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## **Toward an Urban Frontier and the Inter-Linkage: The Taipei Scenario**

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**Abstract:** The hybridization or cross breeding of the regional spatial transformation creates an urban frontier that expresses the tectonic shifts focusing on urban activities change and population migration. The scalar shift that spans across the regional scale brings what lacks within the inter-linkage of “city” and “world” and look beyond the territorial division at large. In Taipei, the phenomenon of geographic concentration of specific sector and economic activity in the metropolitan areas imply the underlying characteristic expounded beneath that can be utilized. Size and growth rate of urbanization thru the population concentration highlight the presence of an intense redistribution, creating a frontier land in need of inter liking of a sort. The empirical results highlight the need for improved connectivity between the northern and other regions in Taiwan and the need to address two major issues--the need re-examine the management policy for land and industry development and the need to provide the suitable public facilities and services for the changing population structure. Other spatial paradigms such as networks or nodes may provide unconventional texture and visualizations of this region, which we can develop into a scalable set of strategies that allocate more localized considered operations to emerge. Within this realm, we inquire the urban-landscape hybrids that will behave as a protector to preserve the ecologies and natural resources of the frontier as well as furthering the inter-linkage of the urban landscape. As this may become an ordering principle for a new economy, one must accept the new mechanism for organizing the patterns of human settlement as well as the economies of production and distribution. This paper contends the Taipei experience provides a model for other developing cities and a reference in understanding the parameters and management policies.

**Keywords:** Inter-linkage, Urban Structure, Urban Frontier, Taipei

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## 1. Introduction

Urbanization is one of the most influential human activities and can radically alter landscapes (McKinney, 2002; Hough, 2004) and is now recognized as a defining feature of the 21st century, turning the attention towards the quality and nature of new cities and communities around the world. Within this framework, the modern metropolis, in a significant sense, has become “unbound.” Just as the clear internal border between city and suburb has begun to disappear, the external boundary of the city region is becoming less confining, opening up the urban hinterland to ever larger regional scales. (Soja, 2000) This calls for a shifting urban framework as inter-linkage becomes a factor of land use legacies, remnant configuration and local socio-economic and environmental concerns. Jean Gottmann recognized the theoretical impacts of his work: “the Megapolitan concept seems to have popularized the idea that the modern cities are better reviewed not in isolation, as centers of a restricted area only, but rather as parts of “cities systems,” as participants in urban networks revolving in widening orbits.” (1987: 52) As a consequence, we must abandon the idea of the city as a tightly settled and organized unit in which people, activities, and riches are crowded into a very small area clearly separated from its non-urban surroundings.

Urbanization begins from early trade based settlements that traded by water and land with agricultural hinterlands and other settlements (Jacobs, 1969); to industrial manufacturing centres with concentrations of factories, labour and rail and sea trade connections (Soja, 2000); finally to post-industrial cities where agglomerations of knowledge intensive services locate and electronic communication networks and flows of capital are central (Castells, 2000). The shift within the Taiwanese urban order is parallel to this development. Over the last decades, Taiwan has developed its economy from a heavily agricultural economy into an industrialized economy and dramatic changes have taken place in its urban landscape, reflecting a fact that the environment has been seriously transformed during the development process. Gathering on Taiwan urban literature (see Liu 1975, Tang 2003, Tsai 1985, Ling 2010) clearly notes the urbanization process that metropolitan developments in the northern, central and southern Taiwan emerged in the mid twenty century and extensively incorporated the major cities and their surrounding satellites into urban regions with industrial economies, employments and communications expanded beyond the city jurisdiction boundaries and driven the metropolitan areas into functional regions. Taipei TMA undertook such process as the socio-economic factors affected the urban land use and local environmental conditions. Models of the good city-of the kind of urban order that might enhance the human experience-invariably tend to project from the circumstance of the times and as geographical entities, cities are hardly discernible places with distinct identities . . . without clear boundaries and they have become sites of extraordinary circulation and translocal connectivity, linked to processes of spatial stretching and interdependence associated with globalization (Amin, 2006).

The first part of this paper develops a theoretical approach by reviewing literature which helps to identify the typology and the process of the urban morphology. The second part is a case study of

Taipei Metropolitan area. It is mainly a study including relevant literature, reports, official documents and statistics. In order to clarify some implementation details, key actors who have participated or are participating in the design and implementation process of Taipei Metropolitan urban development and inter-linkage issues were reviewed.

