental needs, including a Diplomatic area. To improve the environmental and visual quality of Doha. To complete the semi-circular sweep at Doha Bay. To create a new community which would symbolize the new prosperous and developed Qatar." (Pereira Associates, 1975, p.22)

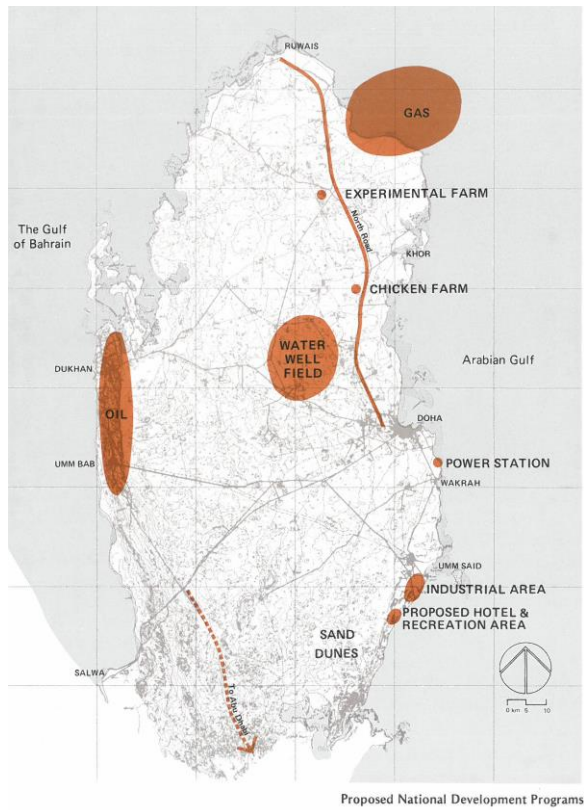


Figure 3.3- Proposed National Development Programs
(Pereira Associates, 1975, p.19)



Figure 3.4- New Doha- Status of Landfill and Landfill configuration in 1975
(Pereira Associates, 1975, p.59)

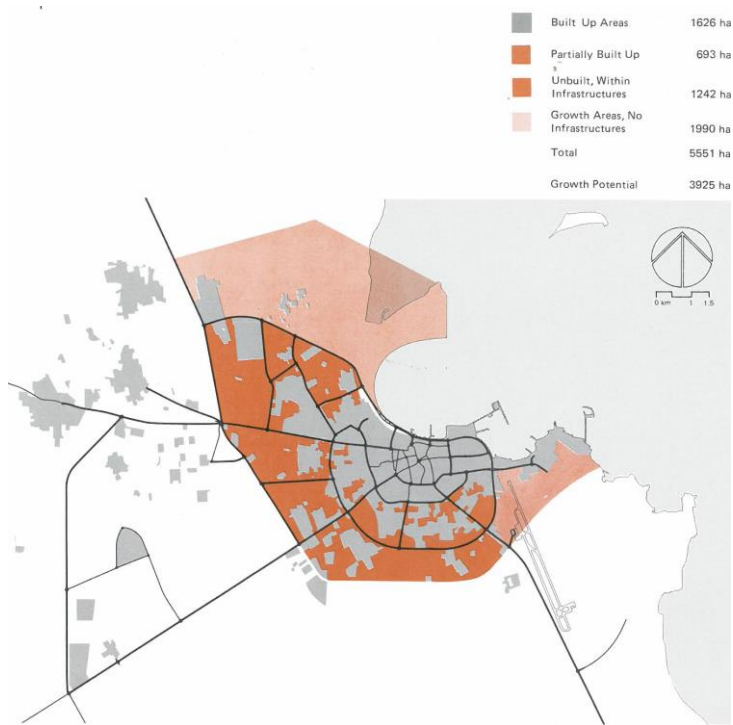


Figure 3.4- Doha Growth Potentials: Population and Housing
(Pereira Associates, 1975, p.32)



Figure 3.5- Proposed Plan for New Doha
(Pereira Associates, 1975, p.46)

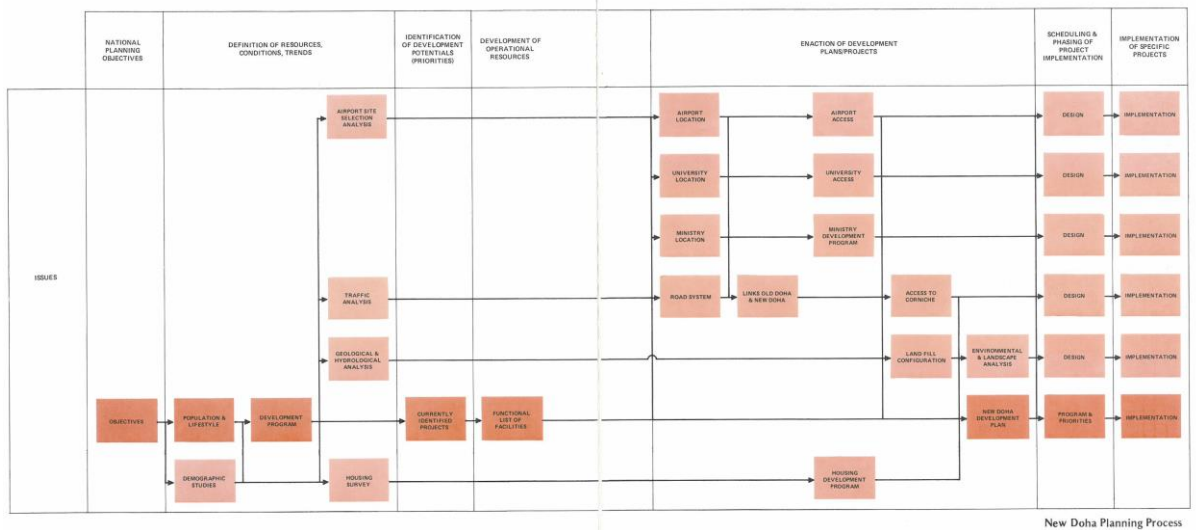


Figure 3.6- New Doha Planning Process
(Pereira Associates, 1975, p.107)

3.2.3 Influences between the 1980s and 1990s

With the oil price rise, the Gulf concentrated on building its future infrastructure, providing housing and modern facilities to its residents. This period entailed interaction with many international consultants that came to the Gulf.

Drawing on sand and recently on sea, as stated by Steven Velegrinis, the director of urban design for Perkins+Will Dubai, “Unlike in Europe, the Gulf city never seems to become saturated. The abundance of empty land and endless waterfronts continue to provide opportunities for new developments. And at the same time, the early downtown projects of the 1970s and 1980s are being transformed and regenerated. These cities, like all urban organisms, are truly Metabolic fields.” (Velegrinis and Katodrytis, 2015, p.74)

3.2.4 Influences between 2000s and onwards

During this period, the Gulf, particularly Bahrain and Dubai were observing Singapore’s planning as the size of Bahrain is relatively similar to Singapore and both were growing island countries at that period. Many urban planners in the Gulf were in contact with the URA (Urban Redevelopment Authority) of Singapore to exchange expertise and ideas regarding technologies used in reclamation, transportation and sustainable measures manifested in greening the country.

“Due to its limited land resources and rapid economic development, the government of the republic of Singapore has been conducting extensive reclamation projects in its territorial waters since 1966. By 1982, 3,200 ha of land area has been added by land reclamation, which comprises 5% increase in the total land of the country” (Matsumoto, 1985, p. 341).

The driving forces as stated by N. Matsumoto are the limited land resources, additional residential and recreational needs due to the growing population, Singapore’s growing importance as a business centre in Southeast Asia, and the rapid modernization of manufacturing sectors and industrialization policies. Matsumoto concluded by saying “ It is no exaggeration to say that the nation is “building up” its own country through the projects.” (Matsumoto, 1985, p. 349)



Fig. 3. A possible master plan that the Prime Minister Lee Guan Yew had shown to Kenzo Tange during his first visit to Singapore.

Figure 3.7- Singapore Concept Plan Structure
(Xue and Xiao, 2014, p.229)

The Palm Island was a direct vision from the crown prince of Dubai whom was keen on adding more beach shorelines to the coast of Dubai in 2001. The proposal of the Palm evolved from the shape of a circle, which had less perimeter to the shape of the palm tree. The execution which was targeted to complete in 5 years brought along many experts in coastal engineering from the Netherlands and Europe.

The Gulf at this stage has reached full exposure to international consultants that have established grounds in many of its countries and have been instrumental in shaping its lands.

A proposed third master plan by Kuwait Municipality in 1977 and another master plan was issued in 2008 by Kuwait Engineering group and Colin Buchanan . (Mahgoub, 2018. P.35)

For example Nikken Sekkei from Japan were appointed in 2015 to design a leisure offshore island in Bahrain, the client asked for several schemes to which Nikken proposed a futuristic vision with oil rigs structure as one option to protect the marine life.

3.3 Intermediary Conclusion

In tracing the reclamation work encountered in the Gulf Region, one can observe the dominance of international planning as early as the 60s and 70s due to the Gulf countries independence at that time and investment targeting an upgrade in the GCC countries infrastructure and public amenities. Prior to that period, the Gulf cities master plans were not developed comprehensively due to the lack of urban planning and design in their educational system. During that time and moving forward reclamation was apparent in many of the cities' masterplans and schemes, which were proposed by the international urban designers and planners. The Gulf shores are shallow and relatively easy to reclaim, given the shallow depths that have to be filled.

The oil wealth has also resulted an increase in urbanization and the migration of foreigners to those countries, which resulted a higher exposure to international planning standards and further reclamation works. Imagining a scale beyond the current borders due to shallow water bodies made the landscape of the Gulf and its territories an exploration zone with constant spatial experimentations and ongoing new creations of its identity. This epoch however resulted major reclamation in the Gulf that resembles the bold vision of the Metabolists to a certain extent.

The new urbanism witnessed with the significant economic growth in Japan in the 1950s and 60s, is similarly witnessed in the Gulf in recent decades due to economic gains from oil and gas revenues.

The Metabolists envisioned the sea, the sky and the air as future mediums for human habitation. The futuristic visions and the technological and industrial optimism propositioned by the group led to groundbreaking epoch of discoveries and shifts in city planning.

The transition from living and occupying existing land to artificial lands and altering the marine civilization with a change in the metabolic cycle of land and sea embodied implications in the Gulf's morphology, the countries' political, social, cultural and environmental conditions.

4. METABOLISM

4.1 Metabolism and its entry to the Gulf

Numerous built and un-built projects were designed by the Metabolists members in the Gulf since the 1960s till the 1980s through direct invitations or international design competitions. Seven out of those projects, at least, have been conceptualized on artificial lands in the Gulf Region. The Metabolists members faced opposition to their ideas in Japan during the economic decline, which resulted in shifting their efforts outside of Japan to implement their ideas and theories in alternative platforms in other parts of the world.

Moreover, it is worth noting that there are multiple Japanese architects that worked in the Gulf in the same timeframe and up to recent days, for example: Minoru Yamasaki designed Dhahran Civil Air Terminal in 1961. Yamasaki's design of the terminal was a blend of traditional Islamic and modern designs and is believed to have inspired a number of building designs throughout the Middle East (Herring, 2017). He has also designed the Saudi Arabian Monetary Agency in Riyadh in 1981, and the Eastern Province International Airport in Saudi Arabia in 1981.

Furthermore, Kazuyuki Matsushita, an architect of URTEC (Unesdoc.unesco.org, 2017. P.11), won a design competition for the original Dubai Municipality building, which was completed in 1979. Additionally, Arata Isuzaki, another member of URTEC team (1954-1963), whom graduated from Tange's school late in the 1960s and his last collaboration with Kenzo Tange was in Expo 70 in Osaka. After that, he established his company after that. Realization of Middle East projects were in the 1970s where Arata Isozaki became independent, therefore, he has only recently designed in 2011 Qatar National Convention Centre, in Doha, Qatar. (ArchDaily, 2013). Those are significant architectural projects in the Gulf, however, not detailed in this research, as they don't entail any reclamation or coastal developments.

Major projects in the Arab world attracted the involvement of Japanese Metabolists such as Kenzo Tange (Kuwait International Airport, an unbuilt Sports City in Kuwait), Kisho Kurokawa (Sarir Bedouin housing in Libya, an unbuilt Conference City in Abu Dhabi), and Kiyonori Kikutake (an unbuilt floating hotel in Abu Dhabi). (Daniell, 2008, p.25)

Many more projects were envisioned on the Gulf's seashores, as stated by Al-Sehlawi and bin Shabib: "The notion of recreational islands began well into the early 1970s. In Dubai, Reima and Raili Pietilä proposed an island themed around "Arabian Nights" for the Deira Sea Corniche competition of 1974. While in Abu Dhabi, the city's archipelagos were potential sites for Cedric Price's suggested "Sea Garden" in 1973 and Oscar Niemeyer's proposed "Lulu Island" in 1977. Jeddah, too, participated in the trend with Kiyonori Kikutake's 1976 floating island idea, which berthed and moved along the city's shorelines. And in Qatar, Kenzo Tange proposed a marginal recreational compound on Doha's Al Aliyah Island" (Ali Baba et al., 2016. p.50).

The projects undertaken in the Gulf region by the Metabolists members are described in Table 1 which outlines a collection of the works investigated in Project Japan, and the books of Kenzo Tange (Associates, 1990), Kisho Kurakawa and Kiyuonori Kikutake (Oshima, 2016). The projects highlighted indicate waterfront schemes (entail reclamation partially or fully):

Name of Project	Period	Location / Owner	Consultants	Size/area	Scope of work for the Japanese Architects	Project Status
Stadium and Sports Centre in Riyadh	1965-	Riyadh, Saudi Arabia	Kenzo Tange	57,000 seats		
Kuwait International Air Terminal Building	1967 - 1979	Farwaniyah, Kuwait / Govt. of Kuwait	Pacific Consultants International (Lead Consultant, Civil, Traffic and Mechanical Engineer): Kenzo Tange+URTEC (architect); KEO(engineering) Contractors: Ballast Nedam Group NV and Solico Contracting Co. L.L.C. (General Contractor); Enrico Romagnoli Spa; Al Hani Construction & Trading Co; Higgins and Castle; Bronswerk Heat Transfer; International Aeradio Ltd; FMC corporation; Stanray Corporation; Lamson Engineering Company Ltd.	67,046sq.m (total floor area)	Arch. Design & Site Supervision	100% Design, 100% Supervision
Kuwait Sports City from the Planned 1974 Pan Arab Games	1969-	Kuwait	Architectural Design: Kenzo Tange		Invited International Design Competition	First Prize
Palace for King Faisal at Jeddah Saudi Arabia (Project)	1972-	Jeddah, Saudi Arabia / Government	Architectural Design: Kenzo Tange Structural and Mechanical Engineer:	8,129 sq.m (total floor area)	Arch Design - Design Competition	80% (stopped) 0% supervision

		of Saudi Arabia	Sato & Prob Engineering			
Master Plan for Pilgrims Accommodation in Mina near Mecca	1973-	Mina, Saudi Arabia	Urban Design: Kenzo Tange Design of Tools: Kenji Ekuan and his Gk group	470 ha (area)	Urban Design	100% Design
Conference City , Abu Dhabi	1975	Abu Dhabi, UAE	Kisho Kurokawa		International Competition	First Prize
Conference City , Abu Dhabi	1975	Abu Dhabi, UAE	Kiyonori Kikutake		International Competition	
Floating Luxury Hotel, Abu Dhabi	1976-1977	Abu Dhabi, UAE	Kiyonori Kikutake			
King Faisal Foundation Headquarters Complex	1976 - 1982	Riyadh, Saudi Arabia/ King Faisal Foundation	Architectural Design: Kenzo Tange , Structural and Mechanical Engineer: Sato & Prob Engineering Contractor: Hyundai Construction Co., Ltd	68,000 sq.m (total floor area)	Arch Design & Site Supervision	100% Design, 100% Site Supervision
Floating Luxury Hotel, Saudi Arabia	1976	Saudi Arabia	Kisho Kurokawa			
Floating Luxury Hotel, Saudi Arabia	1977	Saudi Arabia	Kiyonori Kikutake			
Al'Aliya Island, Qatar	1970s	Qatar	Kenzo Tange ,			
National Theatre, Assembly Hall, Abu Dhabi	1977	Abu Dhabi, UAE	Kisho Kurokawa		Design competition	Third Prize
His Royal Highness Crown Prince's Palace The Royal Palace for H.R.M. the King.	1977-1981	Jeddah, Saudi Arabia/ His Royal Highness Crown Prince of Saudi Arabia	Architectural Design: Kenzo Tange + URTEC , Structural and Mechanical Engineer: Sato & Prob Engineering Contractor: Kajima Corporation	11,000 sq.m (total floor area)	Arch Design & Site Supervision	100% Design, 100% Site Supervision
His Royal Majesty King's Palace Later called: Royal State Palace (guest house)	1977-1982	Jeddah, Saudi Arabia/ His Royal Majesty King of Saudi Arabia	Architectural Design: Kenzo Tange + URTEC , Structural and Mechanical Engineer: Sato & Prob Engineering Contractor: Kajima Corporation	14,000 sq.m (total floor area)	Arch Design & Site Supervision	100% Design, 100% Site Supervision
New Palace for His Highness the Amir	1977-	Doha, Qatar/ His Highness The Amir of The State of Qatar	Architectural Design: Kenzo Tange ,	25,000 sq.m (total floor area)	Arch Design	60% Design
Master Plan for Government Centre in Doha	1977-	Doha, Qatar/ The State of Qatar	Architectural Design: Kenzo Tange ,	200,000 sq.m (total floor area) 100ha (site area)	Urban Design	60%
King Faisal Foundation Headquarters Complex	1976-1982	Riyadh, Saudi Arabia/ King Faisal Foundation	Architectural Design: Kenzo Tange , Structural: Takumi Orimoto & Associates, Mechanical Engineering: Inzuka Engineering Consultants	32,000 sq.m (total floor area)	Arch. Design & Site Supervision	100% design & 60% supervision
Saudi Arabia	1981-	Riyadh,	Architectural Design:	5200 sq.m	Arch Design	20% design

