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Planning the Knowledge City: Reality, Feasibility, and Challenges

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Abstract

This article is examine how globally networked cities are developing and how that influence urban design. Identify the essential characteristics and prerequisites of a knowledge city in order to entice knowledge workers and encourage knowledge-based economic activity. In addition, to suggest fresh ideas and planning tenets for knowledge cities that prioritize information flows, knowledge zones, and network accessibility. It also highlights how crucial it is to build intelligent, sustainable, and smart cities that promote the unrestricted movement of people, ideas, information, and goods. The study concludes by making the case that urban planning needs to change in order to meet the needs of the network society and knowledge economy. Knowledge cities should prioritize information flow, knowledge zones, and network accessibility over conventional zoning techniques. Amman provides an example of how a city can leverage its knowledge assets and modify its physical layout to strengthen its position in the knowledge economy.

Keywords: *Knowledge-based City, knowledge economy, planning for the knowledge city, Network Cities, Virtual City.*

1. Introduction

The developing Knowledge Economy (KE), the growing network society, and the far-reaching effects of information and communication technologies (ICTs) have all been the subject of extensive research to date. Nevertheless, very little research has been done on the actual layout of the city that houses this kind of community and the activities that go along with it.

The paper looks at the worldwide networked cities that are starting to emerge and are reshaping the urban environment. It also examines the recently added Knowledge City (KC) aspects that are required to fulfill the growing needs of activities that rely on networked information and knowledge flows. Not only can such a city meet the demands of trade, but it can also draw in and hold on to the knowledge workers who are the key players in this emerging market. Put another way, the KC must provide a dynamic and high-quality urban living environment while being functionally efficient. The researcher addresses topics pertaining to the urban environment, physical planning, and design of the KC in the part that follows.

The design of the new city and accessibility must be carefully considered by city planners, who should not only focus on physical proximity and contiguity. They should also give adequate attention to the innovative networked knowledge zones rather than traditional land use zoning, and prioritize the flow of people, goods, and information

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rather than the movement of users and products from one area to another. The theory and design of KC planning must address and include a whole new set of developing notions. Examples of cities from around the world and their efforts to gain knowledge are provided, along with some pertinent suggestions to help the cities catch on. It goes without saying that, as of now, no Arab city has been able to establish itself as a KC. After that, some last thoughts and suggestions round up the study.

2. Methodology

Through a critical analysis of Knowledge Cities around the globe, the research is based on a theoretical examination of concepts and principles of the "Knowledge Economy" and its consequences on planning policies and strategies for urban and job formation in a Knowledge City. Drawing conclusions about the key planning tenets and outcomes utilized, as well as how to use these "model knowledge cities" to our cities as a "Case Study"

The knowledge city economic fabric for the city is being studied, and potential opportunities and potential roadblocks are being identified through the application of the SWOT analysis approach to the city, as demonstrated in the city case study.

To demonstrate the relationship between "Knowledge Economy" and "Knowledge City," where "Knowledge City" is the Pot and Ground that house all of the economic activity.

Creating city plans that take into account the ideas for knowledge spaces and zones that have been developed.

Proposing knowledge-based policy proposals with the goal of achieving a knowledge economy for Future Cities. Examine how to apply Knowledge Strategies' tenets to our cities in order to turn them into "Knowledge Cities" in the future.

3. The Importance of Research

By presenting concepts of "Knowledge Economy" and its impact on urban space, regional and national geographical area, the study sheds light on the relationship between "Knowledge Economy" and its various levels of space fallouts (City level, regional level, national and international level) (Figure. 1). Furthermore emphasizing the significance of "Harmonizing" geographic planning and space development with standards and specifications for diverse "Knowledge Economy" endeavors.

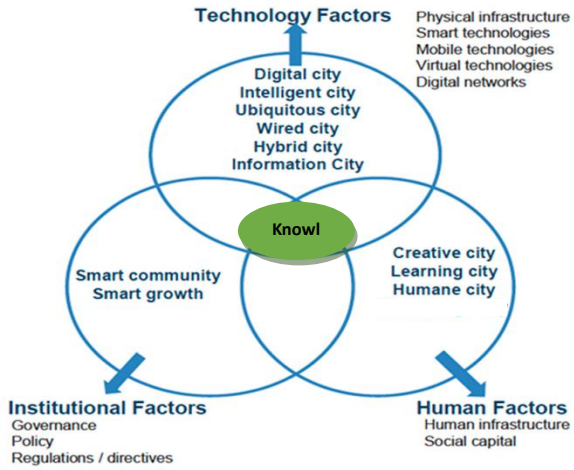

Fig. 1: Essential elements of Knowledge City derived from diverse interpretations and conceptual variations

4. The modern economy centered on information

The so-called knowledge-based activities are taking center stage in today's economic activity. The traditional industrial economy has given way to a knowledge-based, post-industrial one within the past ten years. The assets of the latter economy are patents, culture, value system, talents, knowledge, and technology, while the assets of the earlier economy are land, manufacturing, office buildings, machinery, and cash. Investments in knowledge have become essential to economic progress in this new economic era. The new economy of the 21st-century city rests on a new paradigm characterized by collaboration and a win-win approach based on pooling and leveraging competencies, knowledge, and skills rather than on the competitive win-lose paradigm, which is widely prevalent today. As Amidon (2004) persuasively argues, "we are creating a new economic world order based upon the flow of Knowledge, (not technology), innovation, (not solutions), value-systems, (not chains), stakeholder success, (not satisfaction), and international collaboration, (not competition)." She also affirms that "in this world of knowledge, human development not only depends on having more, but by being more, becoming a co-creator of the future of humanity." The development of knowledge-based services has been a major factor in the KE's rise.

