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Urban Foresight and Planning; Concepts and Three City Applications

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Abstract**—** *The rapidly changing environmental, economic and demographic context of the globe impacted urban planning processes worldwide and made traditional comprehensive planning practices incapable of handling future uncertainties. Popper 2008's argument about the inability to predict the future, and the need to suggest actions for steering future urban development to deal with uncertainties, required a new approach to urban planning, urban foresight. The pedagogical shifts for urban planning from aesthetical and conceptual visions to negotiation and stakeholder participation till we reached system thinking and anticipation, created a base for urban foresight that is fused with multiple futures and sustainability (Roggema, 2016). UK foresight research is discussed as an example of government efforts to deal with the changing world uncertain conditions that is already more than 29 years since its first published report. UK city foresight is a good example of non-traditional approach to planning that uses both qualitative and quantitative methods. This article discusses three urban foresight examples from Mumbai, Singapore and Tokyo before it ends with an epilogue on urban foresight guidelines and main characteristics*.

I. INTRODUCTION

Urban planning has been experiencing various pedagogical shifts over the last few decades from evidence-based comprehensive planning to more community-based and culturally impacted planning approaches. Cities are no longer the local containers of economic and people activities, but rather sustainably networked places to accommodate the flows of goods and people (Dixon, 2023). That flow of people and goods is complicated more by the need to accommodate roughly two thirds (68 per cent) of the world's population by 2050, an increase of almost two billion more urban residents between 2024 and 2050, 90 per cent of which will be concentrated in Asia and Africa (UN, revised 2018 population report). In addition, urban planners need to consider the intense technological and cultural transformations, expanding globalization, and new economic trends that create uncertain contexts. Uncertain changes make it difficult for mapping, monitoring, and coordination (Milica Stojanović, Petar Mitković, Mihailo Mitković 2014). Consequently, urban planning in the next few decades needs to accommodate the uncertain flows of goods and people and the changing contextual conditions in innovative formats such as strategic planning, vision planning, scenario planning and urban foresight (Yesım Parlakyildiz and Tulay Guzel 2020).

Karl Popper, 2008, argued that humans cannot predict the future because of the expected uncertainties, and that understanding present and past trends are not enough to find the most probable trajectory for the future (Batty 2018). Thence, urban managers and decision-makers are constantly seeking new methods to direct urban development in one of two main directions: densification of existing urban areas or horizontal urban extensions to urban extensions, satellites, or suburban areas (Danuta Szpilko 2020). Shlomo Angel, 2012, argues that the latter alternative of reduced expansion densities will be the most plausible alternative for housing the rapidly urbanizing world. Consequently, limiting urban expansions could "choke the supplies of affordable lands on the fringes of the cities and limit the abilities of ordinary people to house themselves" (Angel, 2012 p.540).

1- Definitions and Foresight overview

Foresight by Ben Martin, 1995, "is a process that systematically tries to look at the long-term of science, technology, economy and society in order to find areas of strategic research". According to Parlakyildiz and Guzel, 2020, urban foresight is "future thinking about general economic development of a city", within which communities need to detail the different aspects of urban life such as education, economy, industry, etc. Urban foresight in that sense is like strategic planning that guides detailed planning of all urban aspects afterwards. Urban foresight deals with uncertainty and complexity that require the collaboration of local actors such as governmental bodies, private sector companies, development agencies, local institutions, etc. Milica Stojanović, Petar Mitković, and Mihailo Mitković (2014) recognized that the development of urban areas, considered in socio-economic and environmental terms, cannot be planned in a linear way, from intentions to plan, to action and planned outcome. This means that traditional methods of planning and management of cities are not adequate in times of accelerating change, greater complexity in the environment, and associated uncertainties of spatial development. Urban foresight has been systemically developed in the UK, Japan, Singapore, U.S.A, for urban development and other disciplines.