Embassy and Chancellery	1985	Saudi Arabia / Ministry of Foreign Affairs	Kenzo Tange , Structural: Takumi Orimoto & Associates, Mechanical Engineering: Inzuka Engineering Consultants			completed
Arabian Gulf University	1982_	Manama, Bahrain / The Arab Bureau of Education for the Gulf States	Architectural Design: Kenzo Tange + URTEC , Structural: Takumi Orimoto & Associates, Mechanical and Electrical Engineer: Garmeco	68,870 sq.m	Arch. Design	100% design completed
King Saud University – Al Qassim Campus	1984-1993	Al Qassim Campus, Saudi Arabia	Master Plan, Academic Plan and design the infrastructure: Kenzo Tange Associates Contractors: Consortium: Consec International Ltd., Uk Krikor Baytarian and Somait Engineering (engineering for masterplan and full infrastructure design)	Site area:775 ha Floor area: 1413,000 sq.m	Master Plan and Architectural Design	90% Master plan, 50% Arch. Design
King Saud University, Women’s College	1984-	Al Qassim Campus, Saudi Arabia	Architectural Design: Kenzo Tange ,		Architectural Design	30% Arch. Design
Natioanl University Abu Dhabi / University Town in Al Ain	1987	Al Ain, UAE	Kisho Kurokawa		International Competition	First Prize

Table 4.1 The Metabolists projects and design proposals in the Gulf Region

4.2 Kenzo Tange and the Gulf

Tange’s presence in Saudi dates back to 1965. According to Kenzo Tange, in his Japanese book, () he was invited by a Saudi royal family member who had visited Tokyo Olympic Game (1964) and admired his work. Since then, Tange designed and completed multiple projects in Saudi Arabia; in Jeddah, Riyadh, Mina in Mecca and Al Qassim region. Throughout that period, he had the opportunity to work on many projects in other Gulf countries as well, particularly in Kuwait, Bahrain and Qatar. As the ruler of Saudi Arabia – King Faisal- was fond of his work; this notion encouraged other rulers in the Gulf to work with him. The author interviewed Paul Noritaka Tange, Kenzo Tange’s son, on the 25th of January 2016, who stated that Kenzo Tange had connections to the Gulf because of his work in Tokyo Olympics in Yoyogi and subsequently he had frequently traveled to the Gulf. He further elaborated that in the 1970s, the rulers were very simple and usually invited his father in the evening to their tent to have a meal with them. Paul asserted that his parents became very close

to the royal families of the Gulf, but he did not have a clear understanding of the circumstances that led to this relationship.

That being said, in a research on the works of Tange in Saudi Arabia prepared by Ahmed Kaaki (2015) he affirmed, “Saudi Arabia’s King Faisal witnessed the ability and skills of the Japanese architect, which led to chain of projects in the country and the middle east.” (Kaaki, 2015)

Additionally, Paul Tange stated that, in 1961, Kenzo Tange established ‘Kenzo Tange and URTEC’ (Urbanists and Architects), later modified to ‘Kenzo Tange Associates’, then in 2003, Kenzo Tange as a token of recognition of his business partners, changed the name of his firm to ‘Tange Associates’. Therefore, most of the work that took place in the Gulf involves the URTEC team. Kiyonori Kikutake, a close friend of Tange in addition to Kisho Kurakawa and Arata Isozaki, Tange’s students in The University of Tokyo, joined his firm upon graduation. In fact, the majority of the players of the Metabolism movement were students of Tange’s. As a tribute to Tange’s significance to the Metabolism movement, Mori museum dedicated a large exhibition to showcase that the the history of Metabolism is incomplete without Tange’s ideas.

Moreover, Kenzo Tange did not only work in the Gulf region as outlined in Figure 4.1 below (Tange, 1987), he also worked in other Middle Eastern countries in the 1970s because of the economic situation in Japan. He worked on a palace in Syria, and on several projects in Algeria.



Figure 4.1 Kenzo Tange’s Projects in the Middle East
(Tange, 1987)

In describing the significant architectural projects in Algeria, “Hadjiri and Osmani show the clear and direct impact of some of the most prominent architects of the world who visited the city before its recent struggle with violence and terrorism. Le Corbusier (Switzerland), Oscar Niemeyer (Brazil), and Kenzo Tange (Japan) left their signatures on a number of projects that are important in the image of this distinguished city.” (Fuccaro, 2011, p.112)

Kikuatake and Kurakawa Gulf’s work had no connection to Tange, Paul argues that his father was the frontrunner, which resulted in attracting many Japanese architects to explore the Middle East. Therefore, the work produced by the other metabolists members had not been a collaborative work with Tange.

4.2.1 Saudi Arabia

As described in Tange's book (Tange,). a member of the royal family of Saudi Arabia visited the Tokyo Olympic game in 1964. He was impressed by Tange's work and invited him to Saudi as shown in Figure 4.2 of Tange and Mr. Suboi, a Japanese structural engineer in Saudi (Tange, 1987). Tange was asked to design three sports complex projects in Riyadh, Jeddah and Tehran, but due to the Middle East's war against Israel at the time, the projects were suspended. However, Tange designed a Palace in 1972 for King Faisal Al Saud, but unfortunately the project got suspended due to the King's assassination in 1975. Consequently, the project was implemented later by the Princess, who decided to construct the King Faisal Palace. Paul Tange asserted that, during that period, Tange's projects in Saudi were mainly by invitation from the Royal Family, some were based on competitions that didn't materialize into built work.



Figure 4.2 Tange and Mr. Yushikatsu Tsuboi in Saudi
(Koolhaas et al., 2011, p.592-593)

H.R.M The King of Saudi Arabia invited Kenzo Tange to design his palace; Tange proposed two designs, on different sites facing each other across Jeddah's inlet; one was situated on the shoreline and the other was a circular plan positioned in the inlet. Paul recalls that Kenzo Tange said the King had chosen the one inland that was facing the water, while the Crown Prince selected the second one, both of which are shown in figure 4.3 below (Kenzo Tange Associates ~ 1987, 1987)

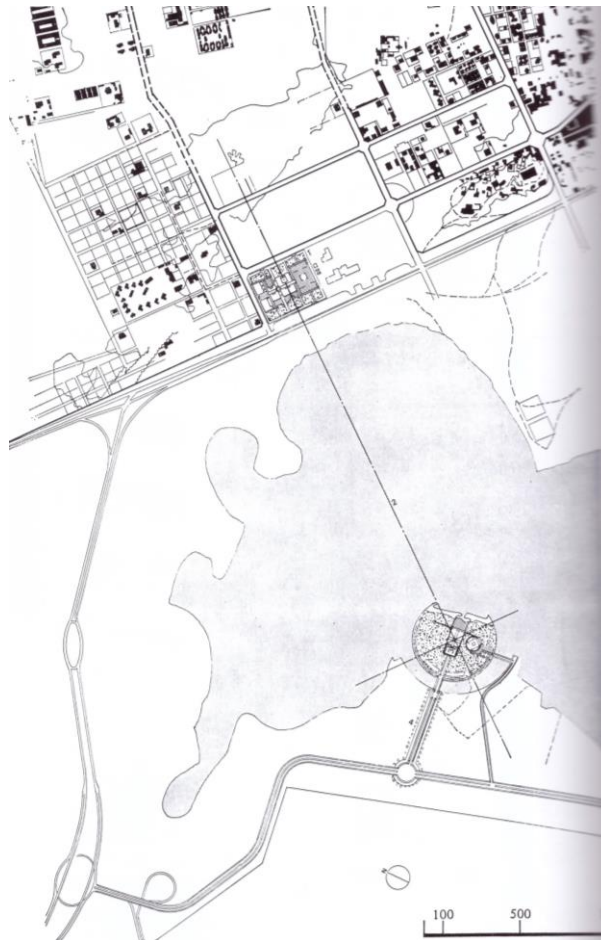


Figure 2.3 Tange's Design Options for the Palaces of H.R.H the King and the Crown Prince of Saudi

(Kenzo Tange Associates ~ 1946-1979, 1979, p.134)

Moreover, in an interview conducted on January 27th, 2016 with Omar Take, an architect from Kenzo Tange and URTEC who was involved in the later stages of the projects in the Middle East, he stated that his mother was the interior designer who designed many of the interior palaces in Jeddah. Take and his mother had worked on many projects for Saudi royal families. He also asserted that Tange's idea was to create a masterpiece, in a prominent location, but the King thought it was situated too far, and due to the abundance of lands available, he did not choose the option that entailed reclamation. However, the Crown Prince King Fahad liked both designs, but he respected the King's selection and implemented the other one for himself. The reclamation was undertaken by utilizing the available inland supply of sand.

Paul Tange, in his interview, recalls that the construction of the King's Palace started on a site, but while the King drove by it during the piling stage, he decided it was not the ideal location along the waterfront, and shifted the site along the same shore. Architecturally, Tange's team was supervising

the full project, and were involved in the material selection, and brought a whole team from Japan; almost 10 architects were stationed in Saudi. During that period, Tange collaborated with many engineering groups as his associates; structural and mechanical engineering was conducted by a Japanese/French engineer called Sato and props. Later, Tange nominated Kajima Corporation; a well known established corporation construction firm in Japan for full engineering and reclamation works, for their first overseas project in the Middle East (Kajima.co.jp, 2010). Additionally, many engineers were British and Lebanese. Tange opened an office to station a team in Riyadh for site supervision. Tange's office was in King Faisal Foundation, which was operational until the completion of Al Qassim University in the 1990s. After which, Kenzo Tange shifted his concentration to East Asia.

As stated by Paul Tange, Kenzo Tange destroyed all further correspondence, as he believed that the projects were confidential and once the building is completed, all the documents should be destroyed intentionally in order to avoid publication in case they were found at a later stage. Tange did not believe that the drawings were of value; he only kept the drawings during the legal period of the projects and only published some plans and photos after receiving permission, therefore, palaces and sensitive projects done in the 1970s lack proper documentation.

It is also worth noting that Tange designed Tokyo City Hall in 1985-1986, post his work in the Gulf, and the geometric patterns introduced in the design of the city hall were out of his inspirations from the Arabic and Islamic patterns that he developed in his Saudi projects. (Kaaki, 2015).

4.2.2 Kuwait

Prior to the works of Tange in Kuwait, he was commissioned by the Ministry of Foreign Affairs of Kuwait to design the Kuwait Embassy in Minato ward in Tokyo, designed in 1966 and built in 1970. The building has no relation to local Arab architecture and demonstrates Tange's metabolism architecture. It is claimed that its due to be demolished and rebuilt in 2018 (Ward, 2017).



Figure 4.4 – 4.5 Kuwait Embassy in Tokyo
(Photos taken by the author in January 2018)

During the same period, in the 1960s an advisory board for planning the master plan of the old city of Kuwait was formed with international members under the chairmanship of the then Prime Minister Sheikh Jaber Al Ahmed. As noted by Haywood (1989), this advisory board recommended that ideas should be solicited from a number of leading international firms. The board presented their ideas to the Prime Minister in 1968, which made him “set up a new masterplan committee to implement the proposals and act as the centre of control of the city development. From these initial ideas the committee developed a system of patronage which resulted in a whole range of public buildings being commissioned from leading international architects” (Haywood, 1989, p.5). According to Al Nakib (2013) “This list of world-class architects included Kenzo Tange from Japan who has designed Kuwait international airport” (al-Nakib, 2013, p.18). As stated Camacho, Saragoca and Fabbri (2016); in 1962, the Japanese Pacific International Consultants took over this project from a British contractor and suggested the name of Kenzo Tange as the lead architect for the terminal building (Camacho, Saragoca and Fabbri, 2016, p.154). Therefore, in 1967, Tange, as depicted in figure 4.6, was appointed for the design of Kuwait International Air Terminal Building by the Government of Kuwait, which was completed in 1979. Paul Tange recalls that he was told from the very beginning, the Kuwaitis found oil beneath the airport site, he remembered as a child that the projects will stop because of this finding, but it continued and got built regardless.

Tange has also entered into an international design competition in 1969 where he won the first prize for designing the Kuwait Sports City.



Figure 4.6: Kuwait International Airport designed by Kenzo Tange
https://archnet.org/sites/439/media_contents/16553



Figure4.7: Tange in a meeting in Kuwait negotiating Kuwait's International Airport Building
(Koolhaas et al., 2011, p.602)

4.2.3 Qatar

An interview was conducted by the author in Tokyo on August 5th 2017 with Tetsuo Furuichi, an architect who worked in Tange's office from 1975 to 1986, during which he was involved in Tange's Middle East projects. Furuichi stated that he visited Qatar, Bahrain, Saudi, Syria and Jordan. Furuichi travelled to Qatar in 1977 to work on the Corniche masterplan which



Figure 4.8 Architect Tetsuo Furuichi - 2017

included a district designated for ministries and government buildings. He lived in Doha for eight months, where he interviewed staff of various ministries to determine their current and future design and staffing requirements. He described Qatar as a very beautiful small village with two existing hotels; the Gulf hotel and the Oasis hotel, and mud-brick residential buildings. Indeed, Adham (2009) asserted that “True, the urban character of the city began to take shape around end of the 1960's with developments taking place along the Gulf shores, such as the construction of al-Corniche Road, the opening of new routes through the city, and the construction of two new hotels, Gulf and Oasis.” (Adham, 2009, p.81). Adham (2009), also asserted that the 1970s was a different period because of the direct involvement of foreign, mainly western planners and designers that shaped the future development of the city of Doha (Adham, 2009). Furthermore, Adham (2009) indicated that the government of Qatar contracted, for the first time, a foreign planning consultant Llewelyn-Davies in 1972 to create a masterplan for Doha until 1990. The masterplan proposal consisted of reclaiming along the shores of the Gulf to create the ‘New District of Doha’ (Adham,2009, p.82).