Many world-class cities are doing all in their power to transition from industry-based activities to knowledge-based services in order to fully capitalize on the opportunities presented by this new economy. In fact, a number of international cities (including Tokyo, Los Angeles, New York, London, Paris, and Los Angeles) have improved their competitive advantages by housing skilled individuals who can be integrated into knowledge-based service sectors.

Thanks to the advancements in wire and wireless technology, global cities are becoming more competitive as the communication landscape expands and develops. There is a claim that the opening up of municipal markets will immediately boost its capacity to compete as the world's information capital. As Castells (1996) puts it, "the global economy will expand during the 21st century with a substantial increase in the power of telecommunications and information processing." This economy will cover all countries, territories, cultures, communication flows, and financial networks; it will literally physically embody the logic of this prediction. The intricate patterns of telecommunication investments in global cities seem to be a living embodiment of this prediction. But it will work selectively, connecting meaningful parts and eliminating wasteful or unnecessary locals. Due to the uneven distribution of production across regions, countries, regions, and metropolitan areas will be strongly contrasted in an exceptional geography of differential value making. You will find valuable foreigners and locals alike, even in Sub-Saharan Africa.

Thus, a city that has a significant knowledge flow is more likely to foster technological, organizational, and institutional innovations, among other kinds of innovation. Among other things, this constant flow of innovation promotes organizational competitiveness start-ups in the form of high-tech businesses and the birth of significant inventive projects.

5. The recently established Global City

The 21st century KC must correctly situate itself in relation to emerging disciplines of study and at the nexus of emerging economic growth models (such as the biosciences and ICTs). Building on its distinctive qualities is also crucial for the KC to draw in and keep knowledge workers, encourage information sharing, and uphold an atmosphere that fosters innovation and creativity. According to Florida (2002), a company's ability to draw in, hold on to, and incorporate creative workers is a key factor in determining its competitiveness in the new economy. A city of the twenty-first century is defined by its

arts, culture, scientific and technological knowledge, and innovation—all of which are strongly correlated with the quality, vibrancy, authenticity, distinctiveness, and tolerance of social lifestyle that characterize the local culture.

This kind of city may adopt the so-called "Glocal" initiatives, which are designed to make sure the city has the resources and technological infrastructure necessary to maintain its connectivity and prominence on the international scene. In this regard, the focus should be on expanding Tran's planetary networks with other international cities and integrating the essential features that draw corporate headquarters as well as elite financial and service sectors. The 21st-century city is designed to house a new kind of civilization that meets the needs of its individuals and groups for virtual relationships and intricate associations, in addition to meeting the demands of international networks and corporate offices.

6. The Virtual City and the Network Society

The construction of spaces that offer sufficient opportunity for human contact has been the fundamental purpose of cities throughout history. The pre-industrial metropolis chose a dense, compact urban shape in order to achieve this. Almost every location for socialization and engagement was accessible by foot. In order to get beyond the limitations of time and location, new forms of human interaction and relationships were developed along with the growth of the modern metropolis and advancements in transportation and telecommunication technologies (Graham & Marvin, 1996). The roles that people in cities play have significantly expanded. Additionally, people are able to commute on a daily basis between the corners of ever-larger urban districts thanks to mass transit and—most dramatically—private automobiles.

Contacts and exchanges are no longer limited to a single city because to advances in ICT and high technology. Instead, they expanded to include locations on Earth. A virtual world or city without physical or administrative borders can be continually created by any individual, group, or organization, with the exception of a particular and modifiable mix of locations or activities linked by communication networks.

People and organizations are navigating a whole new global network of network cities as a result of the growth of network society and network interactions. Because many virtual cities tend to be superimposed and overlap, some people view this system as dematerialized, which makes relationships between individuals and groups even more complicated and richer than they were in the past. Urban areas continue to be essential social hubs for in-person human connection despite their complexity and the dematerialization or virtualization of cities. This may imply that, even in the Knowledge-based City (KbC) era, physical planning and design still have a significant role to play.

7. Cities built on knowledge

It is said that the KC is the newest and most desirable feature of the KE. It is a global or world-class city by definition. According to Friedman (Friedmann, 1998, p. 26), it is "a class of cities that play a leading role in the spatial articulation of the global economic system or designate a dimension of all cities that are integrated with this system to varying degrees."