UK government created a project to research the opportunities and challenges of the UK cities for a 50-year time frame, (Future of cities - GOV.UK, www.gov.uk), it defined city foresight as the "science of thinking about the future of cities which are extraordinarily dynamic and uncertain". The UK City Foresight project was adopted in UK cities for decision makers to learn about partnerships and creative citizen engagements, building ability to cope with future change, and setting distinctive directions for the localities (Swain, 2016). Adopting the city foresight project in each locality, created its own detailed plans responding to the contextual conditions and

structure for its local stakeholders. All such detailed plans added up to the creation of a general city foresight for each city, and all cities' applications created best practices model across the UK. Such best practice models encouraged mid-sized and smaller UK cities to engage in foresight exercises (Swain, 2016). The UK government project for city foresight was also paralleled by other government efforts that made research results available for city managers and planners including foresight programme, research on futures, and foresight and horizon scanning. Each UK city created its own future vision depending on dynamic stakeholder engagement and considerations of the local conditions that made UK urbanization flexible, and capable of responding to uncertain contextual conditions.

UK foresight was performed for almost all life aspects like forestry, the seas, mental health and wellbeing, technology, obesity, cities, genomics, and even Covid-19. In 2020, the UK had 25 years since the first foresight report was published by the government, it has become an integral component of the government's decision-making process, so that the UK government foresight project was relaunched. (UK gov. blog, accessed Aug, 08/2024).

Similar to city vision in the UK, city vision emerged in other countries to develop urban visions for planning and managing long-term change for the future. and creating opportunities for new investment in the local urban economy (Dixon et al., 2018). Foresight was first applied by the U.S. Army during World War II to prepare for unpredictable war tactics, since then foresight methods have been improved to predict the evolution of different life aspects including technology trends. Urban foresight determines our abilities to impact the future (Coates; J. F., 1996), it is recognized as a process for creating future development strategies in times of uncertainty, addressing global challenges, and shaping long-term policies for many countries including the USA, Japan, Great Britain, Germany, France, Austria, etc. (Danuta Szpilko 2020). Futures research evolved historically from relying on external forces (astrology and prophecy), to structured predictions (historical patterns of change, and cyclical changes of systems), and agency (the study and creation of preferred future images) Inayatullah Sohail, 2009. Urban foresight enhances sustainable development through its recognition of systems' complexity and its creation of detailed subsystem plans that add up to a holistic structure. It is a step ahead of the traditional dissection of the city sectors for a comprehensive plan towards the integration of economic, ecological, social factors, culture, governance, etc. in more than one predicted future. Urban foresight is an influential tool for addressing sustainability and creating integrated sustainable strategies and policies (Destatte, 2010).

Early representation of the Futures cone was published by Taylor's cone of plausibility 1993, that evolved afterwards in different forms and by different authors like the graphic presented below by Voros, 2017. The original presentation shows a cone with a base that extends the time axis into the future, and an area that covers the future, not what is predicted in the future. In most cases, the more probable futures are situated at the center of the cone as an extension of the present trajectory, while the rest of the scope has plausible, and possible futures. The futures' cone was intended to visualize the different possible futures locations in relation to the present moment, and to distinguish between probable, plausible, wildcard, preferable and different scenarios for the future(s).

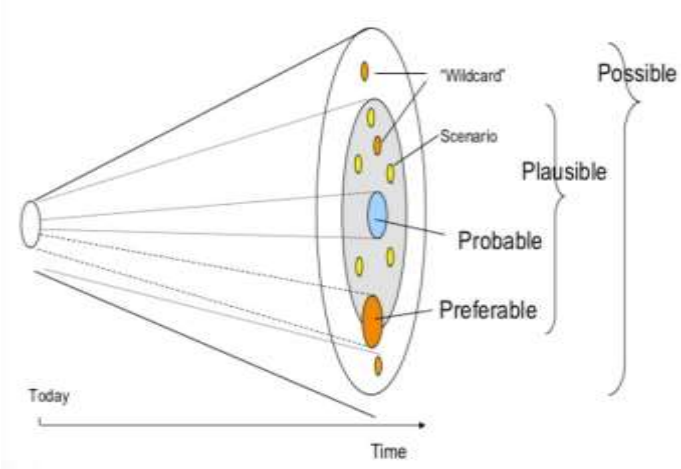

Figure 1. The futures cone (based on Voros, 2003, 2017).