The coastline of Doha was dredged and reshaped in 1976, at the time Tange and many other international consultants were working on Doha's shoreline. Furuichi affirmed that Tange was first commissioned to design the Ministry of Finance building, which was fully constructed and completed as planned. Then, he was tasked to design the Doha Corniche Plan (Figure 4.9) which was 60% completed. The Corniche and the government building were both commissioned on the basis of a design competition. Finally, he was requested to design a new palace for his Highness the Amir of the State of Qatar in 1978.

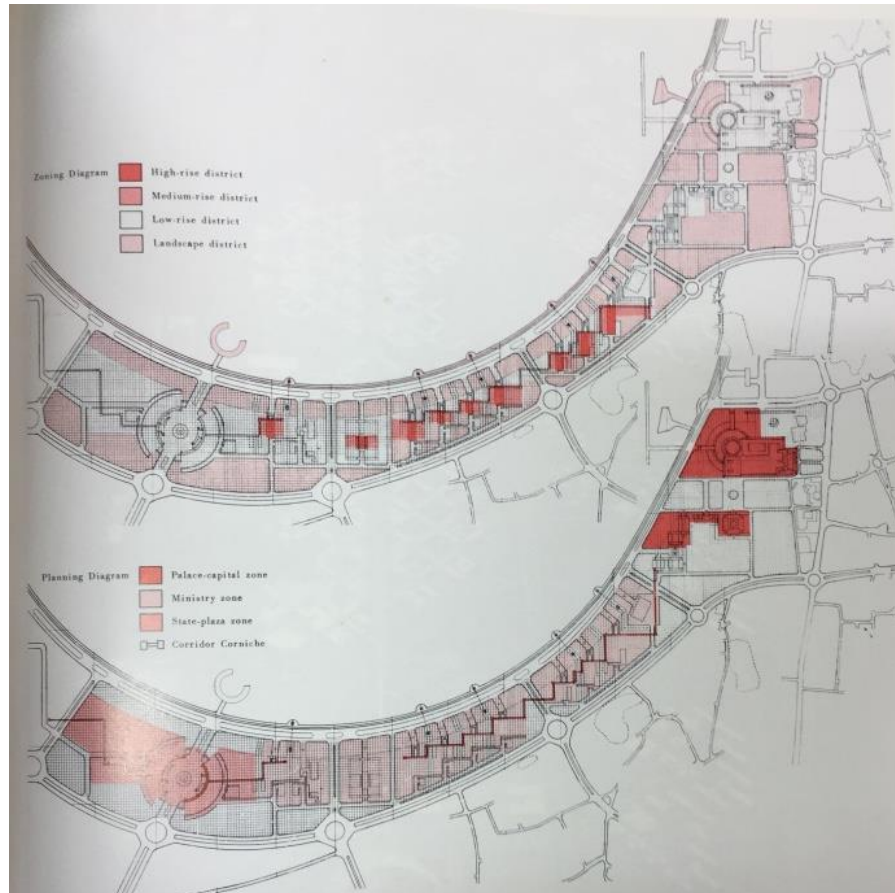


Figure 4.9 Doha Corniche District Masterplan
(Tange, 1990)

According to Furuichi, Tange wanted to explore his vision of the future three-dimensional city in Qatar's Corniche district masterplan. Furuichi described the Doha Corniche Plan as metabolic and adopts typical metabolism notions as the design wasn't static and was meant to adapt to future city growth; he stated that the design intent for the corniche was to create a focal point with radial lines leading to the focal point, with a grid urban fabric in between, as shown in figure 4.9 (Tange, 1990).

The geometric forms ease the future urban connections and linkages as and when required; expanding three-dimensionally horizontally and vertically, reflecting Tange's vision for this masterplan. The circular cores within his designed building footprints were used for vertical circulation and occupied with stairways; Tange used to name his future city concept the 'Urban Core System'. Tange desired to introduce to Qatar his future city that expands three-dimensionally with proposed circular cores which he first proposed in the 1960 Plan for Tokyo bay and later in the Redevelopment Plan of Tsukiji District (1960-1964), as shown in figure 4.10 (Tange, 1990).

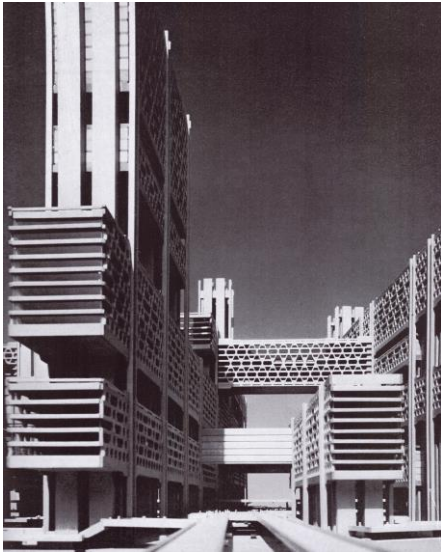


Figure 4.10 Redevelopment Plan of Tsukiji District (1960-1964)
 (Kenzo Tange Associates ~ 1946-1979, 1979, p.49)



Figure 4.11 Fiera District Centre of Bologna (Tange, 1990)

The concept has only materialized on an urban scale in the masterplan of Fiera District Centre of Bologna, illustrated in figure 4.11 (Tange, 1990), which was designed in the late 1960s. However, his idea was developed in many building designs, such as the Yamanashi Press and Broadcasting Centre in Kofu City (1961-1966) shown in figure 4.12 (Tange, 1990), where his three-dimensional building with exposed beams were purposely designed to adapt to future growth. P.42 . Mr. Furuichi said the building currently occupies all the empty spaces that were left open for future expansion; therefore, it has reached its full potential growth.



Figure 4.12 Yamanashi Press and Broadcasting Centre
 (Kenzo Tange Associates ~ 1946-1979, 1979, p.43)

The cornice Plan did not get implemented, as there was a gentlemen in the project management team that caused havoc that generated few problems. Paul Tange remembered that Kenzo Tange one day was upset and said the work would stop in Qatar. However, the Ministry of Finance building was

completed. “Ever since the failure to implement Kenzo Tange’s winning proposal, Doha has struggled to create a fitting centre piece to its Corniche” (Hutzell, el Samahy and Himes, 2015, p.84). “Tange’s proposal was selected, but unrealised, as in the time it took to hold the competition and declare a winner, a number of ministries had already moved ahead with the construction of separate buildings of their own design.” (Hutzell, el Samahy and Himes, 2015, p.91).

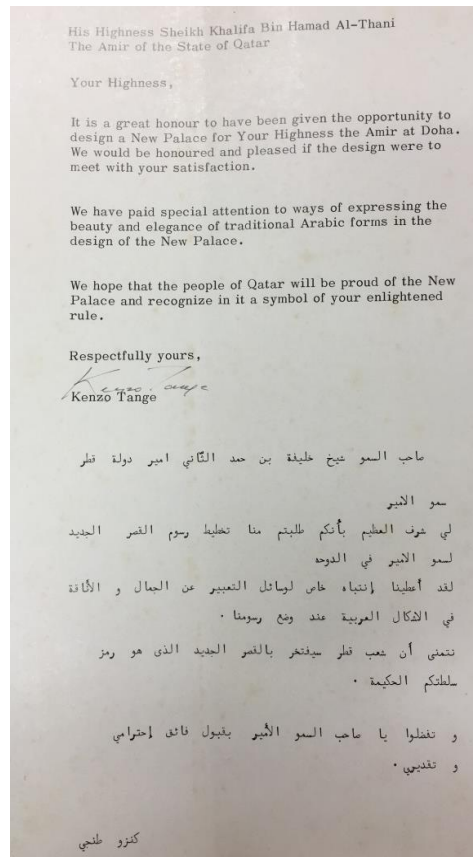


Figure 4.13 Letter to Amir of the State of Qatar (Tange and URTEC ,1978)

Furuichi designed with Tange in 1978 the Amir’s Palace (for his Highness the Amir of the State of Qatar; Sheikh Khalifa Bin Hamad Al Thani) as highlighted in Figure 4.13, proposed as an expansion of few existing old buildings at that stage, close to the clock tower landmark that was taken down recently. The Palace was at the edge of the shoreline, where Tange proposed a building that covers the old buildings and introduces a plaza with a small jetty.

Kenzo Tange had given special attention to waterfront buildings along the Corniche and in his Palace project, where his designs were intentionally elevated to maintain a scenic view towards the sea, as shown in figure 4.14. The Palace renders are captured from the seaside to illustrate the proximity to the water edge and to portray the reflections of his buildings on the sea, showcased in figure 4.15 (Tange and URTEC, 1978).

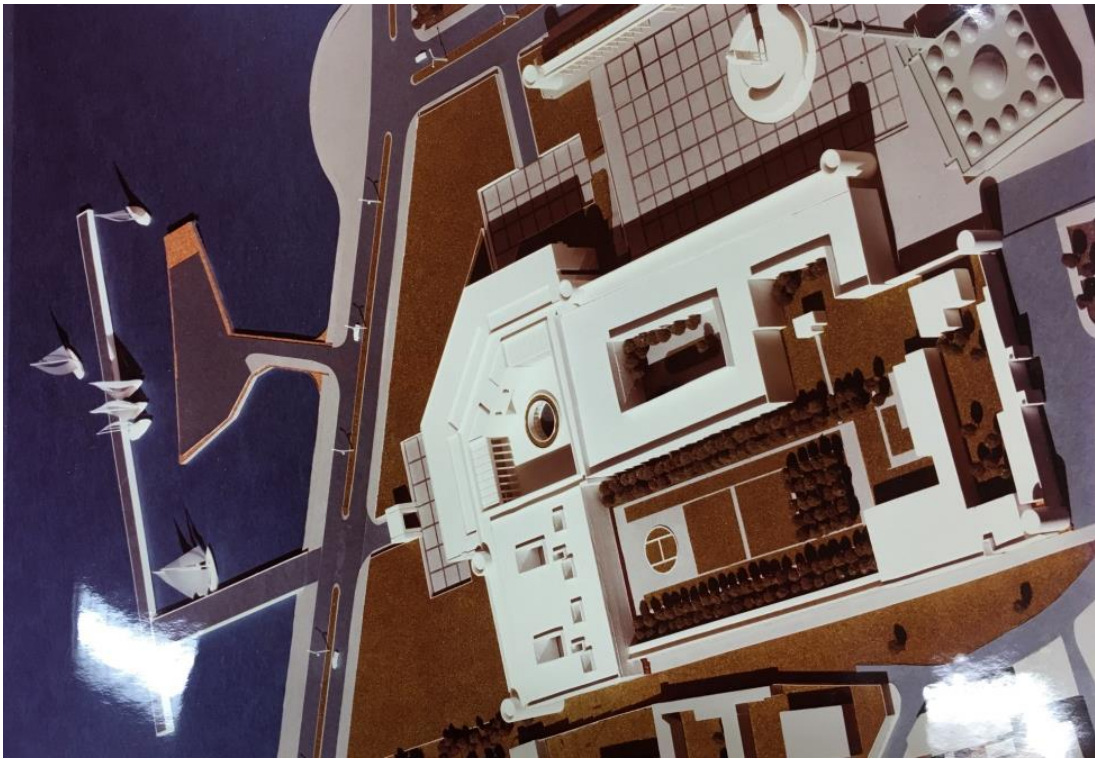


Figure 4.14 Schematic Design for the Palace of The Amir in Doha, Qatar
(Tange and URTEC, 1978)



Figure 4.15 Schematic Design for the Palace reflections on the sea
(Tange and URTEC, 1978)

In the Amir's Palace project, the point of contact at that time was the advisor of the Amir whom was trying to enforce many Arabic ornaments in the design of Tange, which made Tange reluctant to continue his works in Qatar. The advisor was a former employee of an American Architectural firm

called William L. Pereira Associates and therefore favored working with them, The American firm had eventually worked on the new district of Doha and completed the design of the Sheraton hotel in 1982(Qatar Architect., n.d.), which was described by the Amir of Doha as the “first progressive architectural building” in Doha (Vaneycken, 2012). The hotel modern building is shaped like a pyramid and overlooks the shoreline of Doha.

The strong geometric patterns of Tange with circular shafts in the palace were not well received by the ruler of Qatar, as it resembled the architecture of fortresses. Although stated by Dorell that “During the mid to late 1970s the vast majority of Tange’s work was built in the Middle East, with completed schemes including the 1976 Institute of Architecture and Urbanism in Algeria and the Amir’s palace in Doha, Qatar.”(Dorell, 2005) , However, the Amir’s palace was never implemented.

Paul Tange asserted that his father was the first Japanese Architect that made it to Qatar at that period. He also designed an island called Al’Aliya, illustrated in figure 4.16. However, there was a problem with the British consultant in Qatar, thus, not much information was available in Tange’s office on Al’Aliya island proposal.

“It is fair to say that this last-mentioned, unrealized proposal by Kenzo Tange for Jazirat Al Aliyah was the conceptual beginning of recreational islands in Doha. In 1977, the Japanese architect was commissioned to suggest four different schemes for a recreational island northeast of Doha. This peripheral island was intentionally chosen to create a remote attraction that was removed from the centralized concentration of developments in the city. The scheme was to include an athletic club, a marine museum, art galleries, an aquarium, a botanical garden, restaurants, shops, and bungalows.” (Ali Baba et al., 2016. p.50-52).



Figure 4.16 Al'Aliya Island Masterplan
(Ali Baba et al., 2016)

4.2.4 The Kingdom of Bahrain

The Arabian Gulf University was designed by Kenzo Tange in the middle of Bahrain's desert where neither infrastructure nor any settlements surrounded that area at that time, a piece of land was given to design the university in 1982 and the project got completed in 1987 (Archnet.org, 2017). The project was a joint venture between the GCC members and then was eventually changed to the University of Bahrain. "Mr. Yamamoto traveled to the barren site in Bahrain to meet with the university officials on behalf of Kenzo Tange in order to discuss and formulate a design program." (Bukhash, 2006)

During the interview with Paul Tange in January 2016, he stated that after his graduation from Harvard University, he went with his father to visit Bahrain. Paul Tange had family trips to job sites of Kenzo Tange, he went to Kuwait, Saudi and Bahrain. One of his trips as an architect to the Gulf was to Bahrain, he recalls that the university was under construction, and they went to change the head of the site supervision engineer. He asserted that at that time Bahrain was one of the most sophisticated and open countries in the Gulf, the site was given, it was done somewhere not at the center of the city as he described. The master plan was designed by Shippard Robson and Partners, and Tange with URTEC were commissioned to do the architectural and structural design.

As mentioned by Paul, Kenzo Tange always had nice things to say about Bahrain, as it was welcoming foreigners and was pleased to work there. Paul argues that the Middle East is still a difficult environment to tackle for non Middle Eastern people, however, he thought that Kenzo Tange was fortunate to have the connection with the royal family, which made him understand its culture and the context he was given to work in.

In an interview with Dr. Hanna Makhoulf, the former vice president of the university administrative and financial affairs and who used to lead the architectural office of the university. Dr. Hanna praised the design of Tange, he likes the overall planning, specifically the arcades and walkways of the University, which resulted with a masterpiece for Tange in Bahrain. Dr. Hanna believes the design of Tange got constructed exactly according to his original plan. He stated that the only engineering scope that was not delivered by Tange was the air-conditioning of the building, which was done by a

Lebanese mechanical engineer called George Abi Rashed, who had his own consulting office in Lebanon.