A KC is notable primarily for the attraction of talented innovative people and the proliferation of its knowledge institutions like learning establishments, research centers, businesses, etc. A true KbC does not abound only by different types of networking innovation models based on a physical concentration of research and development (R&D) activities, but also by the number and quality of the organizations and institutions that are firmly rooted there, the competence of the knowledge workers, and the dynamics of their

interrelationships. However, these KCs have to provide an appealing and high-quality urban environment to enable such talented workers to stay, live, learn, and work in them. Moreover, the KC is a pool of knowledge workers that is fed by qualified individuals who are attracted to positions that ascribe value to their creative talents. These qualified workers are what Florida termed as the "creative class" that includes employees in ICTs, architecture, engineering, science, education, arts and design, as well as health care, management, finance, legal affairs, and marketing. Telematics is a convergent medium. Consequently, telecommunications and computing grids are basic integrating infrastructures underpinning the shift towards intensely-interconnected planetary urban networks. (Figure. 2)

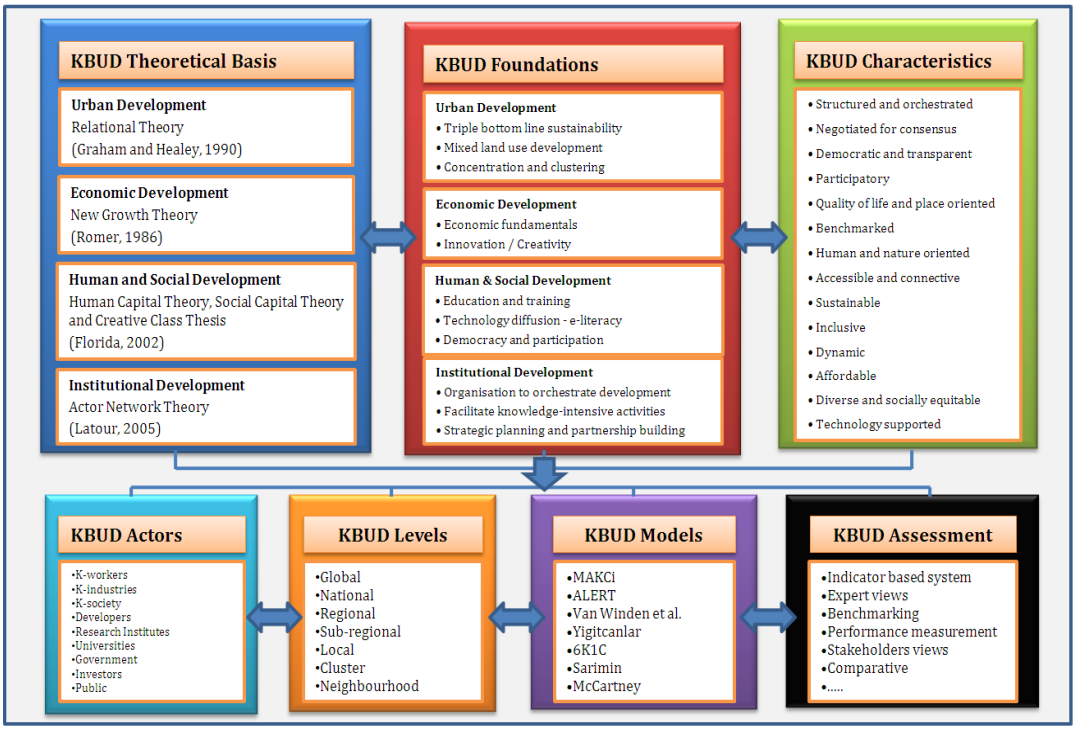

Fig.2: Knowledge-based conceptual framework for urban development

The Kansas City region must function in harmony with four primary dimensions: economics, innovation, human capital, and culture. The primary economic indicators include the growth of high-technology and high-knowledge sectors, the GDP, the employment/unemployment growth rate per capita, and the percentage of the labor force employed in the high-technology sector. In other aspects, the parameters of the innovation process include patents, the number of high-tech start-ups per capita, and the accessibility of venture capital. The human capital factor is measured by the rate of growth in the quantity of university graduates as well as the demographics and qualifications of immigrants. Lastly, the cultural and social environment is equally significant and is characterized by the multiethnic nature of the city.

All of these components must work together to create an entrepreneurial Kansas City that can create a framework for economic growth based on long-term relationships between innovation, technology, and the arts, connected to human capital initiatives and education.

8. The Knowledge City's Planning

The idealized structures of city form and urbanism, center and periphery, urban fringe and city core, inner cities and suburbs, and urban and rural settings are increasingly at odds with the polycentric, dispersed forms and functions of networked cities, whose main

features are knowledge zones and clusters. The form and structure of the KC differs greatly from those of the modern or classical city.