## **2. Urban Form and Extending the Frontier**

Many theories of development view urbanization and industrialization as essentially synonymous. Landes (1969, cited in Williamson 1987, p. 6) situates urbanization as an essential ingredient in modernization. In the age of globalization, advanced technology makes people's trans-national movement or just daily communication become easy and frequent. The first stage of industrialization was based on concentration of production and separation between city and country, the second age should be directed towards decentralization and diversification of production, both agricultural and industrial, and to a closer relation between city and country (Velasquez & Barajas). Many urban geographers have studied the concept of Megalopolis in the United States and have applied it internationally. The Tokyo-Nagoya-Osaka Megalopolis with 39 million of habitants (Moriconi-Ebrard, 1993), or the Pearl Delta River Megalopolis is excellent examples of urban coalescence in Asia. Polycentrism is a spatial reality (HALL and PAIN 2006) and is becoming a new referential for public policies (Gloersen, Lahteenmaki-Smith et al. 2007). Hilberseimer's Decentralized City responded to the problems cause by the industrial age. Pollution, insalubrities, crime and traffic in city centres, addressing the fact that moving about the urban core is essentially a necessary issue to be addressed as it expands beyond the initial boundary. Complex processes of global urbanization are rendering cities into all-embracing social spaces as the world and its ways pours into them, such that they are increasingly read as emblems of the modern (Amin and Thrift, 2005b).

The daily negotiation of the urban environment has become central in defining the privations, provisions, prejudices and preferences of a very large section of humanity. Jean Gottmann recognized the theoretical impacts of his work: "the Megapolitan concept seems to have popularized the idea that the modern cities are better reviewed not in isolation, as centres of a restricted area only, but rather as parts of "city systems," as participants in urban networks revolving in widening orbits." (1987: 52). Every city in this region spreads out far and wide around its original nucleus; it grows amidst an irregularly colloidal mixture of rural and suburban landscapes; it melts on broad fronts with other mixtures, of somewhat similar though different texture, belonging to the suburban neighbourhoods of other cities." (Gottmann, 1987) Furthering this concept, Gottmann defines more specifically: "the Megapolitan concept seems to have popularized the idea that the modern cities are better reviewed not in isolation, as centers of a restricted area only, but rather as parts of "city systems," as participants in urban networks revolving in widening orbits." (1987: 52). Gottmann further stated that "We must abandon the idea of the city as a tightly settled and organized unit in which people, activities, and riches are crowded into a very small area clearly separated from its non-urban surroundings.

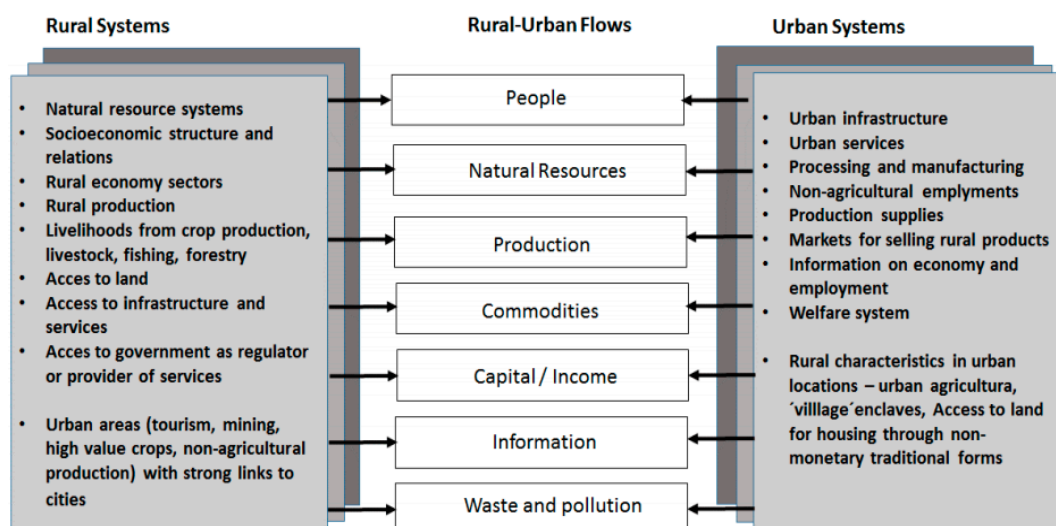
In his article *The World According to Architecture*, Hashim Sarkis critiques the current discourse on the Urban Age and its over-concentration of effort on the Global City, asking, "Why the city should be considered the ultimate spatial manifestation of globalization?" Living in the urban world is the statistical reality for more than half of the world's population, occupying only 2% of the planet's

surface, but using about 75% of the natural resources, and generating about 70% of greenhouse gases (GHGs). Michael Hardt and Antonio Negri argue the distinction between internal and external has disappeared under the modern globalized political economy; this, in turn, eradicated the clear mark or urban-rural divider. This condition was observed as early as 1960's by Melvin Webber, who stated that the visual symbols of urbanization are to be marks of the important qualities of urban society;