Dr. Hanna recalls that the capacity of the University was predicted and researched at that time by looking at the rate of acceptance and expected field of study of students based on the scholarships supported by the King's decree; that led to the design and construction of three colleges; namely the college of science, the college of information technology and the college of applied studies. He recalls that many other buildings were constructed within five years of its opening (with a construction budget of 105 million dollars) as many further facilities were needed. He stated that the number of students increased dramatically from what was designed for (roughly 7000 to 8000 students) to 18,800 within a five-year period, which was a tremendous growth that had to be met. Once the number of students stabilized, the board of trustees of the university directed to stop the university's facilities and buildings expansion without the help of the original designers. At that point Paul Tange was invited to Bahrain, whom came with his team and was given the University's requirements for further expansion; the university lacks buildings dedicated for engineering students, therefore, their recent task mainly focuses on designing the college of architecture and engineering and to fit it within the original masterplan and its architectural language that was aspired by Kenzo Tange. Prof. Hana expressed his deepest efforts in trying to implement Tange Associates scheme after the designs for the expansion got completed in 2006 – 2007, however, it has not materialized yet.

More recently, in 2007, Paul Tange received a call from the president of the University of Bahrain, who asked him to come as the Crown Prince of Bahrain has passed by the university – as Paul heard “The Crown Prince said to the president of the university ‘where is Tange’ and is this plan moving along the original ideas and vision of Tange?”, therefore, Paul Tange is still associated with the masterplan of the University. The university was expanded till 2007-2008 without adhering to Tange's masterplan, then in 2008 (when they planned it, it was a plan for around 18,000 students, where originally it was designed for 8000, thus, the university's capacity increased within the last two to three decades. Tange Associates proposed a revised schematic masterplan which is still ongoing.

In describing the design of the original University, Forster wrote “The roots of his [Tange] solution go back to his association with the Japanese ‘Metabolists’. Tange produced designs for megastructures

that could accommodate different rate of Metabolic change, such as in Tokyo Bay Plan 1960.”...
“This philosophy of regeneration, growth and transformation coupled with a clear structural order, is also manifested in Tange’s current work.” (Archnet.org, 2017, p.58)

4.3 Kikutake’s work in Saudi and Abu Dhabi

Kikutake who designed the ‘Aquapolis’ floating pavilion at the Okinawa International Ocean Exposition held in 1975 to 1976, had managed to display his ocean urbanism ideas in the design of floating structures in the Gulf, precisely in Abu Dhabi (1975) where he designed a conference city and a floating hotel, and in Saudi Arabia (1977), where he designed a floating luxury hotel.

“Kikutake’s schemes for Ocean Urbanism continued to find form through the subsequent decades, in seas far beyond Japan. In the year following Aquapolis, for an invited competition, Kikutake designed a crescent-shaped Abu Dhabi Floating Hotel that floated independently of its interior courtyard, rotating 360 degrees every 8 to 10 hours.” (Oshima, 2016, p.209)

“ Kikutake’s 500-room Saudi Arabia Floating Luxury Hotel (1977) was to be constructed by shipbuilders and towed to shore. This was to be both a “free zone” with legalized gambling and a micro cosmic city with its own water, waste, and energy systems.” (Oshima, 2016, p.209). “The list of projects through the 1970s and ‘80s witnesses a disintegration of the group’s idealism, and its obsession with form over social context: Saudi floating casinos to be moored in international waters; deployable desert cities.” (Self, 2011).

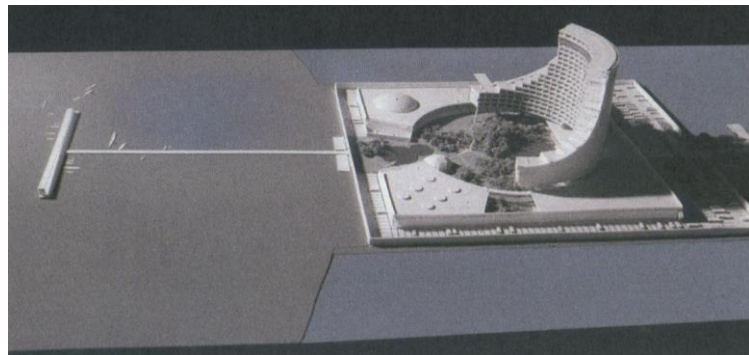


Figure 4.17 Abu Dhabi Floating Rotating Hotel by Kikutake – 1975-76



Figure 4.18 Floating Luxury Hotel in Jeddah, Saudi Arabia by Kikutake- 1976-77

4.4 Kurokawa's work in the UAE

The lack of written documents on the Metabolist work on the Gulf, makes it difficult to trace all their work and their intentions. Kurokawa opened an office in Abu Dhabi, however, not many publications were found on his work at that time. His daughter and son took over Kurokawa's office in Tokyo for some time but then an engineering company called Nihon Koei bought it. During the 70s Kurokawa won several design competitions in the UAE. In 1975, he won the first prize for designing a Conference City on a reclaimed waterfront in Abu Dhabi. In 1977, he won the third prize for designing the Assembly Hall in Abu Dhabi, and lastly in 1987, he won the first prize for designing the UAE University Town in Al Ain.

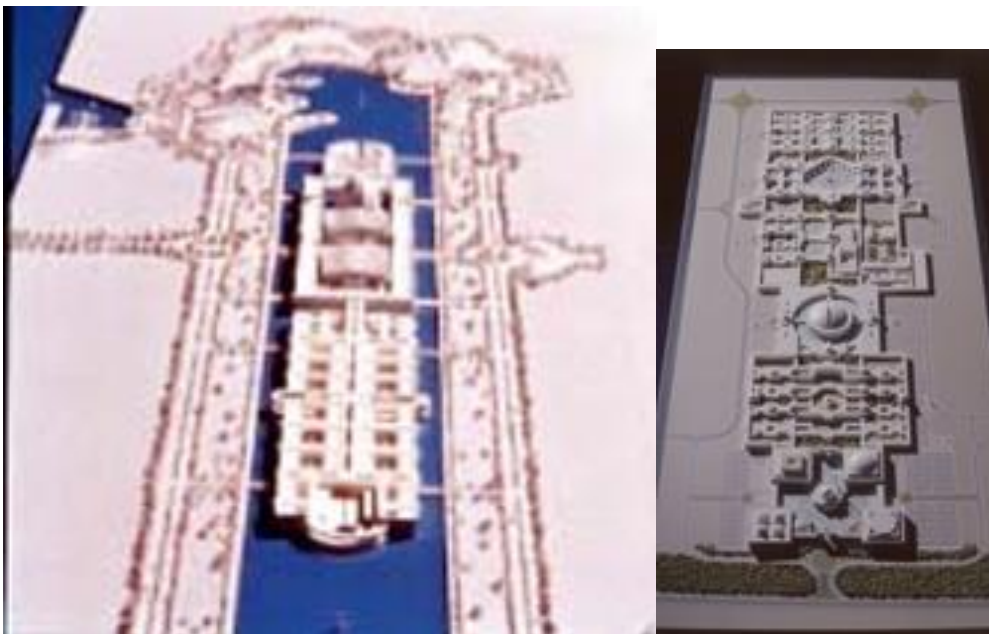


Figure 4.19 Conference City in Abu Dhabi by Kurokawa – 1975

Figure 4.20 National University – Design completion in UAE by Kurokawa- 1975

SOURCE

4.5 Intermediary Conclusion

Although the works of the Metabolists were deeply rooted to their critical situation in Japan, this movement had global recognition and some of the Metabolists members thrived to practice their ideals outside the context of Japan. This entry to the Gulf facilitated their enthusiasm to test their theories in other grounds and has resulted the implementation of architectural projects in the Gulf and the exploration of multiple megastructures after they established their fame in Japan and the west.

The works of the Metabolist group in the Gulf manifests the beginning of a significant transformation of its sea terrain. Metabolism had an aesthetic agenda, which established part of the sea today. The investigation of the concepts of urban utopia carried to the Middle East and the gulf implies the international influence that contributed to its morphological transformation.

The majority of the work of the Metabolist group in the Gulf was carried out by Kenzo Tange, and some of those were the only ones that got realized. Kisho Kurokawa and Kiyonori Kikutake entered the Gulf at a later stage in the 1970s, post the oil crisis (1973) in Japan, through design competitions where they managed to transfer many of their Metabolism ideologies through their conceptual work; however, none of their work came to fruition.

Based on the works of the Metabolists group in the Gulf, the Japanese planners introduced their ideas of planning cities in the water through many of the schemes in Qatar, UAE and Saudi. Though the only reclaimed development that was implemented was the palace in Jeddah, those ideas provoked further reclamation in the Gulf as witnessed currently.

It is worth noting that Tange worked in the Gulf prior to East Asia and particularly Singapore. The First Prime Minister of Singapore Lee Kuan Yew said in one of his published books on the planning of Singapore and his memories “the urban planning of Singapore, especially the reclaimed projects were started by 2 urban planners : I. M. Pei, and Kenzo Tange”.

As published in the Singaporean newspapers ‘The Straits Times’ in 26th September 1971, Kenzo Tange was commissioned to design an indoor sports stadium after his completion of other sports complexes in Tokyo, San Francisco, Saudi Arabia and Kuwait.

thoughtless ways. By evoking the Metabolist “joint core” system and the profile of Clusters in the Air, Isozaki’s design for the Qatar National Library might be seen as an optimistic gesture, a symbolic replanting of the dormant concepts of Metabolism in fertile ground. However, Isozaki admits that the impetus to recycle the design came from his client, the Emir of Qatar: (Daniell, 2008, p.31)

Clearly reminiscent of Metabolism in form, it is diametrically opposed in intent: the library is a predetermined, static object rather than a contingent manifestation of dynamic, free processes. (Daniell, 2008, p.31)

Albeit, Metabolism is not the only influential movement that led to artificial developments in the Gulf, it had significant influence on rethinking city designs on the planning scale and the architectural scale as well. As stated by Zahra Ali Baba “The works of Mohammed Makiya, Sune Lindstrom, Malene Bjorn, and Kenzo Tange as well Kuwaiti-born architect, Ghazi Sultan, propelled a new movement in Arab architecture.” (Ali Baba et al., 2016. p.4)

5. GENEALOGY OF WATERFRONT DEVELOPMENTS AND RECLAMATION IN BAHRAIN (HISTORICAL SURVEY)

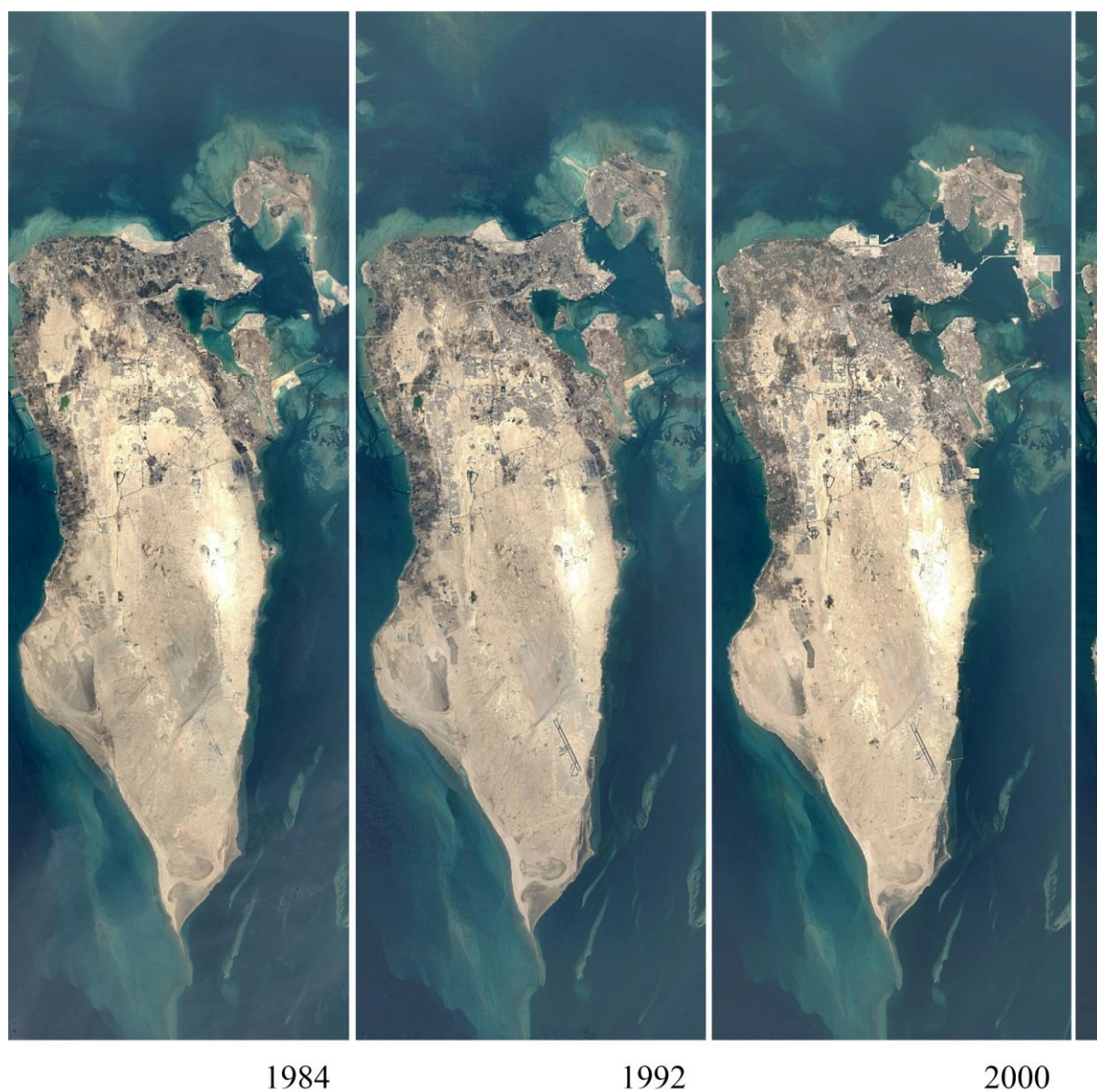


Figure 5.1- Reclamation and topographic alteration patterns from 1984-2017
Done by the author using google historical map records



2004



2008



2017

5.1 Introduction to main body of research

The Kingdom of Bahrain is composed of one main island and other 33 small islands located off the Arabian Gulf. Bahrain is commonly an archipelago, with a total area of nearly 771 square meters as of 2005 (almost equivalent to the area of Singapore ~ 719 sq.km). The country has a population of 1,425,171 million as of 2016 as per the World Bank data, which is expected to grow to 2 million in 2030. The name of the country in Arabic means the ‘the Land of Two Seas’ as its situated between two kinds of water; sweet and salty waters. The country’s economy depended historically on fishing, pearling and trade. With the discovery of oil in 1932 by the British, the economy has witnessed a shift, evident by the different trade activities and the change in the lifestyle of the inhabitants and their relation to the sea. Majority of the earlier settlements in Bahrain were deployed along the shorelines, which in these days are intertwined within the larger urban context due to vast expansion towards the sea. When the oil was discovered, the generally flat areas within the centre of Bahrain were tied with oil activities and with continuous oil drilling works, leaving the outskirts and the coastal areas as the only areas suitable for development. Bahrain is currently trying to diversify its income streams and by it being strategically located within the Gulf, made it an important business hub and centre within this region. Bahrain’s area increased from 666 square kilometer in 1968 to 771 square kilometer in 2015 (Figure 5.2). 105 square kilometer, which is about 10,500 ha, was reclaimed in Bahrain over 47 years, comprising a 16% increase of land in the country. Most of the total reclaimed land area is completed in the main island, while reclamation of offshore islands is negligible. Bahrain is surrounded by shallow waters of 1 to 3 meters, which is one of the reasons for fast pace of reclamation. Tokyo on the other hand was dealing with an average of 20 meters for the areas that were reclaimed in Tokyo Bay.