The goal of planning in the Knowledge Economy (KE) is to establish a robust urban core that simultaneously supports and sustains dynamic outlying settlements that use their economic might to address physical dereliction and social exclusion. The high-tech advancements in telematics (information and communication technologies) have resulted in massive increases in the flow of people, goods, waste materials, information, services, ideas, images, capital, and labor, challenging traditional notions of urban boundaries and city planning.

Recognizing the increasingly borderless nature of the contemporary city does not mean that we have to give up on the planning and design of physical urban places entirely. As far as cities are evolving into extensive webs of interaction supported by fast transport and real-time communication networks, urban planners and designers need to come to terms with this evolution since we are traditionally used to deal more with zones rather than flows and with proximity rather than accessibility.

The virtualization of the city and the dematerialization of the urban form are challenging the modern tradition of urban planning and governance, which tended to view cities as unitary objects confined within some specific administrative borders and amenable to physical intervention at the local level. These developments are also changing the idea of the city itself.

Additionally, urban planners are concerned about the social makeup and demographics of Kansas City. As the city welcomes an increasing number of diverse ethnic groups with unique cultural practices, city planning must rise to the occasion and accommodate the needs and customs of each diverse ethnic group that makes up the mosaic of cultures that is modern urban life. The issue of cultural heterogeneity and multiculturalism, along with urban consensus building, collaborative planning, and conflict resolution, has become a central concern in discourses on urban governance and planning policies (Sandercock, 1998; Healey, 2002).

The modernist tenets of urban planning, which center on the idea of a singular, definable public interest and the logical, top-down method by which professional planners impose their opinions on the entire urban community, are actually called into question by these shifts in how the knowledge era's cities are perceived.

Regional planners must deal with the issue of increasing pressures on urban concentration and growth associated with the Kansas City region (KC) because the KC affects the entire region, and the wealth and economic growth it generates must not obscure the negative effects that are quite evident in the form of extreme traffic, pockets of unemployment, urban poverty, social exclusion, and urban sustainability.

This evolution has resulted in a fundamental shift in the relationship between the social dimension of the city (the density of built structures, or the civitas) and the physical dimension of the city (the city as density of built structures, or the urbs). If the spatial coincidence between the civitas and the urbs was appropriate for the pre-industrial city, it is not appropriate for the KC of today (Dematteis, 1988). In the modern world, it is possible for the social and physical dimensions of the city to gradually loosen or even separate due to the civitas and the urbs. This possibility is further complicated by the advent of advanced telecommunication technologies, as complex webs of human interaction can develop without any apparent spatial support (Castells

The physical places continue to be important components of our open urban systems. In particular, there is a great potential for providing the variety and regularity of human contacts that are still necessary for many urban activities in places where interconnected mobility flows occur, such as in motorway service areas, airports, railway stations, urban

squares, and parks (Bertolini, 2003). These places' quality is determined by the attributes of each location as well as the characteristics of their patrons.

A sufficient conceptualization of this increasing openness of the urban system is necessary for effective urban planning and design; the analysis focuses on the new urban dimension of transportation nodes, as this is a phenomenon that may best exemplify this evolution. Physical accessibility, or the quality of connections to transportation (and, increasingly, telecommunication) networks at multiple spatial scales, is the leading thought in an increasingly mobile urban society and critical quality locations; accessibility is linked with other more proximity-related features of a location to determine specific sets of conditions.

In conclusion, in order to handle the following planning areas and take into consideration these new problems and social-urban issues, a new set of planning policies and programs for establishing the KC is thus required:

- Planning for urban land use and the construction of cities.
- Planning for urban ethnic communities' multicultural needs.
- Policies for urban government, reaching agreements, and cooperative planning.
- Higher education, universities, science parks, R&D centers, and other knowledge institutions.
- Associations for the arts, culture, and ecology, and innovation enterprises.
- Techniques for Growing Small and Medium-Sized Businesses (SMEs).
- The ICTs.

9. Novel Ideas for Network Cities Planning

The current advances in telecommunications are a set of phenomena that tend to be overwhelmingly driven by large, internationally-oriented, global regions. The activities, functions, and urban dynamics that become concentrated in a network city heavily rely on the facilitating attributes of advanced telecommunications for supporting relational complexity, distance links, and snowballing interactions, both within and between cities. Global City networks are associated with rapid advancements in both intra-urban and inter-urban information infrastructures.

Information and communications play a significant role in the planning and design of network cities because they not only serve as examples of the malleability of urban space and, consequently, its openness, but also have the ability to completely reorganize the city's activities and physical layout.

The complexity of urban activities and uses is growing, as evidenced by the diversity of activities and mobility patterns of people, homes, businesses, and organizations. Physical distance becomes less significant in a network society where information flows and instantaneous real-time communications predominate. In this kind of environment, the efficiency of network connections, mobility, and spatial policy are critical. Since many conventional concepts of spatial planning, such as "location theory" and "the compact city," do not adequately account for these developments, a new understanding of network cities is desperately needed.