In short, the futures' cone visualization explains the 3P concepts (Possible, Plausible, and Probable) with many points in the future that we might target as scenarios or wildcards. Inayatullah, 2013, suggested an organization of future studies' methods to reach those points in the future into six categories that might be abbreviated as MATDCT: Mapping, Anticipation, Timing, Metaphor, Creating alternatives, and Transforming the future. The choice of a specific method for futures' studies in any locality depends on the surrounding context, aims of specific foresight, time allowed, means available, and scale of the study (Puglisi, 2001).

2- Urban Foresight

The urban perspective is a method of looking at the past of cities, not to be confused with the aspects of urban development that are the end result of the process that makes cities good and sustainable. still, to live, to be creative, and so on. Plans that result from urban foresight processes, as discussed above, regardless of the final shape and detail of the urban plan, need to be adaptable to uncertainties, engaging the stakeholders, and fitting to the changing local contexts. It is argued that urban foresight is a better fit than traditional urban planning methods in meeting the needs of contemporary cities. It is decentralized, extends to the urban sub-systems, and can flexibly improve innovative governance and city management (Sasanpour & Mehrnia 2012). One of the decentralized urban foresight methods is scenario planning, which according to Peter Schwartz, in UNDP, 2018, is a method for taking disjointed decisions based on viewpoints and expectations about the future and not necessarily forecasts.

Scenario planning was first motivated by corporate strategic planning before it evolved to developing several tenable scenarios (Avin & Dembner, 2001; Chakraborty & McMillan, 2015). Different scenarios are concerned with specifying different plausible futures responding to the varied contextual conditions (Bartholomew, 2007; FHWA, 2011). They acknowledge contextual variations and difficulties to respond

to the communities' objectives and values (Angel et al., 2012). Each scenario is a constrained potential future, providing a useful frame of reference for assessing current tactics and policies or coming up with new ones.

The potential of future-oriented tools assists urban and regional policymakers and planners in developing new strategies that can manage change, but not necessarily control it. Utilizing the wide array of foresight tools can shift between quantitative and qualitative techniques depending on the local context and the situation at hand. It is also crucial to acknowledge the perspectives of the urban and regional decision-makers and understand the impact of the surrounding political circumstances as foresight should consider the setting and the community preferences. Additionally, exploring the similarities among various types of future studies at urban and regional levels is essential (Puglisi, 2002), highlighting the importance of urban foresight. According to Raimond, 1996, there are two styles of foresight; the first involves shaping the future and anticipating its outcomes (the plan side and its qualities), while the second is creative foresight that engages the decision makers and the community (the people side). Urban foresight is different than comprehensive planning as it integrates multiple futures, the decision-making process, the tools, the beneficiaries, and the methods into the anticipated plan(s) and scenarios.

Foresight, according to Roggema, 2016, is an evolution of urban planning that requires anticipation and understanding of systems, complexity, chaos, and other approaches that came after comprehensive rationalism and vision planning. Consequently, urban foresight doesn't necessarily follow rational quantitative predictions but requires systems' thinking, negotiation, and participation of all the stakeholders (co-creation).

Shifting paradigms from aesthetic visions to futurism

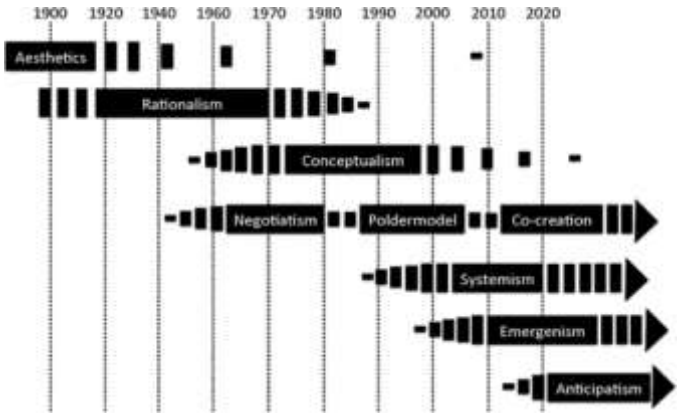

Figure -2-; Concepts and approaches of sustainable urbanism (graph from Roggema, 2016)