...We have compared these symbols with our ideological precepts of order and found that they do not conform; and so we have mistaken for "urban chaos" what is more likely to be a newly emerging order whose signal qualities are complexity and diversity.

There is no longer a nature or countryside external to the city; it is no longer possible to locate oneself outside the urban environment and the lifestyles associated with it. Therefore, the linkage for the urbanized areas and their supporting rings requires a schematic system of flow that comprising of human and natural resources as well as the necessary production and waste management to sustain their livelihood as seen from the figure below.

**Figure 1.** Urban-rural inter-linkage and Flow.



Adapted from: Douglass, M. 1998. A regional network strategy for reciprocal rural-urban linkages: an agenda for policy research with reference to Indonesia. *Third World Planning Review*. Vol. 20, No.1, pp. 1-35; and <http://web.mit.edu/urbanupgrading/urbanenvironment/issues/rural-urban-linkages.html>

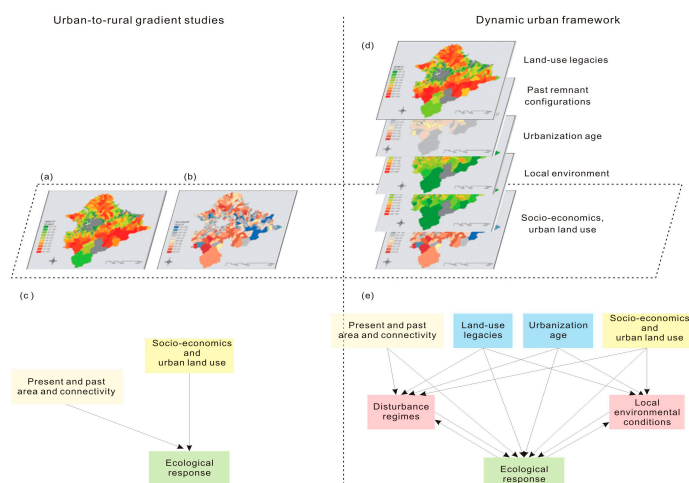
Adequate infrastructure such as transportation, communication, energy and basic services is the backbone of the urban-rural development. Interactions can be defined as linkages across space (such as flows of people, goods, money, information and wastes) and linkages between sectors (for example, between agriculture and services and manufacturing), including 'rural' activities taking place in urban centres (such as urban agriculture), or activities classified as 'urban' (such as manufacturing and services) taking place in rural settlements.

Some capital cities (e.g. London) combine all or most of the highest national-level functions related to politics, commerce, finance, media communication, education, etc. Furthermore, some capital cities (e.g. Washington) are designated as the political capital without significant economic functions (Hall,

2006). Moreover, some ex-capital cities (e.g. Berlin) constitute ancient historical and cultural references of the nation. In addition, some cities (e.g. New York) play a capital-city-like role, because they function as the nation’s window for international cultural and economic interactions. Koolhaas (1994), on the other hand, stated that “if there is to be a “new urbanism” it will not be based on the twin fantasies of order and omnipotence; it will be the staging of uncertainty; it will no longer be concerned with the arrangement of more or less permanent objects but with the irrigation of territories with potential” “a good deal of the land in the 'twilight areas' between the cities remains green, either still farmed or wooded, matters little to the continuity of Megalopolis” (GOTTMANN 1961: 42) Gottmann expressed that it was the economic activity and the transportation, commuting, and communication linkages within Megalopolis that mattered most. Urban complexities have evolved since the last century, as households may live a “multi-spatial” life, with some members residing and working in rural areas, others in the urban core, engaging in non-farming activities in the rural periphery, or in urban agriculture.