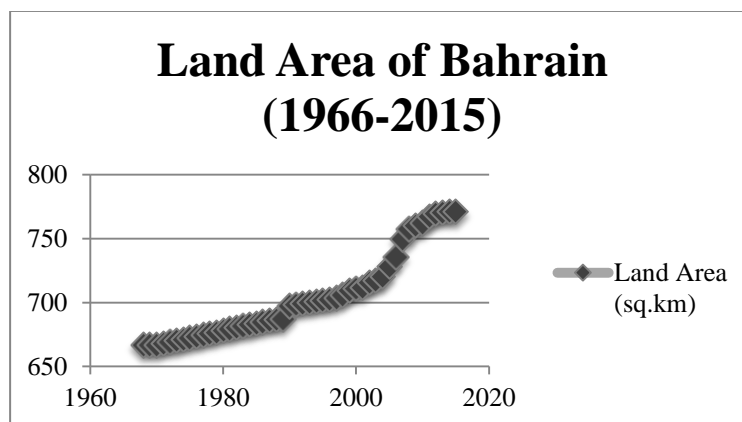


Figure 5.2- Chart done by the author based on the information displayed in the exhibit at Survey and Land Registration Bureau in Bahrain

Bahrain witnessed an immense expansion, which stretched out its spatial coordinates almost all along its original main land parameters. Bahrain moved from a British protectorate that lasted from 1783 to 1971, to an independent state. Throughout that period a British Advisor was appointed to the Amir; sir Charles Belgrave whom designed many buildings and worked on connecting some of Bahrain’s main islands via reclaimed bridges. The oil wealth acted as a catalyst for urban developments within the country, similar to all Gulf countries, leading to constant transition in the city associated with substantial reclamation of new lands from the sea. This led to a newly emerging planned urban environment that shifted constantly the shores from nearby developments.

As the country consists of more than 33 largely flat islands that project out in every direction of the main island, sprawling into the sea is inexorable. The islands were originally covered by native plants and known as the island with million palm trees, however gradually the trees and agricultural land became scarce due to major development requirements. Bahrain is confronted with conservation, sustainability, infrastructure, water transportation wildlife preservation, energy consumption and distribution and the environment in addition to solving the set of urban design problems that were created along the way.

Bahrain is surrounded by many offshore islands, most of which are not developed for permanent settlements, as obviously potable water, educational and medical facilities, and economic activities are amongst the basic necessities that need to be provided and the question is, which of those islands could be inhabited and which should remain as they are with minimal interventions.

The evolution of artificial settlements in Bahrain is key to understand and trace back its history. Crafting a synthetic setting; the artificial human settlement phenomenon materialized nearly six decades ago, the main aim of it was to build bridges and connect Bahrain large islands. This distinctive trend in the urban expansion of cities found its way to the Gulf and to Bahrain in particular.

Socio economic drivers for reclamation: Bahrain capitalizes on the tourism flow from the proximate GCC countries. Offshore islands are envisioned as magnets for that group sector, with recent shift to freehold investments.

Similar to the issues that confronted the coastal areas of Japan and Singapore, Bahrain shallow waters, traffic congestion, shortage of land for new buildings and land-uses, lack of good urban facilities, cost of natural versus reclaimed land, weakness of expropriation laws, housing shortage and lack of strategic locations for industrial growth are the main drivers that led to reclamation, land production and urban sprawl in the sea.

Important questions are being raised over the future of Bahrain islands. The hunger for leisure and tourism sites contributed to intensive plans for the utilization of the archipelago of Bahrain and its surrounding waters. This intensity has threatened or destroyed many of the natural qualities and resources that could have been preserved by careful planning to encompass human inhabitation.



Figure 5.3- Figure-ground map, first map recorded delineation of the coastal configuration of Bahrain. The islands were first surveyed in 1820, when they were called the Wardens’s Island by the British, and two villages were recorded (Harvard Library)

5.2 Bahrain’s History of Coastal Developments

The trend of urban planning and design and the current expansion in the Gulf particularly in Bahrain has been through land reclamation and the creation of man-made cities and islands. Bahrain can grow approximately 7 times its current size if its full territorial limits are filled.

5.2.1 Early Influences from the British and the Portuguese

“After 1924 land reclamation also became part of the new ‘cosmetics’ of urban modernization, as refuse started to be used systematically for the construction of the motor road along the seafront and of the causeway which linked Manama to Muharraq.” (Fuccaro, 2012, p.196) By 1971 the landscape

of the outskirts of Manama and the geography of its coastline had started to change irreversibly. (Fuccaro, 2012, p.206)

Historically, Pearl trade was the main industry of Gulf coastal settlements between the 18th and early 20th centuries. (Katodrytis and Mitchell, 2015, p.32) The Portuguese and the British invaded shores of the Gulf for protection and access to oil resources.

Sir Charles Belgrave, a British advisor who was appointed by the rulers of Bahrain ‘was the *deus ex machina* of Manama’s waterfront renewal, which was implemented in successive stages through land reclamation. His brainchild was bab al Bahrayn which he designed in 1945 as the seat of government, part of a complex which was built in front of the harbor after 1939.’ P.193

5.2.2 Reclaimed developments between the 1950s and 1960s

5.2.3 Reclaimed developments between the 1970s and 1980s

Government entities in Bahrain since the 1970s if not earlier were reliant on international expertise in urban planning and design. This has materialized for the fact that many engineering disciplines have only been introduced to the educational program in the country in the 1980s and 1990s. The government realization of the shortage of land in Bahrain with the increasing demand for public housing led to researching and exploring many potential sea sites, those areas were then subject to studies to test the environmental, marine and other conditions prior to proceeding with various master plans.

The first plan designed by a British planner for the capital city Manama in the 1970s was suggesting an expanded road network layout in the sea, given the intricate and narrow fabric of the historic cities. (Figure xx)

After achieving political independence in 1971, Bahrain had experienced major changes in her economic structure and financial position. The quadrupling of international oil prices in 1974 consequently led to a rapid increase of Bahrain’s foreign exchange earnings from oil revenue. Net earnings from oil rose from BD 25.5 million in 1972 to an estimated BD 198.5 million in 1977 while exports and re-exports increased from BD39.5 million to BD 150 million, respectively. Most of these funds were spent on land reclamation in accordance with the Manama-Muharraq Master Plan, on

electric power, water and sewage facilities, and the expansion of the port, airport and road network, on public housing, schools and health centers. Noor Al Nabi

The main island of Bahrain has long been recognized as badly misused natural resource of great potential. Landfill, pollution military and private uses since the 1980s have preempted the enjoyment of natural resources. Thus the numerous proposals that are put forward for the future of the remaining islands over the last couple of years have been in some ways more environmentally conscious. These proposals ranged from intensive residential and recreation development to conservation and restoration of some of the islands' natural exquisiteness. Degradation of marine habitats, scarce agricultural lands, large-scale coastline erosion are the immediate implications of the lack of awareness and the outcomes of the lack of protection.

In the case of Fasht Al Adhm reef, a natural shallow reef that has been pointed out since the 1980s as a potential site to be reclaimed for housing expansion but to date has not been developed. The Ministry of Housing appointed HFA Halcrow Fox and associates in 1984 to provide an urban development programme and was subsequently followed by an urban development study done in 1985 by Dar Al Handasah.

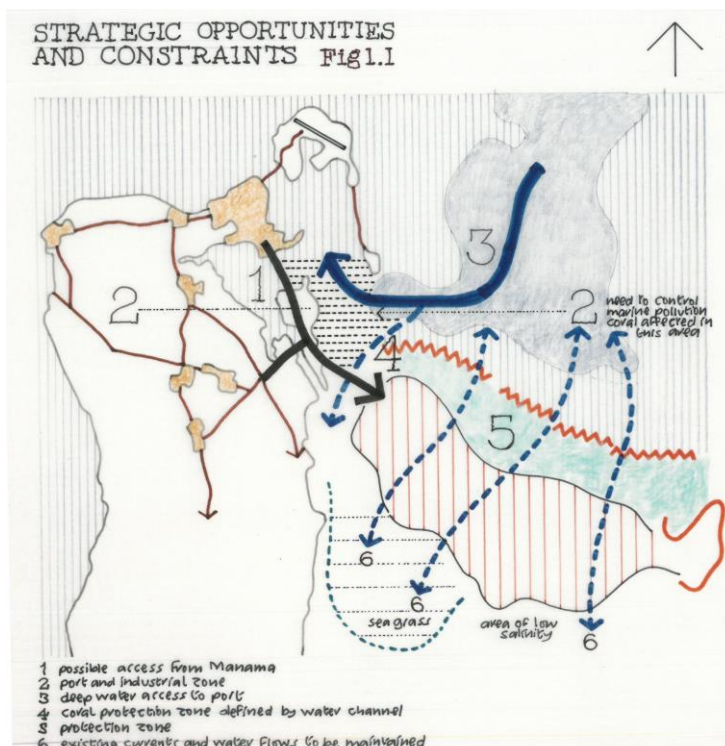


Figure 5.4- Fasht Al Adhm Urban Development Programme, State of Bahrain, Ministry of Housing Proposals, HFA Halcrow Fox and Associates, Freeman Fox International, Watson Hawksley, August 1984

In the urban development study done for Fasht Al Adhm reef in 1985 by Dar Al Hadasah consultants, it noted that the reclamation and the possibility of creating a new town in this area is subject to marine, environmental and engineering factors. Also, the source for the fill material for such a large-scale development has not been studied at that time. The proposed master programme is envisioned to have socio-economic benefits and will mitigate transport problems that were evident at that period.

The plan and programme was designed to have inbuilt flexibility and robustness to changing circumstances over time.

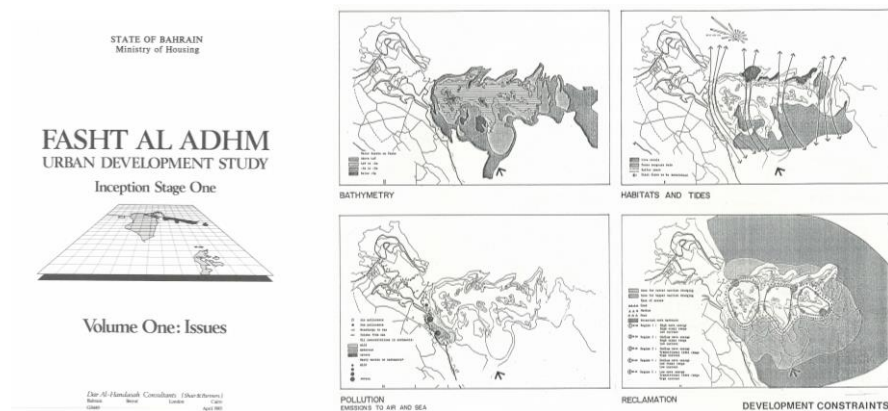


Figure 5.5- (Al-Handasah, 1985, p.3)

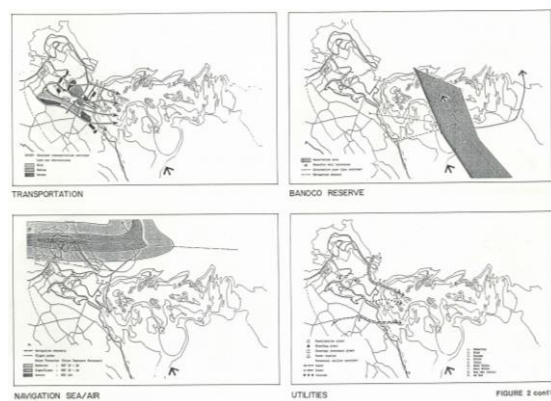


Figure 5.6- (Al-Handasah, 1985, p.4)

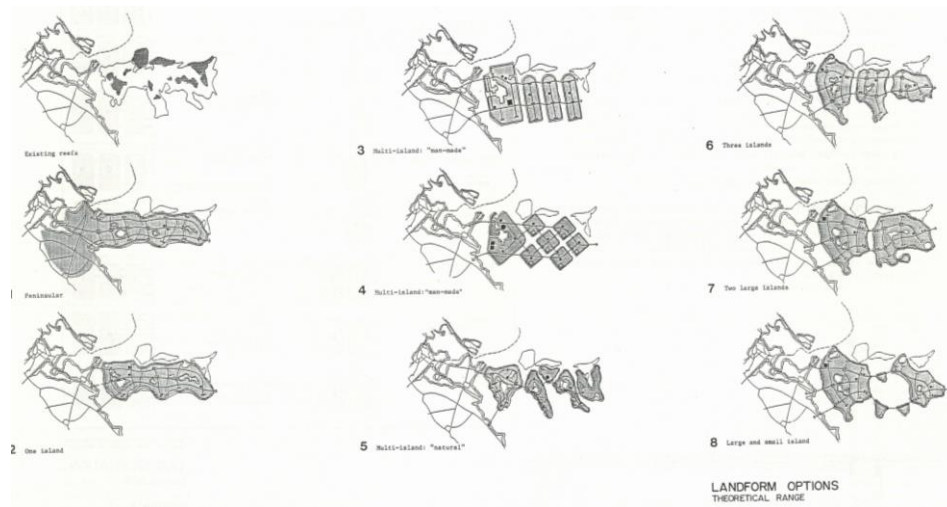


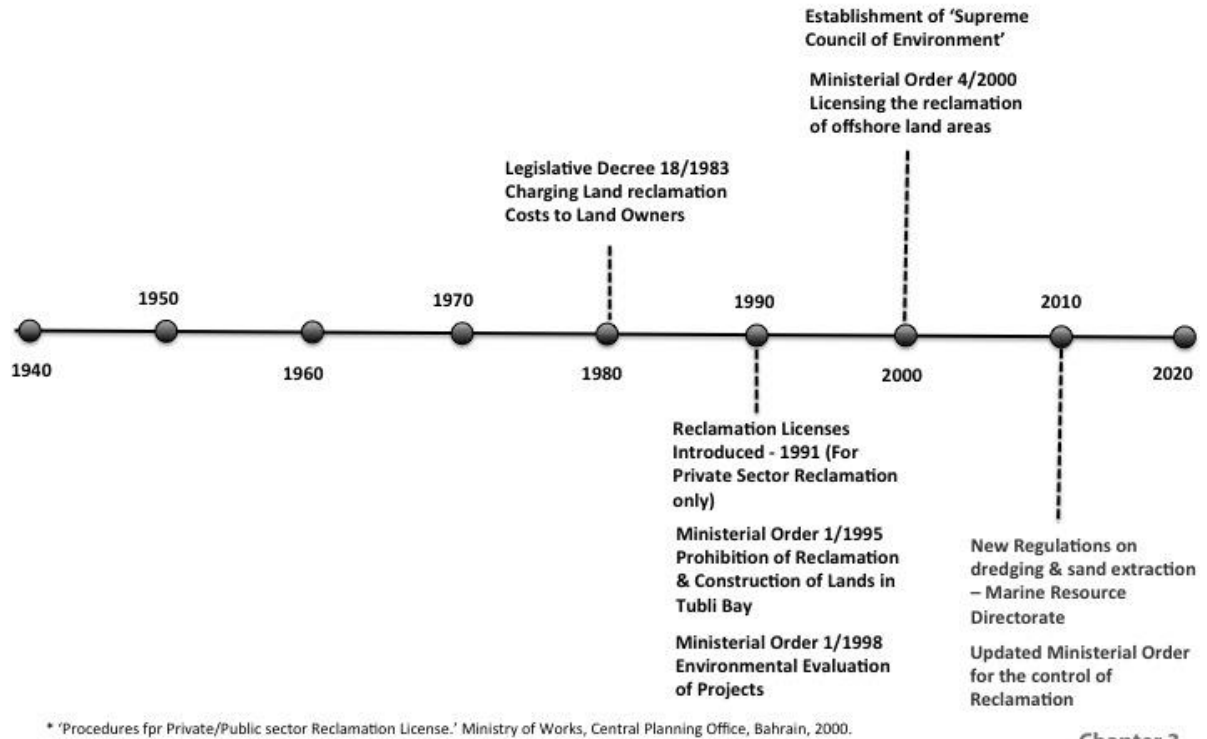
Figure 5.7- Studies showing the factors considered in reclamation of Fasht Al Adhm reef

(Dar Al Handasah, 1985, p.12)

Dar Al Handasah noted in their report that the “image” of Fasht urban development is fundamental and a key factor considered in their design proposal. They stated that “Experience worldwide has shown that unless promoters of urban development have an “image” of the type of settlement that they wish to create and strongly press that image onto all aspects of the development process from plan preparation to implementation that development will essentially fail.” (Dar Al-Handasah, 1985, p.6)

It is worth noting that as a consequence of ad-hoc reclamation activities, reclamation policies were introduced in the 1980s to impose charges and approvals for such developments. Figure 5.8 shows the decrees and laws introduced pertinent to reclamation in Bahrain.