In order to fit the emerging network cities context, urban theories and policies should address the growing openness of cities and abandon the assumption of closure or static nature and motionless of the urban system. This means that efforts must be made to integrate mobility facets into urban planning and design, and the introduction of new concepts like "network cities," "urban networks," or "corridors" can be one such effort

headed in the right direction. The new conception of urban networks must consider the city as an open dynamic system. In fact, human interactions and activities are no longer limited to a bounded, closed urban setting; rather, they tend to expand over ever larger physical and virtual spaces.

For example, the concept of corridors calls for a change from the current unplanned development of economic activities along motorways to more planned, concentrated urbanization with maximal functional mix along a restricted number of (international) transport axes. Corridors can be viewed as sub-components of network cities, which are emerging, functionally-connected sets of urban centers at the regional scale.

Rather than the traditional city center or urban core, the new urban planning and design strategies that consider mobility environments should consider them as the new central places within network cities. Such leading concepts can be effective in influencing spatial developments in an increasingly mobile society.

The notion of "action space," or the area in which people can carry out activities, is another idea that can be useful in urban spatial planning. It can offer planners a better understanding of how people behave in space and teach them how to influence people at the local and regional levels.

Knowledge clusters, universities and science and technology parks, e-commerce spaces, passenger airports and fast-rail stations, free trade zones, free internet zones, and multimodal logistics enclaves dedicated to freight are the four most prominent types of networked mobility spaces that developed in the contemporary KbC. As has been argued thus far, the knowledge city form and urban structure require new conceptual insights. Such theory serves as a basis for defining newer spatial organization models and exploring the emerging networked configurations of these four salient types of networked mobility spaces.

9.1 Clusters and Zones of Knowledge Innovation

Knowledge and innovation are at the core of the KC concept. The KC is thus, characterized by the flows between the nested networks of Knowledge Innovation Zones (KIZs). A Knowledge Innovation Zone (KIZ) is defined as an urban space or a geographic region where products, services, or industry segments are produced and where a community of practice lives in which knowledge flows from the point of origin to the point of need or opportunity (Amidon: 2004). The indicators of KIZ can be human capital factors (high education levels and deep pools of talents, artists, scientists, etc.); intellectual capital (values, patents, and cultural diversity); infrastructure capital (directories and maps to knowledge repositories, resources, expertise, networks, and communities of interest and practice); networks of higher learning institutions, libraries, universities, R&D labs, think tanks, and art schools; and social capital (shared culture and spirit of creativity and innovation; and collective respect for indigenous and local knowledge and customs), etc.

In order to achieve this goal, the KC must build sophisticated technology infrastructure and create a cybersports to keep up with the information revolution. As a result, a cyber culture critical mass may be consolidated that can be partially nurtured by the physical form of the built environment. The KIZ, therefore, adopts the idea of a service-based cluster, as is the case with the "Silicon Valley." The vision with which this zone must be developed should be based on seeing it as an innovative entrepreneurial city intended to create a new techno-urban identity.

9.2 Innovation Hubs (Free Trade Zones and Electronic Commerce)

Another element of the KC that urban planners should consider when discussing networked mobility zones are the electronic commerce (e-commerce) spaces and hubs. These are the inevitable results of the rapidly and explosively expanding digitally-

connected Internet and electronic transaction facilities, or online retailing and e-commerce. The upcoming KC will see the emergence of numerous other types of networked electronic retail zones, such as Free Trade Zones and E-Commerce Distribution Hubs (Figure. 3). These new retail zones are a product of the exponential growth of Internet traffic and e-commerce, which is expected to double globally every year over the next ten years.

With the explosion of e-commerce, virtual malls, and online grocery shopping, the physical hidden support, storage, and transaction-processing systems for virtually-sold goods are likely to become highly important examples of urban space. It was estimated that by 2010, one-third of the $60 trillion business to business (B2B) economy would be operating online. City planning and urban design must adapt to the new spatial configurations of these emerging networked commercial zones.

Free trade zones (FTZs) are essentially low-tax and low-regulation havens for international trade. Their primary function is to provide cities with the superior infrastructure connections required to place them within international trade and transaction flows. Typically, FTZs are found in border cities or at sea and air ports.