The insistence of clear division for the land use had its roots in the segregationist urban planning policies of the *Congres Internationaux d’ Architecture Moderne (CIAM) IV*. The notion of separating housing, work, and recreation use remains as the mainstream governing rule and the planning ideology for urban and rural areas. An alternative view represented by Situationist in 1957 as Constant Nieuwenhuys emerged from this perception and his proposal for future city called *New Babylon* represented a view of the city as a wide mesh, a network of connected sectors superimposed over a system of rapid transit routes with the “principle of disorientation” “a deliberate confusion of spatial hierarchy through obstacles, incomplete geometries, and translucent elements”, intending to disrupt and reinterpret the segregated urban model. The inter-linkage depends on the flow of land use and local socio-economic as well as the connectivity tissue that constitutes the framework as seen from figure below.

**Figure 2.** Urban Inter- linkage and Flow Factors (Source: compiled and drawn by the study).



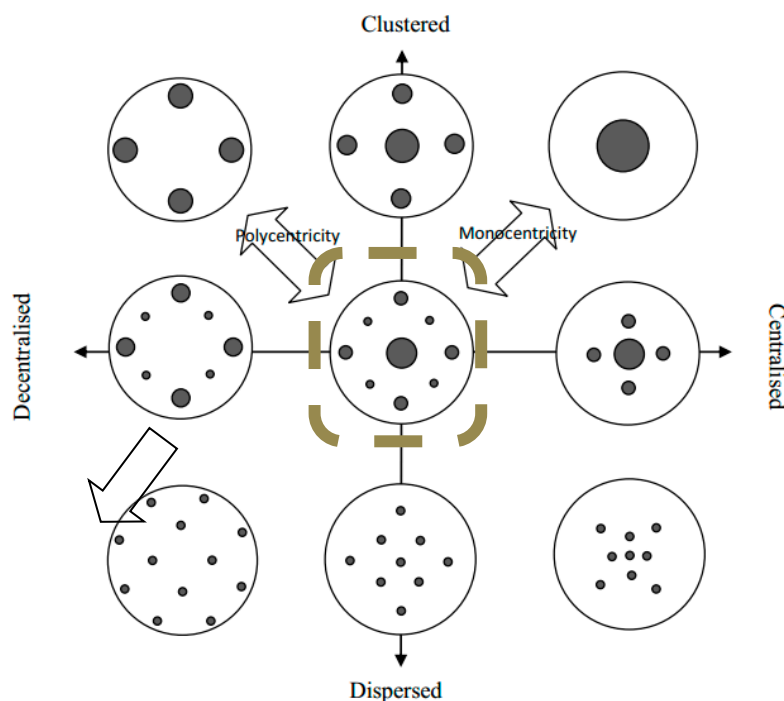
Every city in this region spreads out far and wide around its original nucleus; it grows amidst an irregularly colloidal mixture of rural and suburban landscapes; it melts on broad fronts with other mixtures, of somewhat similar though different texture, belonging to the suburban neighbourhoods of

other cities. (Gottmann) Contact and communication is central to the very existence and functioning of cities, as it underpins the attraction of urban locations to residents and businesses. Polycentrism is a new spatial reality (Hall and Pain 2006) and is becoming a new referential for public policies (Gloersen, Lahteenmaki-Smith et al. 2007). The attempt to define intervention that may be capable of effecting transformation and responding to globalization and fragmentation of the urban fabric is evident. Zardini extends the observation into an argument that the entire world is now urban, stating:

*“...there is no longer a nature or countryside external to the city; it is no longer possible to locate oneself outside the urban environment and the lifestyles associated with it. The old notions of the city versus country versus nature are now obsolete. To extrapolate, the only possibility for action now lies within the urban world, a variegated world marked by profound differences.”*

Joan Busquets acknowledged the fact that diffuse forms of urbanism pose a specific set of challenges for architects and urbanists, since they “..Do not follow the patterns of the continuous and / or traditional city” Urban areas have been the primary locations for social movements, intellectual discoveries, and the rise and fall of nations and civilizations (Greene and Pick, 2006). This constant shift of clustering and dispersion as well as expansion toward hinterland is depicted in the diagram below:

**Figure 3.** Urban Core Hierarchy Patterns thru Clustering and Centralization (Source: compiled by this study).



Acknowledging that while, “a good deal of the land in the 'twilight areas' between the cities remains green, either still farmed or wooded, matters little to the continuity of Megalopolis” (GOTTMANN 1961: 42) An urban containment policy usually has three components –greenbelts, urban growth boundaries (UGBs), and urban service boundaries (USBs) (Pendall, Martin, & Fulton, 2002).