Reclamation Policies in Bahrain – Major Milestones



Chapter 3

Figure 5.8- A timeline indicating the reclamation policies milestones in Bahrain

(Ministry of Works, 2000)

Reclamation in Bahrain also became a tool for achieving other development plans – ie the Seef area was initially conceived as a way of finding compensation land for the owners of land along the Saudi Causeway route – the government could offer a smaller but higher value and easily serviced plot of land for a large plot of rural undeveloped land straddling the route.

The interesting thing from those heady days of the 1970's was the number of international design consultants being used as advisors and the number of competitions for all sorts of projects and dreams – all of which clearly influenced the Client – ie the Rulers, PM's, the governments, the Sheikhs. etc who set the ground for coastal developments.

Then they started getting economic input and developer input –LLD were using Trammel Crowe for the States, and these big property developer types were advising to go for the wow factor. Increasingly people were educated abroad, visited all the best places and saw new things all of which influenced their appetite for a different urban future.

5.2.4 Coastal Developments 1990s onwards (privatization of reclamation)

Reclamation in Bahrain was characterized by uniform expansion into shallow waters, and filled in the sea purely for pragmatic reasons until 1990. Bahrain had almost equal 50-50% of private versus public land reclamation initiatives. Public authorities initiated the reclaimed waterfront developments till the 1990s. Whereby reclamation was used as a tool to expand existing towns and villages. During the 1990s, reclamation became more active with public and private interests and it started to follow a different morphology, which portrayed the planning regime practiced at that time in the Gulf region.

As stated in Dr. Madany's research on Dredging and Reclamation activities in Bahrain in 1991 *"Reclamation of land by dredging marine sand from the sea is relatively inexpensive in Bahrain because the sea is very shallow for a considerable distance from the shoreline. Approximately two meters of fill, readily available from dredging off-shore, is sufficient to raise the level above the high-water mark and permit development. Moreover, seabed consists of hard sandy rocky bottom which facilitates development. The government in some reclaimed land follows a policy of renting the land to the industries for economic gain."* (Al-Madany, 1991, p.197-198)

As Al Shehabi and Suroor emphasizes, "Bahrain has a strong claim, however, to being the most intensive case of land reclamation in the world. Shaped by the natural qualities of the archipelago, including its small size and shallow coastal waters, land reclamation has a long history of being a relatively easy and low cost venture to procure valuable extra land. It accelerated immensely in the 21st century, with more than 50km² reclaimed during 2001-2011, increasing the size of the archipelago by nearly 10% (CIO 2014)." (AlShehabi, O.H. and Suroor, S., 2016: 849)

Bahrain 1990s – with Qatar boundary limits resolved by international arbitration, by then the delineation of the boundaries across the ocean space had been resolved entailing a change in the economic and political realm of those countries.

The experimentation of Bahrain in islands multiplications emerged in the 1990s and continues well into those recent years. The 2030 masterplan was used as a guide to define and draw the lines and shapes of each island, which was followed to a certain extent. The masterplan neglected the surrounding offshore natural and reclaimed islands and archipelagos. Those are being considered mainly for leisure and tourism destinations.



Figure 5.9- Dredging and Reclamation between 2008 and 2010 – Boskalis Westminster M.E.
<https://www.slideshare.net/NielsAsjee/bahrain-country-projects-project-manager>

The financial investment in sea lands and owning title deeds in the sea, made commercial gains for investors and real estate companies, as potential lands in the sea with the provision of all the necessary infrastructure is more economical to privately owned properties in the mainland. Add to that, the attractive and scenic views created by such coastal lands.

Bahrain had scarce body of laws, policies, enforcement bodies, development frameworks and land-use guidelines for coastal expansion, though has a strong inclination to land expansion due to land shortages and congestion. There have been many random proposals done over the years to reclaim further spaces on the different islands to promote tourism mainly, however, the lack of funding in some cases and the lack of strategies towards the ecological protection and conservation of those schemes deemed some of them to be unsuccessful. In the 1990s, for example, the ‘100 private islands’ concept was proposed by local architects close to Hawar Islands in Bahrain to capitalize on the ever-increasing demand for tourism destination products. However, the scheme faced practicality and build-ability issues and made the proposal abandoned see figure 5.7. Moreover, in 2005, a seahorse shaped mixed-use island was planned by Scott Wilson in the northern coast of Bahrain to compete with the ‘Palm’ Island in Dubai; nevertheless, the concept was changed due to serious criticism of the island’s form.

This set of islands around the main island of Bahrain are mostly natural and not reclaimed, most of the offshore islands are under public control as they are owned by the government, and are dedicated for tourism and recreational purposes as suggested by the 2030 National Planning Strategy that has been developed for the entire country by Skidmore Owings and Merrill (SOM) and later further detailed by Atkins to ensure the country's planning stability.

Bahrain has been criticized for being beach-less at some point as the majority of the island beaches were privatized and enclosed by private developments. This has recently been reconsidered and many projects are underway to create public shorelines with resorts hotels and mixed-use developments along the shores. Hence, activating coastlines are thought of very rapidly, leading to more reclamation in some cases due to marine works, profiling and stabilizing the beach.

The un-built urban waterfronts of Bahrain: many international firms were appointed to develop master plans and different layouts and proposals for seashore developments. One of them was developed by Scott Wilson, which imposed a seahorse shaped island on the northeastern side of Bahrain for a public housing project, it was later replaced with Diyaar Al Muharraq development on the same location, which is to date the biggest city created through land reclamation and required a special sand search and huge borrow areas in the sea to implement it.

Obtaining fill material has been an ongoing struggle for reclaimed projects. In most cases, the source of material is obtained from the quarry as fill material. In other cases, such as Diyar Al Muharraq, sea sand from seabeds are excavated from permitted borrow sites to create those projects. Sprawling beyond the shorelines of Bahrain means land sand has substantially been exhausted; therefore, nowadays the country is in search for sand resources within its territorial limits, to mitigate the reduced sand deposits caused by the extensive reclamation projects.



Figure 5.6- Historical Development of Man-made islands and Coastline changes in Bahrain
Ministry of Works

National Planning Development Strategy 2030 developed by Skidmore Owings and Merrill in 2008

In 2008 the Crown Prince of Bahrain urged for a comprehensive vision for the entire country, which led to the appointment of SOM a consultancy firm based in Chicago to recommend strategies on a national level and to provide a complete masterplan for Bahrain 2030. The Plan proposed included several new reclaimed cities to cater for the increase in population till 2030.

100 Private islands were proposed on a tourism site to accommodate individual water villas, then the same location was designed by HOK for Danaat Hawar, a tourism destination which entailed massive reclamation, Fasht Al Adhm new town, moon shaped hotel and resort in Seef area, BAJ AECOM proposal with artificial islands, Water Garden City for Al Bilad Real-estate.



Figure 5.7- 100 Private islands proposal close to Hawar Islands – 1990s

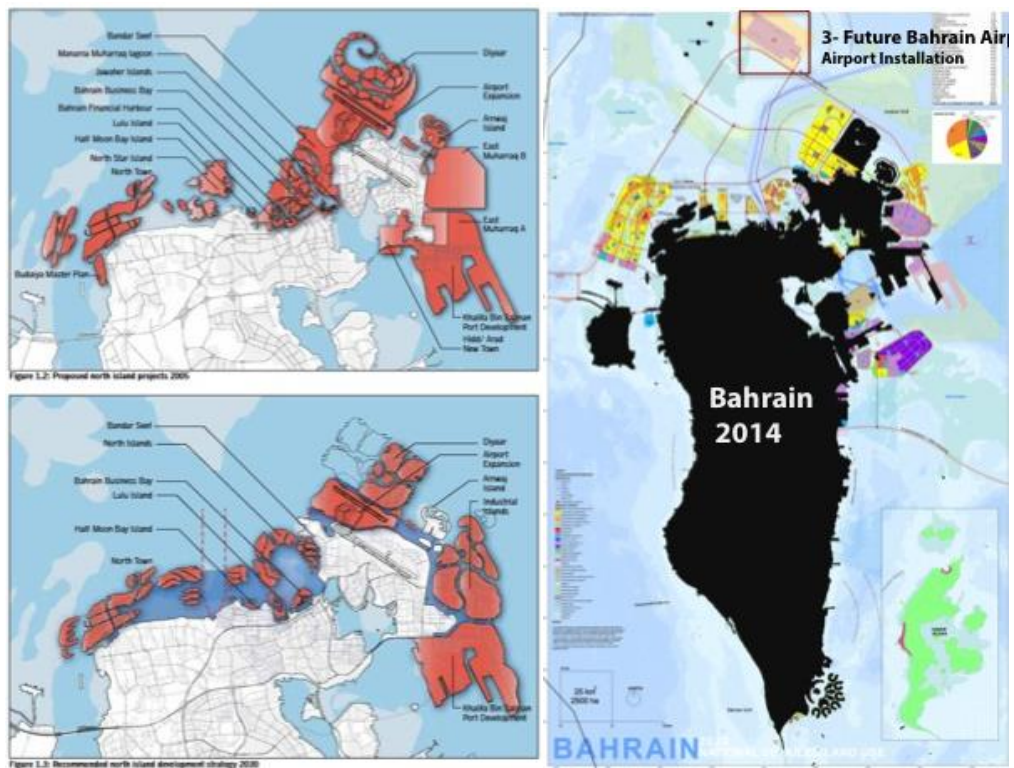


Figure 5.8- 2030 Masterplan proposed by SOM

Bahrain work with Nikken Sekkei to develop a reclaimed leisure Island



Figure 5.9- Um Jalid Leisure Island proposed by Nikken Sekkei - 2015

An 'island of leisure' a concept introduced in Japan is one of the ideas explored recently in Bahrain as a way to promote tourism in the natural and reclaimed offshore islands surrounding Bahrain. Figure 5.9 illustrates one example, which was developed by Nikken Sekkei in 2015 based on the government's request to expand the island's footprint to accommodate several hotels and leisure facilities.

In 2015, an offshore island called 'Umm Jalid' was seen by the government and the real state entity that owns the island as a potential leisure and recreational island. The Japanese firm Nikken Sekkei was appointed to provide design alternative conceptual layouts based on their highest and best use studies. The firm proposed three alternatives with one being futuristic, capitalizing on science and technological advancement, on the horizontal and vertical exploration of the sea and finding ways to co-exist with the marine life, which relate to metabolism ideas, given the oceanic floating on sea based platforms proposed which appear like modern oil rigs similar to Kiktake's Aquapolis Pavilion. (Figures 5.10-12)

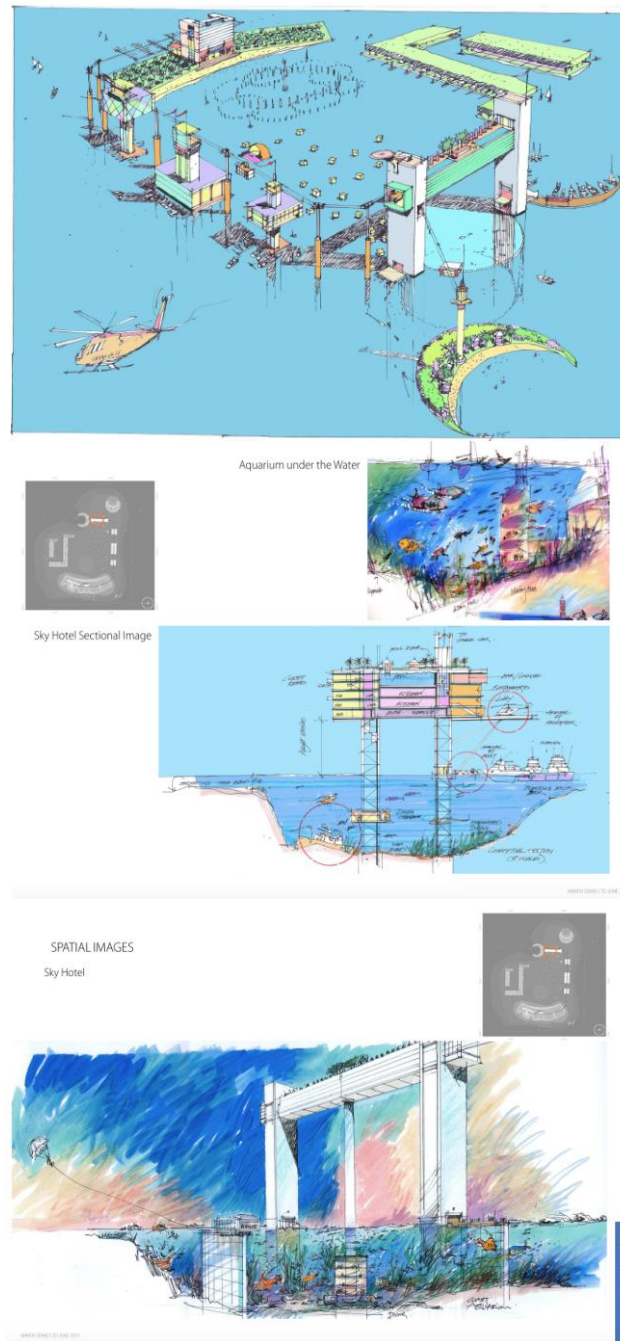


Figure 5.10, 5.11, 5.12- Nikken Sekkei proposal for Umm Jalid Island in Bahrain. Client: Bahrain Real Estate Investment Edamah, from the (Highset and best use Conceptual master plan, Stage 1 Report: Project Inception and Concept Alternatives, June 7th 2015)

Bahrain remains under pressure to develop and expand its territory and landmass to accommodate future development needs.