Urban foresight requires learning about the community, understanding the evolving context, and its uncertain changes, as they cannot be evaluated independently (Georghiou and Keenan, 2006), but I believe they require additionally an improvement of the planning process. Urban foresight depends on horizon scanning for all the urban aspects and to explore each urban sector's potential that might be used to "weave" flexible futures for the community in its geographic location. It should be interpretative of the community, the context and the planning process, to serve as a foundation for developing foresight approaches (Dixon & Tewdwr, 2021) and using creative quantitative and qualitative methods.

The UCL access research group, ARGnote, summarized in a 2014 study by Nick Tyler that aims to develop a path to low-carbon cities in Colombia, calling the future cities as "complex systems of hybrid components and crossover design" he said. Its results defined 5 principles for the future city model that applies to the whole city or components of it as follows:

1) Courteous, where stress levels are lowered by encouraging behavior for positive social interactions.
2) Active; economic, social, educational, health, leisure, and other activities that are distributed across the city to be available to the whole population.
3) Public spaces are designed as open and accessible to provide protection, safety, and security and create a sense of belonging and ownership.
4) Healthy by promoting improvement of health by good design, appropriate materials, clean technologies, less energy use, etc.
5) Evolving; The fifth principle describes the process by which urban foresight is achieved by being "adaptable, flexible, innovative, dynamic, and responsive", to allow for meeting the unseen changes of the future; uncertainties.

Conclusion of Tyler, 2014, is that the first four desirable urban foresight principles will be "evolving", so that they won't be in "a fixed perfect state" but will rather evolve as the needs of the people evolve and as "all the different systems of the city change", Sanchez & Tyler 2016.

Tyler's 2014 model for urban foresight sets up a dynamic process, that begins with the four principles and anticipates continuous dialogues among the stakeholders to promote the necessary flexible actions. Some components of that anticipated dynamic planning process have already been experimented with across the globe in response to the uncertain changes as will be discussed next within the context of three global cities: Mumbai, Singapore, and Tokyo.

3- Mumbai, India and Singapore.

The city of Mumbai had a Master Plan that was perceived as a process rather than a conclusive statement, to provide guidelines for the physical development of the city and to guide investments (Tiwari, 2002, Ramakrishna 2009). Mumbai plan used methods that combined the quantitative, qualitative, consultative, and deliberative processes to be dynamic in steering the vision in response to continual change anticipated over a ten-year time horizon. the varied methods used benchmarking studies of peer cities and successful model city transformations, without being predictive for a static future (Nallathiga Ramakrishna 2009).

Planning department in Singapore was given the power to control the development of land, implement the 1958 master plan and had the power to review and amend the master plan once every five years (Dale, O. J.1999). Singapore's master plan was revised five times – in 1965, 1970, 1975,1980, and 1985, which were mainly updating exercises till 1993 when a

more flexible planning direction was adopted. The government completed the State and City Planning Project (SCP) in 1971, assisted by the United Nations to produce Singapore's first 20 years concept plan, to guide physical development. Unlike the master plan, which outlined boundaries and density parameters, the concept plan only outlined the general direction of the state's land and transportation policy. The concept plan was accompanied by the development of detailed development plans (55 of them between the years 1993 and 1998), these plans together formed the final 1998 overall development plan.