Gottmann expressed that it was the economic activity and the transportation, commuting, and communication linkages within Megalopolis that mattered most. The evolution of urban form can be viewed through the tension between forces of centralisation and forces of dispersion.

### 3. Inter-Linkage in Taipei Metropolitan Area

Taipei metropolitan area, comprising of Taipei city, New Taipei City and Keelung City, is the most densely populated and converged urban area in Taiwan and clearly formed a polycentric centre. The spatial organization of cities can be described as a hierarchy. There are many small towns scattered throughout the region, fewer medium cities, and only one or two very large urban centers. One reason for the hierarchical organization of cities in the landscape is the distribution of goods and services as described by Friedman (1973). This is certainly the state of Taipei Metropolitan Area (TMA). Table below shows the demarcation for the TMA by 2014:

**Table 1.** Taipei TMA administrative demographic table. (Source: compiled by this study).

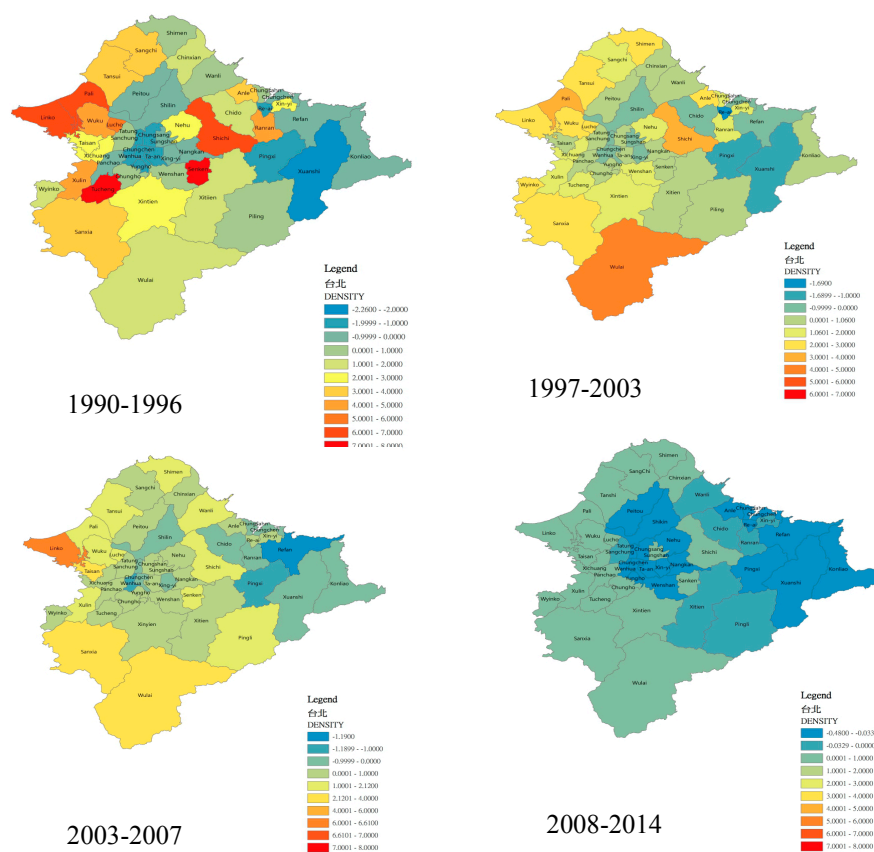
city	Administrative districts	Villages No.	Area (KM2)	Population	Population Density (people/Km2)
Taipei City	12	449	271.7997	2,622,090	9,647.14
New Taipei city	14	1,017	2,052.5667	3,837,077	1,869.40
Keelung City	7	157	132.7589	389,067	2,930.63

The city system of Taipei, New Taipei and Keelung exhibits interdependence between. Prior to 1895 the city was in the midst of the settlement building near the river and water route, one may see the sprawl development along the water way. This growth continued thru the Ching dynasty as railway was constructed for easy goods transportation. During the 1895-1945, the Japanese occupation era, the railway was extended toward the westward plain to fully access the island as modern planning methodology was applied to adjust the axial development with grid block system. The city experienced decentralization after 1945 with the arrival of the KMT troop. The new settlement arrived and segregated the city centre and he periphery territory became even more apparent. With the implementation of the new land zoning law, certain production activities were expelled from the city centre. Before the 1960s, Taipei was a major distribution centre for agricultural products and the main consumption centre in Taiwan (Chou, 2002). In the late 1980s, Taiwan underwent a process of deindustrialization related to global and regional economic reorganization process. The number of financial, insurance, service industries in Taipei increased significantly, while most manufacturing industries moved out of Taipei to Southeast Asia and China (Ching, 1999).