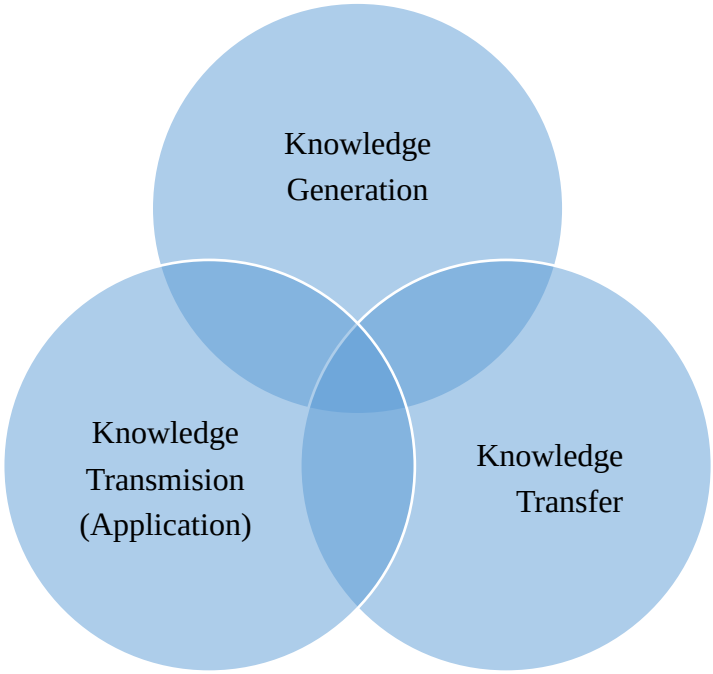

Figure 3: Researcher Functions of the Knowledge Hub

9.3 Institutions of higher learning

The city's deficiencies in the "knowledge economy" can be addressed in large part by universities, which, along with research and development facilities and science and technology parks, form the nodal knowledge innovative cluster required to support the city's competitiveness. Universities also supply the city with skilled graduates, provide opportunities for ongoing education and training for knowledge workers, and aid in luring and keeping knowledge-intensive businesses.

10. A Few Illustrations of Knowledge Cities

In recent years, many cities around the world have embarked on initiatives that support their development into KCs. They have established sets of strategies aimed at optimally managing their competitive assets and building on a vigorous knowledge base economy. To ensure their success in the knowledge era, those KbCs have developed a pervasive

knowledge culture and invested in attractive, stimulating urban dynamics to attract and retain talented workers. Analysis of their experiences discloses that some cities have poured large shares of their investments on science and high technology, traditional infrastructure, and strategies into the arts and culture as in the case of Singapore. Others have adopted a distinctive particular mix of investments to fit their own specific needs and managed to make an outstanding effort to present themselves as KCs. Boston's classification of high KC has been attributed to its new scientific developments. Others, like Dublin, have paid considerable efforts to transform their industrial structures and invest in high technology and important private sector businesses. Still, others, e.g., Barcelona and Florence, have built on their specific cultural and artistic assets to assert their presence and identity in the knowledge era. Some of these cases will be presented with some detail in the following section.

10.1 Singapore's Case

With four million people living on an island, Singapore has 90 percent of its population with Internet access at home, and its level of living and technology integration is on par with or better than that of the US and Switzerland. The World Economic Forum has ranked Singapore as the most competitive country in the world due to its remarkable success in making the transition to a knowledge-based economy.

The Singapore Lyric Opera and the Esplanade have been designed to lead exactly to that end. Singapore has also adopted an arts and culture strategy, articulated, in part, around international caliber events. The approach taken by Singapore consists of developing its human capital through investment in education, learning, and training, as well as supporting attraction and retention of competent, talented individuals.

Singapore started building its competitiveness by modernizing its port facilities in the 1960s, and in the 1970s, it set a series of priorities like attracting multinational companies by offering a flexible growth-oriented business climate, accountable competent municipal administration, and institutionalized strategic scenario exercises to weigh future options so as to always remain a step ahead. In less than 30 years, this city-state, modeled after Dublin, has become one of the most dynamic economies in the world.

10.2 Boston Case

Maintaining KC status by definition entails continuously generating and modifying ideas, concepts, processes, and products and assigning them monetary worth. This raises the story of two knowledge cities: Oxford's relative decline and Boston's rapid ascent. The first city prioritizes education and tourism, followed by engineering and publishing, while the second city prioritizes biotechnology, medical sciences, and information technology, then education, and finally professional services, conferences, and medical events (tourism niche).

10.3 The Montreal Case

In order to strengthen its position as a Knowledge City (KC) in the medium and long term, Montreal has chosen to significantly increase the critical mass of high knowledge activities, including the innovation process, the development of human capital, and the attraction and retention of qualified immigrants. Although Montreal has accelerated its knowledge-based economy, it still lags behind Calgary, which has grown its employment by 25.9% overall between 1996 and 2001, with 66.7% of that growth being attributed to growth in high-knowledge jobs; in comparison, Montreal's growth during that time was only 11.9%. In order to be nominated as a Knowledge City (KC), Montreal must also concentrate on the caliber of its educational institutions; the higher these institutions are, the higher the caliber of candidates it will draw.

10.4 Melbourne's Case

The goal of the city of Melbourne was to develop a state economy that would have enough critical mass to support world-class specialization. To that end, the city established bureaucracies that were both responsive and creative, as well as reliable regulatory institutions. The city also invested in learning and training to acquire the necessary skills and in research excellence to support its competitive assets. Lastly, the city developed highly-performing networks of commercial influence and sophisticated connective infrastructure, along with a competitive and collaborative business culture. Lastly, the city offers a high quality of life to attract and retain knowledge workers.