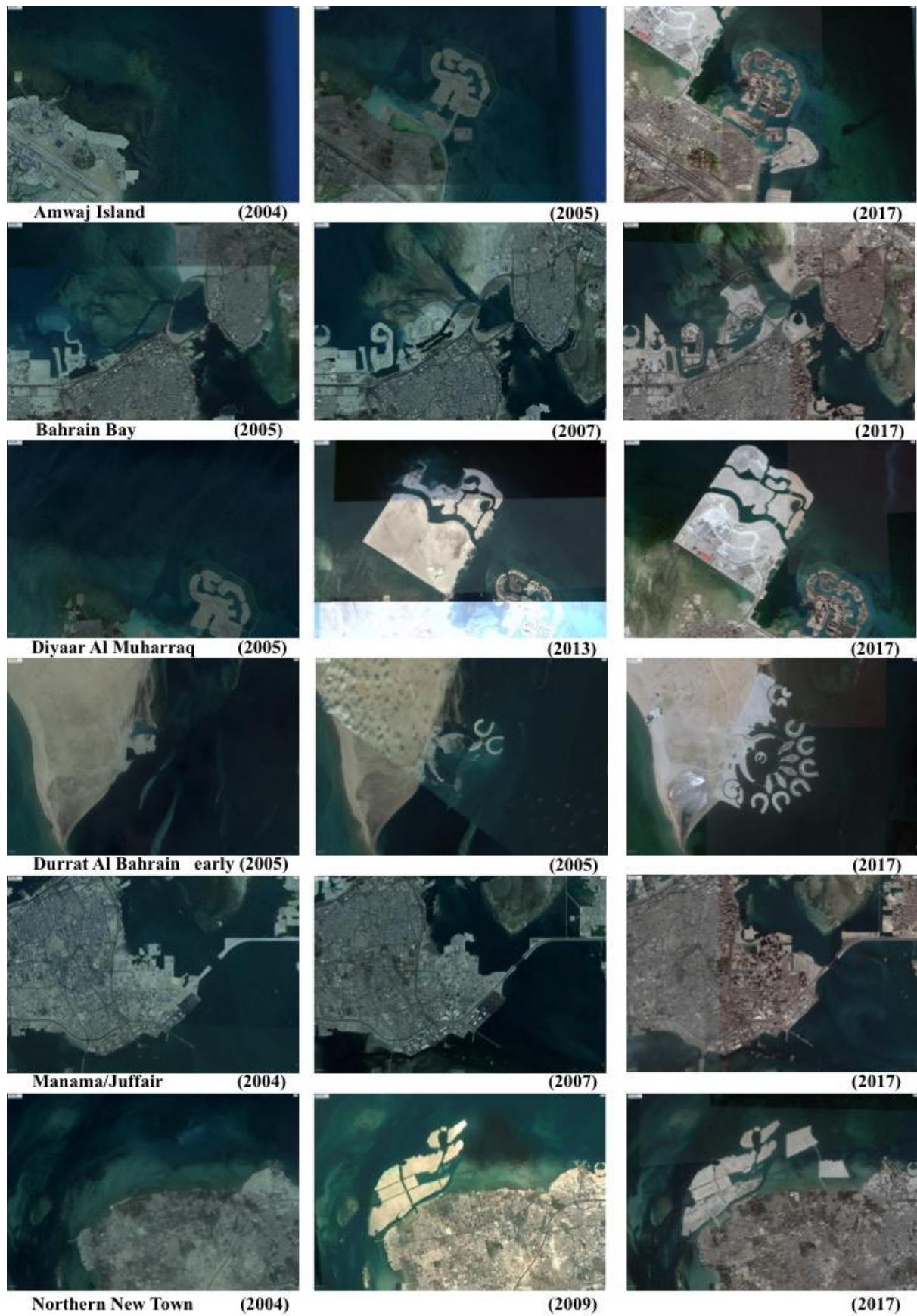


Figure 5.13- Coastline changes in Bahrain since 2004
(Google earth historic images)

Based on the recent announcement of additional oil and gas discovery in Bahrain in 2018, the production of the oil and related oil exploration is subject to further dredging and reclamation works, as digging on shore is more economical than providing offshore drilling rigs, this activity has also led to huge tracts of sand being formed as potential drilling platforms and later as developable lands. As it is with the case of Fasht Al Jarim offshore islands north of Bahrain.

In the case of Bahrain specifically, topics in reclamation studies cover the ensemble of social relations examined through looking at land reclamation during the years 2001-2014. (AlShehabi, and Suroor, 2016)

As truly stated by Al Shehabi and Suroor “the idea of a new town being conceived, designed and executed by financial institutions is a concept that requires a pause for thought. It is the ultimate vision of the real commodification and financialization of the city, a process by which in the city itself is systematically designed and produced from its inception by finance for market exchange and profit purposes.” (AlShehabi, O.H. and Suroor, S., 2016: 838)

5.3 Intermediary conclusion

Bahrain as the rest of the GCC countries is moving away from oil dependency and focusing on diversifying its economy. Although the population of Bahrain is about 1.5 million inhabitants in 2018, Bahrain is targeting a resident catchment area of 5 million from the neighboring countries and specially from Saudi Arabia. This has resulted huge investments in infrastructure, building, dredging and reclamation works. The trend of urban design and expansion in the Gulf particularly in Bahrain has been through land reclamation and the creation of man-made cities and islands. Bahrain can grow approximately 7 times its current size if its full territorial limits are filled. Thus, Bahrain is used as the main case study, as it went through excessive reclamation to expand its territories and still continues to sprawl with more projects planned in the future.

Arabian Gulf Urbanism has been depicted so far, in this research, the study goes back to 1960s or earlier, as there are already important key players that will be prominent in waterfront development through on, they got exposed to the international planning approaches, whom internalized these ideas,

add to that, there are British colonial legacy implementing British planning standards and institutions, oil relations, on top of that Dubai, as Bahrain starts observing and benchmarking in relation to the other GCC countries .

Reclamation of waterfront to create artificial land from the sea led to numerous iterations of Bahrain's coastline and transformed the country's morphology, which set the scene for planners and viewers to question the ever-changing shape and reshape of the country's masterplan. The shallow waters and reef areas around the country played an important role in easing reclamation and cutting off original dwellers close to the seashore from the beach and the waters.

Over the years, extensive reclamation almost all around the main island's coastline has occurred, a phenomena that has been described by journalist as the 'reclamation flu' which deteriorated the marine and natural physical environment and made some of the small islands disappear and became an integral part of the mainland. Hence, It's a momentous opportunity for the country to seriously think about factoring environmental concerns and reducing the damage that may occur with not well-planned future developments.

In the case of Amwaj and Durrat Al Bahrain, these reclaimed islands are maintained as a way of serving the larger society vis-a-vis these little enclaves that are totally dream communities in which is different very specific social class, trying to find a way of being part of society but being completely detached from the society. Its a different paradigm of how those islands despite all the environmental questions they may bring are also being used or proposed to serve different interest.

If Kenzo Tange is alive and sees what's happening in Bahrain today, what would be his reaction. Paul answered, the reason why his father thought of concepts on the sea, as the land is scarce in Japan. 20% of the land in Japan is usable, where as island country like Japan, made his to build on the city, his original idea of Tokyo bay was feasible, he called the linear approach the backbone or the spine which facilitates the movement of goods and people; linearity and respecting the access. Spine was Tange's word, to create a clear idea and directionality to create movement. Tange if he sees the masterplan of Bahrain, Paul said he would think of spines and connections to create a one system instead of multiplying islands in every direction.

With the recent massive dredging and reclamation works in Bahrain that resulted resistance from the environmentalists with a tremendous investment in infrastructure works, establishing new urban areas in different parts of the country and minimizing the focus on developing inland areas, the international planners started to gradually shift this Metabolic thinking and concentrate on infill projects to support existing infrastructure and urban communities. The top down approach to massive development schemes and the introduction of mega-scale projects are gradually decreasing, to emphasize on integrating the public in the decision making process similar to the idea of Machizukuri in Japan which is not yet practiced in Bahrain. Sustaining the theories of the Metabolism although resulted an awareness of the various space possibilities beyond existing lands, it not only raised environmental concerns, but it has also not been followed to its fullest idealistic proposals, which resulted reclaimed lands that are barely metabolic as the islands designs are fixed and predetermined, which does not follow the spine principle for example which allows further growth on an urban scale.

The states attention shifted from reclamation and investing in megastructures to infill developments in Bahrain. This shift came as a recommendation from the French international planners that are consulting the local urban planning authority of Bahrain. With this shift, future enhancements and more efficient urban fabric can be aimed.

Types & Characteristics of Man-Made Islands
Using the Man-Made island categories of T.Matsumoto



Figure 5.14- Types of islands developed in Bahrain

In other classifications, as presented by T. Matsumoto in his article ‘An Analysis of Offshore Man-Made Islands’ in 1985, (Kato, W., B. C. Gerwick Jr, M. Homma, R. Lenschow, O. T. Magoon, C. C. Mei, S. Matora, K. Okamura, and J. Penzien.1985: 9).he categorized such developments mainly under different land utilizations that emerged in the world and evident examples of such types specifically in Japan if existed at that time. The below table summarizes the types as per his classification: reference within text (Kato et al., 1985)

Types of Man-Made Islands	Existing Examples
1. Undersea Mining Bases / Offshore Oil Drilling Platforms	Gunkanjima, or Battleship Island – created to mine coal from the Ocean (1891-1974)
2. Harbor Installations 2.1. Shore Extensions for Shoreline use efficiency	2.1. mostly located in harbors of big cities – Daikoko Pier in Yokohama and Port Island in Kobe.

2.2. Construction of Harbor Facilities in Deep Water	2.2. no such installation in Japan, Robert Bank Island in Vancouver.
3. Airport Installations	Nagasaki Airport, Kansai International Airport.
4. Recreation and Leisure Installations	The Wildlife Island in Tampa, Florida and Hart-Miller Island in Baltimore
5. Industrial Installations	Ukishimacho, Chidoricho, Ogishima and Higashi-Ogishima in Tokyo Bay are multi purpose industry and cities
6. Electric Power Plant Sites (i.e. nuclear, coal fired plants)	Gobo Thermal Power Plant- Wakayama Prefecture
7. Island Cities 7.1. Development continuation of an existing city built on the sea 7.2. Independent Island, Functional, Fully Integrated Urban Unit.	7.1. Port Island in Kobe 7.2. type under study, no such type in Japan, i.e. Kikutake's plan for Sagami Bay, Pilkington sea city in England

- It is worth noting that Universal Studios Osaka is a recent example of the recreation and Leisure installations in Japan. Therefore, all such types have been developed in Japan; similarly, Bahrain has explored all types to date except for the Airport installation, that being said, the 2030 master plan of Bahrain includes a new airport on an offshore island to be reclaimed in the future.

Table 5.1Types of Man-Made Islands According to T. Matsumoto

Types in Bahrain

Using the Man-Made island categories of T.Matsumoto



Note:

3- Future Bahrain Airport
Airport Installation



1 - Fasht Al Jarim
Oil Drilling Platforms



7 - Diyaar Al Muharraq
Island City

6 - Hidd Power Station
Electric Power Plant

5 - Salman Industrial
City/ASRY
Industrial Installations



2.1 - Khalifa Bin
Salman Port
Harbor Extension



4 - Al Dar Island
Recreation/Leisure
Installations



7 - Durrat Al Bahrain
Island City



4 - (7 Islands) in
Hawar
Recreation/Leisure
Installations



Annex Figure 5 - Aash Ship-building and Repair Yard (ASRY)



Annex Figure 5 - Port of Siba



Chapter 3

Figure 5.15- Types of Islands developed in Bahrain
Done by the author

6.1 Main themes and planning principles within the Gulf

Diyaar Al Muharraq, Durrat Al Bahrain, Bahrain Bay and Amwaj island are selected as case studies in Bahrain to test the Metabolism intentions within those established developments. The four islands within Bahrain are used as an investigation tool to test the Metabolism ideologies and call attention to the current urban design practices in this region. Through the medium of diagrams and mapping along with texts derived from interviews with related stakeholders, this chapter analyses the islands through the perspective of Metabolism.

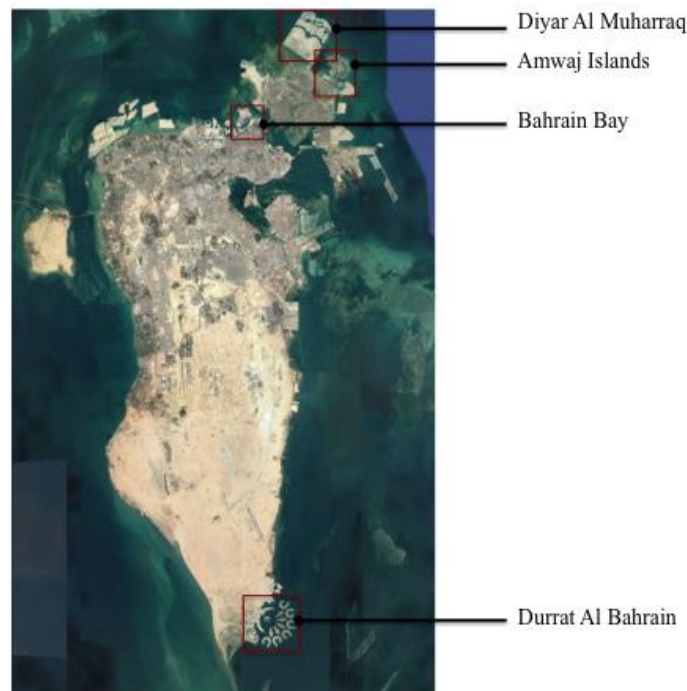


Figure 6.1- Locations of the case studies

6.1.1 Amwaj Island

Launched in 2002, the island was designed by a local firm called Gulf House Engineering. It's an artificial island designed to accommodate residential, tourism and leisure uses. The site area of the island is 2,157,567 square meters with an anticipated population of 30,000. Organic architectural forms that determine the shape of its seashores form Amwaj Island. Residential units predominantly occupy the coastal edge.

Amwaj island is the first freehold artificial development in Bahrain, however, it's a gated community, that caters for the upper class segment, and inhabited mainly by foreigners. Accordingly, it adopted modern design standards that act as a complete different urban form from the surrounding traditional nature of Muharraq old city.

Amwaj was the first reclaimed island to adopt geotubes filled with sand as a method of reclamation. However, the reclamation led to marine degradation and loss of fishing areas. The island was only connected to the existing network of the mainland via a singly bridge, it lacked any further connectivity till recently when another reclaimed road was introduced to connect this development to the wider infrastructure and transportation network.

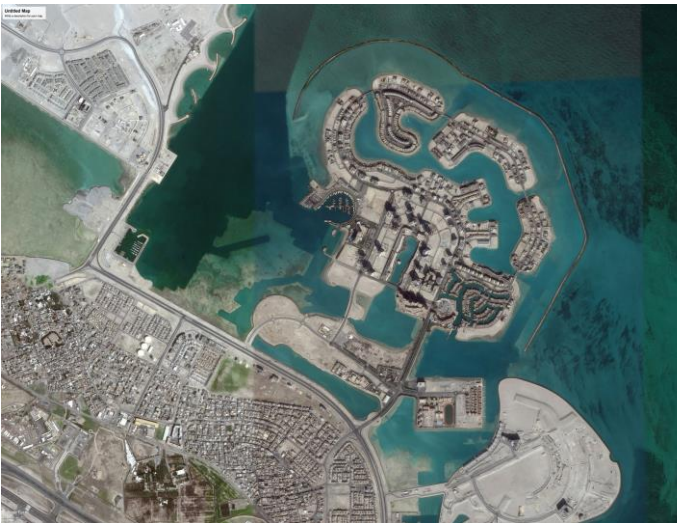


Figure 6.2- Satilite Image of Amwaj Island
Google Earth



Figure 6.3- Aerial View of Amwaj Island
<https://www.amwaj.bh/sites/default/files/Amwaj%20Islands%20Brochure.pdf>

The plan of Amwaj is predetermined by its form, which limits its future growth. The residents however have the freedom of designing and choosing their homes' building material, which gives them certain flexibility.



Figure 6.4- Tala island within Amwaj

<https://www.amwaj.bh/sites/default/files/Amwaj%20Islands%20Brochure.pdf>



Figure 6.5- Al Marsa Floating City

<https://www.amwaj.bh/sites/default/files/Amwaj%20Islands%20Brochure.pdf>



Figure 6.6- Cadastral and topographic map of Amwaj Island – 2015

6.1.2 Bahrain Bay

Started in 2006, Bahrain Bay is an artificial mixed-use business district master planned by Skidmore Owings and Merrill SOM. The plan was designed for a population of 30,750 persons .



Figure 6.7- Satilite Image of Bahrain Bay
Google Earth



Figure 6.8- Aerial View of Bahrain Bay
https://www.som.com/projects/bahrain_bay_master_plan



Figure 6.9- Cadastral and topographic map of Bahrain Bay – 2015

The artificial island is situated off the business coastal side of the mainland. It is connected by causeways to the capital city Manama with a site area of 432,000 square meters. The masterplan won

several master planning and urban design awards. The plan is organized radially, with a boulevard that permeates the districts and connects public spaces and waterfront recreational areas. A five-star hotel is built in the central island with the other two islands surrounded by office and residential buildings. Cultural venues and parks are also designed on the mainland coast on the opposite side to complement the master plan with an open boulevard and a park however; the Avenues mall recently occupied it.