As shown on the figure above, a breakdown of TMA into Taipei City and New Taipei City and Keelung City shows an increase in New Taipei City over 60%. The decline of Taipei City’s population as a proportion of TMA’s population of 50% in 1980 to less than 40% in 2012 implies the suburbanization of the population and therefore an increased migration to the extended areas. Labor force employment rate in Taipei has been growing over 95% since 1969 (DGBAS, 2005). A few clustering factors should be mentioned: firstly, from 1985 on, after the martial law was lifted, the city

underwent a rapid economy growth and urban agglomeration and development in the economic core reached saturation point by the late 1980s; there was not sufficient space to accommodate Taipei’s new global activities. Two major consequences resulted. First, it fuelled a rampant development in land speculation, and real estate prices soared to a record level. Secondly, as the northern core dominates the economic and social activities at large, the territorial reorder deems necessary and important. The accelerated consumption of the regional infrastructure and resources demands an integration and reconfiguration of the urban planning and management system. The urban development expanded to eastern suburbs of Taipei, and lead to spatial shift of the urban economic core. Secondly, the export-based manufacturing headquarters, mostly acting as subcontractors of Japanese and Western transnationals, moved to Taipei, emerging certain clustering pattern of industries (Ling, 2010). From both its place within the global commodities trade and Taipei assumes the role of global city (Wang 2003; Kwok 2005).