10.5 Barcelona's Case

Barcelona drew its route to the knowledge era through the development of its cultural assets and the elaboration of the due instruments for making knowledge accessible to its citizens. Within this context, it has established a network of public libraries that is compatible with the European standards and made the new communication technologies readily available for its inhabitants. The city constitutes a successful melting pot with diversity of cultural practices of the component ethnicities and races. It has developed a sound educational strategy with all cultural facilities and services revolving around it. It has also developed a network of schools connected with artistic instruction throughout its territory. The city streets and spaces are designed and rehabilitated so that they can be at the service of culture. Civic centers are open to diversity and designed in such a way as to foster face-to-face relations. The city does not deny anyone the right to express herself/himself freely and openly by making available to everyone all the tools required for her/him to fulfill that right.

11. Amman's Potential to Become a Knowledge City

Amman asserts itself as a world-class city capable of competing on a regional and even global scale by positioning itself as a city of Middle-Eastern importance and highlighting its asset base, particularly its business assets, infrastructure, and connectivity through scheduled air links to other cities in the world.

The city is also often invoked as having highly-sophisticated infrastructure of ICT networks. The direct, digital, broadband connections that are essential for extremely fast and multimedia financial service telematics applications are now available at very competitive rates. Amman is also a hub of finance and business services such as accounting, legal and advertising services, communication, international transport, the publishing industry, fashion, and mass culture. The city enjoys many of the world-class city characteristics like a large urbanized region with dense patterns of interaction. These characteristics make Amman a city node well integrated in a growing networked global economy. The city is also striving towards greater openness, providing the flow of people, goods, and ideas that have contributed to the multi-faceted commercial and cultural development of the city, thus creating a vibrant milieu that attracts talented people and provides workers with the incentives, both to explore and to exploit technological possibilities. An urban milieu of quality is a must for any KE city that cares to attract and retain skillful knowledge workers.

Most cities that want to be considered Knowledge Cities (KCs) must first perform a thorough assessment of their current state of the art. After that, they must formulate a clear vision, develop a strategy to achieve it, and adopt action plans. KCs can only accomplish their predetermined goals by utilizing partnerships between local players, or the public and private sectors. Throughout this process, the city should never lose sight of its goal of providing higher-than-current urban living standards within high-quality spaces and smarter sustainable projects that are highly valued by creative, talented workers.

Amman needs to make a concerted effort to expand its knowledge assets, which include scientific, commercial-financial, entrepreneurial, cultural, and environmental expertise, if it hopes to secure its status as a Knowledge Capital.

In terms of scientific knowledge, Amman is taking significant strides in this direction by planning and constructing universities, research and development centers, and science parks across the nation. The city alone is already home to numerous universities and university colleges that offer instruction, training, and research projects or consulting. The city's higher education institutions produce over 12,000 graduates annually for the knowledge market (Ministry of Planning and Statistics, 2004). For those who prefer this option, these institutions also offer electronic and distance learning (e-learning).

In terms of commercial-financial knowledge, Amman provides a large portion of its building floor space for office use; the Land Use Master Plan indicates that commercial land uses occupy an important portion of the city; urban retail and office uses are concentrated along the commercial spine office complex and the arterial roads; the creation of five urban sub-centers is anticipated by the strategic comprehensive plan for the city in order to accommodate high-level office buildings; it is important to note, however, that trade barriers are being lowered in order to support the city's economy and maintain its growth. A number of functions are commonly associated with the status of a world-city. These include finance and transnational corporate headquarter functions.

An important characteristic of any KC is entrepreneurial knowledge. An entrepreneurial city seeks creative approaches to sustain or improve its economic competitiveness in comparison to other cities and economic environments. When we talk about entrepreneurship, we're talking about the creation of opportunities for excess profit through novel pairings or creative thinking that moves the focus from urban managerialism to urban entrepreneurialism (Harvey, 1989).

While policy, infrastructure, and investment are undoubtedly important, successful cities draw their energy from entrepreneurial dynamism and the quality of the workforce. In an economy with accelerating technological innovations and rising specialized service functions, the labor force needs good basic education and skills. As a result, measures to ensure an adequate supply of entrepreneurship, skills, and labor will be one of the biggest challenges. In the case of Amman, entrepreneurialism is embedded within the city through the emergence of bilateral business associations and the setting up of other business institutions (e.g., the Commerce and Industry Chamber and the Real Estate Council) and business incubators to help start up firms in

Environmental knowledge is becoming more and more important in Amman society, where a lot of people care about the environment. Some associations are calling for new legislation to be adopted for that purpose. The city has also been working gradually to address infrastructure deficiencies that have a high impact on environmental quality; an urban infrastructure renewal process is currently in progress. In addition to these five knowledge spheres, Amman needs to improve its standards of livability in order to become a more competitive city in the region and globally. These aspects are briefly explained in the paragraphs that follow.

11.1 Livability and Competitiveness

Amman must invest in skills and knowledge development; it must pay attention to not only focus on traditional investments on infrastructures but on human capital as well; it must emphasize the assets that are valued by the knowledge workers; and it must improve its economic performance in knowledge-intensive sectors, the quality of its innovation process, the availability and level of skill of its human capital, and the richness of its cultural and social assets.