According to Ooi, G. L. 2004, review of the concept plan was completed in 2001 and its review results produced the 2003 master plan. The 2001 plan was originally scheduled to be reviewed after 10 years; however, a midterm review was conducted in 2006 whose results were incorporated in a revised 2008 master plan. Another concept plan was completed in 2009. A 2011 review of the plans incorporated public feedback and ended in the 2013 sustainable Land Use Plan. The continuous reviews of the concept and master plans created the necessary dynamism of the city's development that made Singapore's planning a true urban foresight example with courteous, active, public space, healthy and definitely evolving.

4- Tokyo, Japan

In 1867 when political authority was transferred to the young Emperor Meiji, the political capital was moved from the imperial capital of Kyoto to Edo, that was named Tokyo afterwards, meaning "Eastern Capital". Economic growth after WWII lead to Japan's economic transition from agriculture to industry and migration to urban areas, mainly to Tokyo. Tokyo's population was 2.78 million in 1945, increased to 6.7 million in mid 1950s, and reaching around 30 million by the 1970s. According to David Gordon, 2006, Tokyo's urban core at the beginning of the 20th century reflected the traditional urban layout of the Edo castle town till they were developed by the Tokyo Urban Area Improvement Commission. Modern facilities replaced the traditional structures (except for the castle), Tokyo Central Station was constructed in 1914, the National Diet Building in 1920 where both the house of representatives and house of councilors meet, a modern office district and a new government building district followed. Tokyo modern developments included becoming an IT hub with research and development centers of many new companies and Institutions like the University of Tokyo and Tokyo Institute of Technology for science and technology (Gordon, 2006).

Tokyo's rapid growth prompted the enactment of the Capital Region Improvement Act in 1956 to regulate an area extending roughly 100 kilometers from Tokyo Station, which might be considered Japan's first urban foresight. The Capital Region Improvement Plan was first announced in 1958 and amended nearly every decade, with the third plan in 1976 introducing Business Core Cities like Yokohama to decentralize functions from Tokyo and to strengthen the concept of the IT hub. Those capital region improvement plans strengthened the private sector involvement in information technology and electronics industries by locating companies like Sony, Panasonic, and Toshiba which became global drivers of innovations. These companies developed and produced cutting-edge products such as transistor radios, televisions, and later, computers and semiconductor technologies (Gordon, 2006). By 1964. EARLY BIRD was launched in the US and earth stations built in the United Kingdom, France, Germany, Italy, Brazil, and Japan, allowing Japan to televise some of 1964 Tokyo Olympic games. Japan was a founding member of the International Telecommunications Satellite Organization (INTELSAT), which facilitated Japan's foresight functions of NISTEP especially when the first global commercial satellite was in orbit in 1969, (Whalen, 1997).

Science and Technology Foresight project in Japan started in 1969, it was reviewed every five years, and was implemented after its fifth iteration in 1992 by the National Institute of Science and Technology Policy -NISTEP, (published in Kagaku Gijutsuchō Keikakukyoku 1971). The purpose was to give an overview of the mid- to long-term developments for thirty years (NISTEP, 2024) NISTEP as an institute of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). NISTEP runs a survey of the different science disciplines to anticipate their future interdisciplinarities and was mimicked in Germany with a one-year delay by the first German Delphi Report (BMFT 1993; Cuhls and Kuwahara 1994). Japan and Tokyo's foresight were not centrally created as private developers and institutions were always involved, even before the rapid developments that accompanied the post WWII marshal plan.

Japan's foresight covered the different aspects of Japan's growth, industry, economy, urbanization and other aspects. Information and international connections were basic themes for Tokyo's foresight since the 1950s, that had the 1958 Tokyo Communication and Observation Tower as a symbol of Tokyo as a beacon of culture and dissemination of information. Tokyo's 1964 Olympics was evidence of the international recognition for Tokyo as a global city that rose out of WWII ashes. It was accompanied by improved highway system, new urban control measures (Floor-area ratio), the Shinkansen (bullet train), among other things. (Gordon 2006)