**Figure 4.** Taipei Metropolitan Population change 1990-2014 (Source: compiled and drawn by this study).

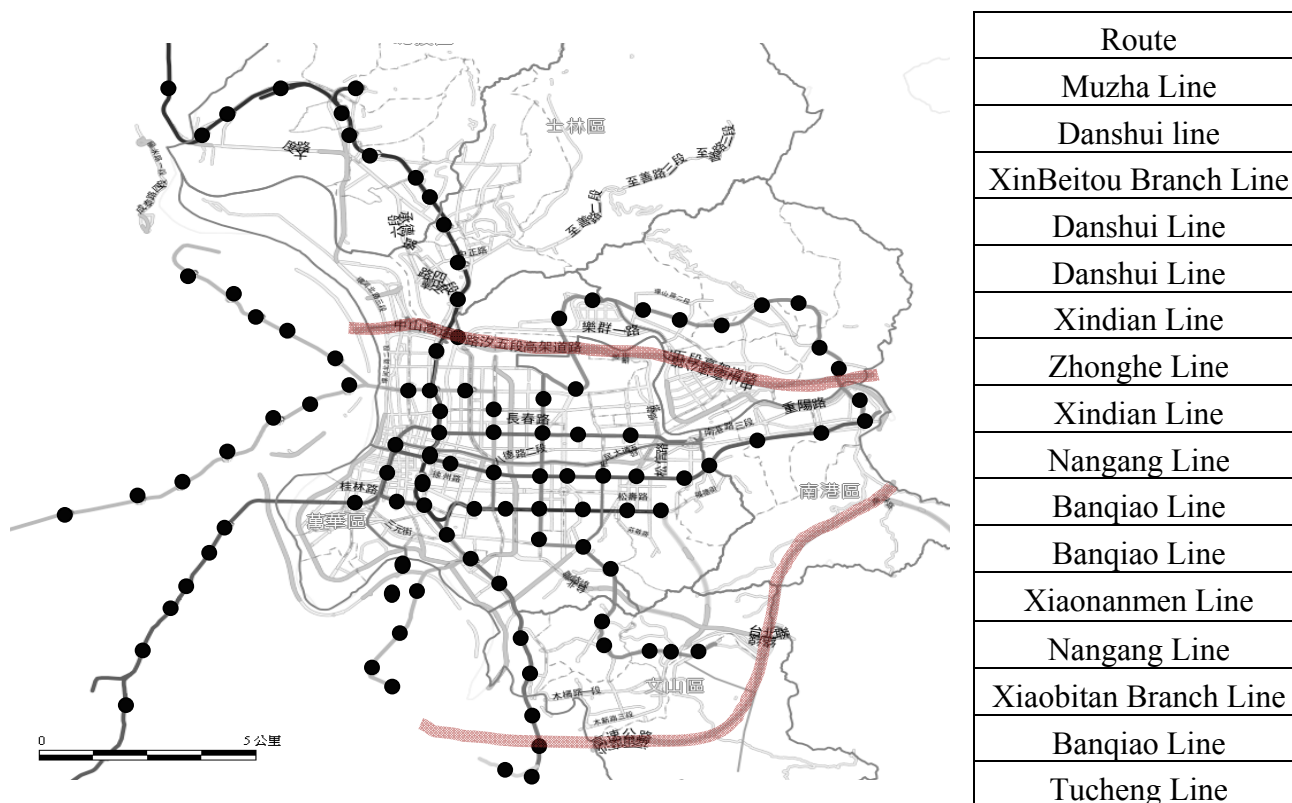


However, the inter-linkage within the metropolitan proper should be carefully examined. As Gottmann would have described in the “city-systems”, TMA initial three administrative areas have gradually merged thru the urban landscape extension of the transportation and other urban infrastructures are planned or regarded as a whole system with development thru stages. The economic activity and the transportation, commuting, and communication linkages within Megalopolis created the dispersion. In TMA, the dispersion force of the planning of the meshing network of connected



sectors superimposed over a system of rapid transit routes, in radial, circumferential and gridded configuration as several corridors served the multi-nucleated conurbation; the connection with Keelung is served thru rail and highway line (see figure below) has clearly aided the inter-linkage.

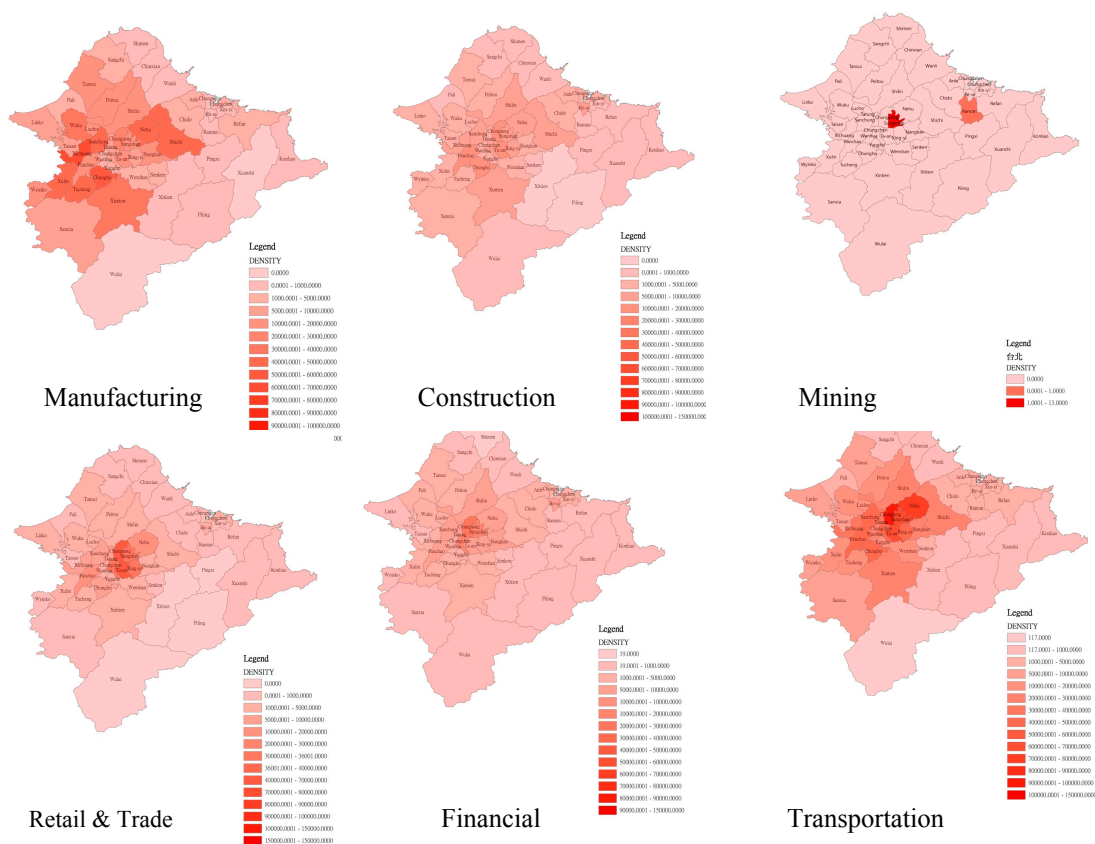
**Figure 5.** TMA Urban MRT Line Distribution Plan (Source: compiled and drawn by this study).