11.2 Zones for the Development of Technology and Economy (ETDZs)

Amman has established a number of new industrial districts in order to attract foreign investment and global businesses. Additionally, in order to guarantee future development that is broad-based, the city is enhancing the industrial, scientific, and technological capacities of these new districts. The quality of these services is gradually enhancing Amman's bargaining position with respect to foreign companies, allowing it to push for joint ventures, local contracting, and technology transfer. In this regard, two free trade zone hubs are also planned: one located near the international airport in the north of the city, which specializes in high-tech products and processing, and another located south of the city, close to the industrial park, which is devoted to warehousing.

11.3 Establishing Regional Connections

Amman needs to strengthen its external connections as it positions itself as a world-class regional city. It is true that there has been progress in this regard; nonstop flights now connect Amman to most major global cities. Beyond this global reach, becoming a major cyber hub is another ambitious project in Amman's plan to forge strong external connections; rapidly increasing Internet use is also linked to the import-export orientation of Amman-based enterprises. Finally, the continuously improving quality of telecom facilities is aiding Amman's integration with the global economy.

However, it should be noted that the city should be open not only to its region but also to other world cities. Greater openness is a feature of the KCs. The pursuit of openness has many dimensions, including trade, the legal system, finance, and culture. Another aspect of the movement towards openness is improved communication with other nations, a goal already actively pursued through significant investments in telecommunications. The combination of openness and competitiveness-inducing policy measures is most likely to produce results that serve the long-term interests of the city of Amman.

12. Conclusions and Suggestions

The analysis above makes clear that a new form of city planning is required for the twenty-first century in order to accommodate the emerging knowledge economy and the new network society, which are defined by flows of people, goods, and services. In order for a city to be competitive in the global market for world-class cities, it must transition from the traditional industrial economy to the post-Fordist economy based on knowledge innovation and services; it must also reorganize its urban form in order to provide high-quality urban living for highly qualified knowledge workers; additionally, it must draw and hold corporate headquarters of globally renowned corporations and create a new network of commercial financial hubs for services.

The sophisticated high-tech infrastructures for high-speed network connections are an important feature of this new city. These new services and activities require a vibrant urban space with land uses distributed according to new planning paradigms, where concepts of network accessibility prevail instead of physical proximity or contiguity. Concepts of knowledge zones and hubs of innovation instead of functional or activity zones should guide urban planners in their quest for appropriate forms for the city of the knowledge era.

The smart, intelligent, and sustainable city of the future—a Knowledge City (KC) that transcends physical borders and limits—can be created by physical planners and urban designers. People, information, goods, and ideas can flow freely within and between these kinds of cities, providing a wide range of cultural entertainment, spectacles, and enjoyment to both locals and visitors.

A new legislative arsenal of technology-oriented policies, multicultural, ethnic, and collaborative planning, distance learning, and ongoing reskilling of the city's workforce

are all necessary to support the aforementioned recommendations. Without these changes, the transition from the traditional modern city will not be complete. These changes are necessary to enhance the entrepreneurial and self-governance capacities of the technological base of the 21st century city and may include acquiring technical knowledge, international experts, and multinational corporations; promoting R&D centers; and developing agglomeration economies based on universities, technology-based enterprises, education institutes, science parks, and private firms.

In order to investigate Amman's potential for showcasing itself as a knowledge competitive city, the case study focused on how the city can leverage its knowledge assets to effectively transition from a traditional modern economic base to a knowledge post-Fordist economy. It also explored the necessary adjustments to the physical land use planning and urban form, as well as strategies for promoting and expediting this process of change.

To put it briefly, Amman's efforts to become more structurally competitive are intended to support the growth of its information services industry and solidify its status as the region's leading center for communications and information.

Note that this is by no means an exhaustive attempt to outline some of the physical projections relevant to the KC as exemplified for the Amman case; more research and analysis are required to ascertain the effects of (K.H.) developments on land use change and related urban form (Figure. 4). It is advised that future studies pay close attention to clarifying the intricate connections between the city's urban fabrics, social makeup, and growing knowledge sector.

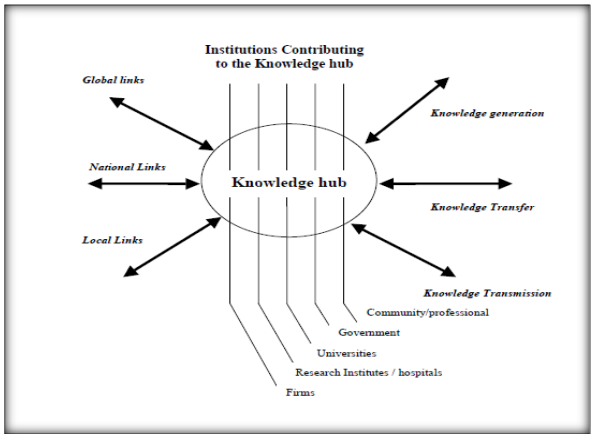

Fig. 4: A Knowledge Hub's Interactive Nature

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