Figure 6.10- Aerial View of Bahrain Bay - 2014

Infrastructure and reclamation works were carried out in 2011 with reclamation level of the entire plot at 2 meters. The island is equipped with a district central district cooling facility, a 66KV primary station, potable water reservoirs, and modern sewage treatment plant with sewage pumping stations and fibre telecommunication facilities to maintain high standards in technology and to energize this island. The master plan is predominantly approached by car lanes with the outer access road is designed in order to prevent traffic congestion; however, pedestrian lanes and water taxis are also amongst the transportation modes that are planned for this island.

Bahrain Bay is divided into seven distinct zones, each with clear organic forms composing the proposed reclaimed district. The development is designed for high-end office spaces and high end users. The central island in the artificial island has the four seasons hotel, and its surrounded by luxury apartments.

The rest of the reclaimed area aside from the residential and mixed use components in Bahrain Bay along the coast will mainly be occupied by an extension of the existing seaside park, which will complement the man-made bay that stretches for around 1.5 km along the coast. There will be a marina and promenades along the shoreline in addition to several retail districts, mosques, and a school in order to establish and advertise the project as self-sufficient. Bahrain Bay is zoned as a special project area without a detailed public zoning plan. This is mainly due to current regulations, which allow investors to change their projects according to their future needs.

6.1.3 Durrat Al Bahrain

Durrat Al Bahrain is an artificial island and a resort development. Reclamation started in 2007 with the vision of developing a mixed-use development, however, mainly residential villas built to date. The client is the Bahrain government and Kuwait Finance House. It is designed by Atkins over a site area of 4,581,851 square meters and planned for a population of 49,537. The project name means in Arabic language the pearl of Bahrain and has been designed to mimic the shape of a pearl necklace with 13 connected islands. The island's architectural forms clearly dominated the overall planning of this island. The multiplication of 6 atolls and 5 fish-shaped petals has formed this reclaimed resort.



Figure 6.11- Satelite Image of Durrat Al Bahrain
Google Earth



Figure 6.12- Aerial View of Durrat Al Bahrain
<https://www.gldd.com/portfolio-item/durrat-al-bahrain/>

Durrat Al Bahrain (Figure 6.11 - 6.15) is the first large scale mixed use development at the southeastern tip of Bahrain. It is designed to include about 1800 residential units, recreational parks, marina, commercial buildings, golf course, and beaches. The development required substantial dredging and reclamation to provide the basic physical infrastructure for the project. As per the Great Lakes Dredge and Dock Company, the reclamation required 33 million cubic meter of fill material to extend the coastal zone and create a series of shaped islands connected via circular bridges. The reclamation was done with minor environmental studies to speed the reclamation works. The construction of the resort was a joint venture between Great Lakes and AA Nass contracting. <https://www.gldd.com/portfolio-item/durrat-al-bahrain/>

Durrat Al Bahrain development is not self sufficient, it is purposely built as a resort occupying villas that are used as secondary homes to affluent people within the Gulf. Similar to the Mirage city plan developed by Arata Isozaki plan, Durrat Al Bahrain is designed and built not to necessarily accommodate a form of a stable community, but rather come and stay temporarily used for vacation or second residence , however, Mirage city plan totally rejects cars to create a comfortable environment (Vasulka.org, 1997, p.9)



Figure 6.13- Render of atoll island

http://www.durratbahrain.com/content/the_islands.pd

f



Figure 6.14- Render of the petal island

http://www.durratbahrain.com/content/the_islands.pd

f



Figure 6.15- Aerial View of Durrat Al Bahrain residential community
http://www.durratbahrain.com/page/The_Islands

The shape of the master plan of Durrat Al Bahrain is restrictive and all quay walls are in place to restrict the development to the targeted shape. Moreover, unified housing prototypes have been successful in this development due to strict planning regulations (Figure 6.15).

The master plan uses seawater desalination RO plant that is environmentally friendly and the recycled water is used for irrigation. A traffic impact assessment (TIA) is completed for this development restricting its number of users and generated traffic. It also provides linkages to the existing transportation network.



Figure 6.16- Cadastral and topographic map of Durrat Al Bahrain – 2015

6.1.4 Diyar Al Muharraq

Diyar Al Muharraq is a huge 6 sq.km reclaimed development that is master planned to accommodate mixed use facilities. The master plan was reclaimed in 2006 with reclamation of an average of 3.6 meter above chart datum, and first inhabitants dwelled this area in 2012. By 2018, over 150 million dinar was spent on infrastructure and the provision of basic amenities to this island. It's a residential and mixed-use community, designed by Scott Wilson and AECOM, with a site area of 11,977,920 square meters and a targeted population of 117,240. As of 2018, the masterplan includes Dragon city (a Chinese product shopping center) opened in 2015 with 740 retail units, residential villas which was joint ventured with the ministry of housing to offer 3000 affordable units to the local residents. Additionally, a portion of the island was developed as a joint venture with Eagle Hills Abu Dhabi and called 'Marasi Al Bahrain', which includes the biggest shopping mall under construction in Bahrain, a 2km beach, residential apartments and hotels. Diyar also include a local Bahraini retail concept that includes a central market in one of its parcels, in addition to further residential schemes i.e. Al Barih, Al Ayoon, Diyar Homes, Saraat residential development and Al Naseem floating city. The floating city will include villas, apartments, a marina and a hotel with a canal.

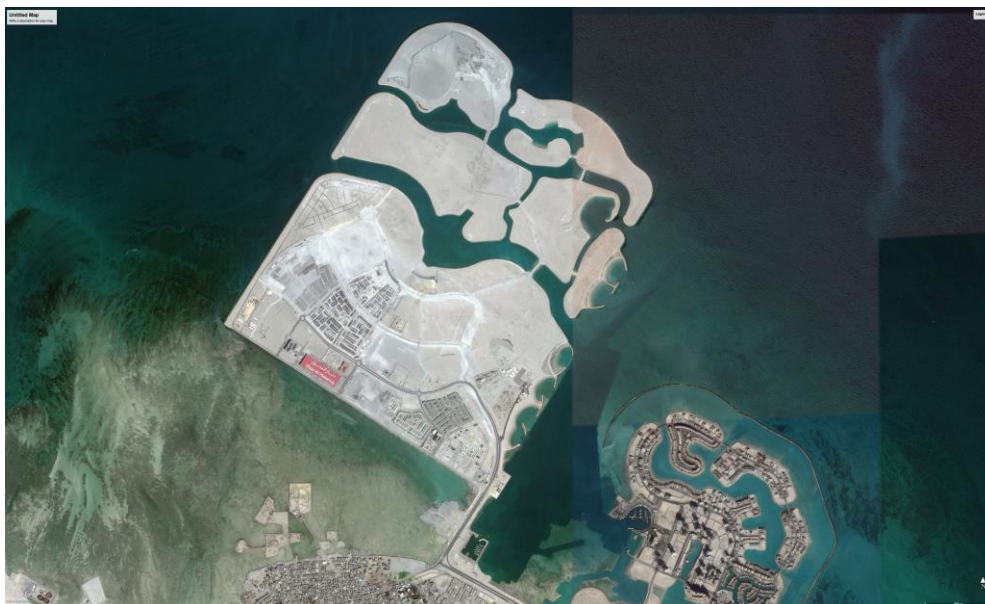


Figure 6.17- Satellite image of Diyar Al Muharraq - 2017

Diyar Al Muharraq contribute mostly to social housing, as it collaborates with the Ministry of Housing to provide suitable residential units to the local citizens. Diyar Al Muharraq Marine and ecological degradation is not fully studied. This island creation resulted detrimental impact on the coastal environment and was a major cause for sand resource depletion, Diyar on its own requires considerable infrastructure to support this new development. The reclaimed island has an independent water and power facility (220 /66kv) BSP which is built by IrinaTech to energize this monumental waterfront development.

Diyar Al Muharraq is designed to be a self-contained development integrating commercial, leisure, and social facilities in addition to large residential areas comprising around 30,000 housing units that can provide a home for an expected population of around 100,000 people. Diyar Al Muharraq master plan maintains connection to outer transportation network through reclaimed public roads.



Figure 6.18- Render of the Diyar Al Muharraq Masterplan



Figure 6.19- Cadastral and topographic map of Durrat Al Bahrain – 2015



Figure 6.20- Render of Social Housing at Diyar
<http://www.diyar.bh/media/#lg=1&slide=0>



Figure 6.21- Render of Marasi Al Bahrain
<http://www.diyar.bh/media/#lg=1&slide=2>



Figure 6.22- Locations of the case studies
<http://www.diyar.bh/wp-content/uploads/2017/04/Masterplan.jpg>

6.2 Intermediary Conclusion

By examining the ideologies set out by the Metabolism team members and its application to current planning practice, those concepts are tackled from adaptability and sustainability perspectives, which form part of wider design theories and international practices, however, recent developments lack flexibility, they tend to fix an image to those new masterplans which are often static, lack resilience and does not factor those cities as an evolving metabolic process which is ultimately open to change, destruction or further biological growth. It is worth noting that the Japanese Metabolism Movement came as a protest to a situation in Japan, capitalizing on technological advancement that have not fully materialized to date, but regardless of it being paper architecture, its thoughts were unique and applicable to a wider geography despite the fact that their theories have only lasted few decades.

In comparison with Japan and the intentions of the Metabolist group, there is much more pragmatic take on how to make those projects feasible in the Gulf and respond to a very unique demographic which targets different social groups in every development. Hence, the communities that are being created have a very specific image for a very specific public, but there is not that much grounded desire to transform society and transform living standards, its more a way of making those projects financially viable to entice a very specific group of society.

In the Gulf and particularly in Bahrain, reclamation was predetermined by the shape created for the various islands around the country as planned by the different international planners in their proposed masterplans which in turn is used as a marketing tool to increase the development's feasibility and attractiveness to the end users. These projects were not considered prototypes of an urban form that can eventually be expandable or implementable around the archipelago in multiple locations, but rather dictated by the real-state dynamics, marine and environmental restrictions and left to the imagination of the different appointed urban planners and designers.

(M) Metabolic, Organic and Biological	The practice of cell divisions, prototypes, prefabricated units are in early stages in Bahrain. Dubai has recently opened an office of modular 3D printing construction and explored few building types with that technology. Architectural forms forming a city like the case of the agricultural city is also lacking in the Gulf.
(E) Equality and Social Perspective	As most of those developments are gated communities, they have been targeting specific segment of the public , including GCC and international residents. Population in most of these developments are studied carefully to derive the traffic demand assumptions and design the spaces accordingly.
(S) Symbiosis and Co-existence	Given that each development is branded separately and act as a unique development with the majority of them being gated communities, its difficult to trace co-existence between the outer fabric and the inner fabric within those newly built communities. In most cases the architectural language, the master-planning layouts, the landscape and transportation network within the reclaimed islands are treated differently to enhance the lifestyle of those developments.
(F) Flexibility, Growth and Adaptability	In comparison with projects done by the Metabolists group, like Kenzo Tange’s proposal for Doha Corniche, thinking three dimensionally and allowing the city to grow for future uses via the use of grid and radial system is not widely explored in Bahrain. This has not been manifested in the developments in Bahrain, given the predetermined detached forms off the main island of Bahrain. Flexibility and adaptability is practiced to a certain extent in the selection of material or architectural style of residential units in some cases.
(I) Industrial and Technological	Industrial design production and prototypes have not been widely explored in the Gulf. Bahrain particularly has been testing housing prototypes for years but with no success. As public housing types are tied to the material of construction that is commonly used and the tendency of the residents to manipulate and expand the housing units. With technology, the advancement of technology is utilized in essential requirements, i.e. power and water. Smart grid technology and advancements in reclamation techniques that liberate the marine wildlife is not yet explored in Bahrain, given the cheap and convenient method of dredging and obtaining sand as a fill material and the reliance on conventional construction techniques.
(P) Process, Flows and Circulation	Many of the recent reclaimed islands are developed by real estate developers, that collaborate with the government for the provision of the reclaimed island’s basic utility needs i.e power, water, road and infrastructure connections. The short fall is in the adopted master plan that dictates the limited entries, exits to and from those reclaimed sites and limits the transportation networks as it does not impose a change in transportation modes and rely on cars and buses as the only form of transportation.

Table 4.3 An analysis of the reclaimed islands in Bahrain using the principles of the Metabolists

Chapter 7: CONCLUSION AND RECOMMENDATIONS

7.1 Summary of the Research

Metabolism was a movement in the 1960s responding to a specific post war situation in Japan, however, its idealistic and utopian approach to urban planning led to recognizing their principles and philosophies on an international level. Despite, their ideas have not been tested widely on megascale, their theories were implemented on small scale industrial and furniture designs, buildings scale and on urban schemes.

The Gulf region in general was influenced by many international planners and architects, the Metabolists group ideas were amongst those early influences, as Tange, Kurakawa and Kikutake, participated in developing waterfront projects and proposals that relate to expanding territories, architectural experimentation on grand scale in the Gulf in the 1960s to the 1980s.

In comparing the fragmented and segregated urban landscapes and reclaimed waterfront developments in Bahrain, it's very evident that some of the theories of the Metabolists are considered as international planning standards nowadays that are essential in mega-scale developments, like establishing connections, flows and transportation networks which contributed to shifting the urban morphology and the rapid evolution of its urban fabric along its coastline.

In some of its other principles and ideologies like the industrial and technological aspects, they still maintain as visionary and futuristic and are challenging to date to implement given their long term vision and their high tech perspective and associated financial implications.

Given the urgency of defining the master-plan layout, land-use and zoning by the authorities, this may restrict the metabolic creativity, which rely on growth, expandability and replacement. However, Metabolism can provide a useful framework in the initiation and conceptualization of mega scale projects within the Gulf, given their sensitive approach to nature, ecology and future urban growth.

The current master plans are planned separately and in isolation of one another. Metabolic theories can be utilized on a wider masterplanning level to integrate those developments and ensure that they are expandable while maintaining linkages that accommodate for the future

growth.

Given the engineering sophistication required to create those islands in the Gulf, they are built with quay walls and wave protections, which makes those islands come with a defined morphology. Thus, metabolism ideas of flexibility are difficult to achieve, unless developments consider other advanced solutions than conventional reclamation techniques, which reinforces the idea of metabolic growth, symbiosis and coexistence with nature.

Since current masterplans do not apply prototyping except in the production of large residential subdivisions, this approach could be further tested in an architectural scale like the Metabolists ideas introducing capsules or plugin units, to ensure future masterplans are more flexible on the urban scale and on the buildings' scale as well.

As a conclusion, Metabolism if practiced on the national level of Bahrain at least, it will eliminate piecemeal masterplans and offer an autonomous and a comprehensive national masterplan that is well interlinked with future networks that are resilient and open to change. Metabolism responded to an urgent situation in Japan and appreciated globally for the various principles that the individual members have added. However, given that many of their mega scale projects did not come to fruition, the dominance of the image, symbol and identity that came along with those developments were not visualized nor theoretically discussed amongst the Metabolists members.

7.2 Some Limitations and Difficulties

As stated in the beginning, this research was conducted in English while the Metabolism theories originated from Japan. Many historic journals were not covered due to the language barrier. Furthermore, the study examines a group of architects and urban planners and their theories predominantly in the 1960s, which was challenging due to the limited number of individuals that are still alive and associated with this movement.

7.3 Further Research

Based on the research findings and the amount of work covered in the Gulf by the Metabolists group, further research could be explored to tackle the urban and social networks that resulted with the

introduction of Japanese design and planning in the Gulf. Furthermore, other international influences that led to reclamation in the Gulf are not widely covered in this research and remains as a further topic for more investigation.

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