Foresight has been instrumental in Japan's growth. Long-term economic plans and strategic industrial policies guided by the Ministry of International Trade and Industry (MITI) promoted key industries such as electronics, automotive, and robotics. Initiatives like the Capital Region Improvement Act and the development of new towns like Tama New Town helped manage urban growth and balanced regional development. Though it was not mentioned in literature that Shinkansen (the bullet train system) was part of Tokyo's foresight plans, it was mentioned that change of Tokyo's railway system from narrow to wide rail was discussed in 1939 but decided in 1957 (JRTR, 2023), the first line opened in 1964 at the time of Tokyo's Olympics. The Shinkansen was the result of R&D at the forefront of technological railway innovation which was accompanied by urban solution to reduce railway noise around the rail system. That wide gauge railway system was afterwards augmented with private railway development and the introduction of the subway system. The bullet train, the subway system, and private rail, all together created a good foresight for the railway sector of Tokyo's transport system with good participation of the stakeholders as discussed in

JRTR, 23. Living on difficult terrain with a culture that respects nature, made the future of pollution control essential in every Japanese life aspects and a main component of Japan's and Tokyo's foresight (Kagawa-Fox, 2017).

Dominance of market forces in the Japanese culture caused urban development to focus on investor-developer-government interactions, role of the urban planners were regulation and administration of spatial development. Local government planners do 'market facilitation' (granting planning permission, revising planning applications), rather than engaging with urban design and the creation of public value through planning (Gordon, 2006). Prime Minister Koizumi's Urban Renaissance Program (machizukuri) in the 1960s, fostered neighborhood making to empower local communities in the development of their built environments through "more participation, independence in the decision-making process, and true democracy. This community-building program was the proper response to a market-dominated spatial development in the Japanese culture which allowed flexible urban foresight to adapt to the continually changing market conditions. Increased market and citizen-driven initiatives were supported by deregulating planning and building control for a sustainable future (Haimes, 2022). Post-war Tokyo represents something of an anomaly: a fast-growing city, but a balanced city, Benjamin Bansal, 2022. The first concept of a smart city is known as a framework based on advances in information and communication technology (ICT). to solve these problems. Challenges of urbanization.

Tokyo's growth has historically been driven more by market forces than by deliberate planning, necessitating a balance of governmental and citizen-driven initiatives for a sustainable future. To mitigate over-urbanization, future policies focus on encouraging secondary cities' development and integrating smart city technologies could ensure a more livable urban environment. The focus on information and internationalization not only fueled Tokyo's economic growth but also laid the foundation for its continued development as a dynamic and influential metropolis on the world stage (Gordon, 2006). Foresight in Japan is repeated in different ways every five years on the national level to provide a huge amount of data not only for Foresight but also for Hindsight, when performed with different methods — depending on the objectives or questions asked for the purpose of long-range planning (Kerstin E. Cuhls (2016).

Urban foresight in Japan and for Tokyo was mainly assisted by private company initiatives and the adoption of a dynamic flexible culture for living with uncertainties.

5- Epilogue

In conclusion, urban foresight is an urban planning direction for creating a flexible and dynamic development decision making process that can work with potential risks, allowing city planners to proactively design infrastructure and policies that deal with future uncertainties.

Urban foresight deals with uncertainty and complexity that require the collaboration of all the involved actors, it focuses on the need to create coherent visions of a city to plan and manage future long-term change and create opportunities. It creates flexible futures for the community in its geographic location, to be interpretative of the community, the context and the planning process, to serve as a foundation for developing foresight approaches (McMaster, 1996). Decentralized planning practices with good participation of all the stakeholders is a common characteristic of the three selected cities, in addition to their ability to produce an overall flexible guiding concepts accompanied by many detailed plans in different city aspects.
Many cities across the globe have been applying different urban foresight techniques and methods to be flexible, dynamic and capable of dealing with the changing contextual conditions and uncertain economic and demographic transformations. Cities of Mumbai, Singapore and Tokyo as discussed in this article, used some components of urban foresight for their long-range developments during the last few decades.
The 5-city urban foresight model (Tyler et. al. 2014) is a good base for creating courteous, active, public space, healthy and evolving futures.

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