Various studies have empirically investigated the influence of subway systems on urban development, e.g., San Francisco (Cervero and Landis 1997), Los Angeles (Fejarang 1994), Miami (Gatzlaff and Smith 1993), and so on. These investigations have concluded that subway systems significantly influence population, employment, land use, activity distribution, and property prices along subway lines. The implementation of the MRT line changes considerably the linkage and activities concentration along the line itself.

We observe that Taipei attracted most of the service industries to migrate to the center and the labor force also shown a strong increase as well. Since Taipei is the capital city in Taiwan, and along with New Taipei city exhibit an employment increase in 2014, exploits scale economies in production, retailing and public goods. The existence of specialized service sector employment in Taipei city means that the employment structures of the centers appear to have formed a “divergence club” and becoming more unlike each other. Unlike industrial activities, services have few negative externalities and more modest space demands, thus are highly amenable to city centre environments. The international skilled workforce at the centre of these services is attracted to the „buzz“ of city centre life (Storper and Venables, 2004). Below we find the sectoral composition for the 2014 as we see a high centralization of service sector and decentralization of manufacturing sector within the TMA.

**Figure 6.** Taipei Metropolis Sectoral Employment Demarcation (Source: compiled and drawn by this study).



In the figure above a clear demarcation of the core and the growth within the frontier as related to the MRT line distribution. Most notably are the ChunHo and SinChuang districts as the MRT line began the service during 2010. In TMA the frontier or ‘twilight area’s linkage was further aided by the implementation of the rapid rail system thru out and by the rise of service industry convergence in the metropolitan proper. Construction of Taipei MRT is divided into three stages. The first stage (1986-2009) refers to the in-service 92.9-km-long network that currently carries an average of more than 1.32 million daily passenger trips. The second stage (2010-2018) refers to the 87.1-km-long network currently under construction. And the future third stage of construction refers to another 98.3 km of routes. It is expected that with the completion of the system, it will be able to handle an average of 3.6 million passenger trips a day. With the issue of IC smart card since 2002 to provide passengers a more convenient connecting service for rail and rapid transit and well as parking system, is regarded as a potent emulsifier for inter-linkage, since it further enhances the easy intermodal transport and encourages the migration toward to the frontier land. As this cause effect was confirmed thru the relationship between ridership and population density for the BART (Bay Area Rapid Transit System), where an increase 1000 inhabitants per square mile added an average of 8 more rail trips over 1000 residents (Bernick, M., and Cervero, R., 1997).

Taipei city government has updated the zoning ordinance around the MRT station areas to allow more mix uses and reinforce the density coupled with joint development. Today, TMA has ten rail lines are currently in operation, this forms a grid of north-south and east-west routes across the city

core and extending outward into the rapidly-growing frontier, forming a direct inter-linkage, allowing access to and from the core. Within the core, stations are located at 800-1000m intervals, while in the suburbs they are 1-2km apart. Currently, the average daily transport ridership for the rapid rail in the TMA is 2,098,393 trips, in contrast to a mere 42,559 trips in 1996. As of February of this year, ridership hit the 5 billion, averaging a daily ridership of 1.6 million rides. During the recent as the mayoral election in 2014, elected officials called for tighter linkage and network to extend the urban service boundaries thru extensive system of cycle way and bike rental system as well as planning mass rapid services to Keelung. This call received extensive public support since the issue of containment of Keelung city, long regarded as the frontier land of a sort, and was largely passed over by the masses previously, reflecting that the twilight hinterland in Keelung should be connected yet even tighter. Consequently, the natural MRT sprawling effect along with public policy reinforcement created within the TMA creates a deepening uneven growth in the western corridor; this convergence of activities concentrates largely within the TMA. With the introduction of a new high-speed train line (YEH 2007), running thru the north-south axis on the western corridor, placing even more weight on the dependency of TMA as well as expanding the frontier land within the metropolis further toward Taoyuan County. The high-speed railway is a visible form of the flow of technology that expresses the birth of a new spatial form of the metropolitan region<sup>4</sup> emerging in the West Coast of Taiwan (Hsia, H.C. 2000) This promoted the spatial restructuring, creating a push toward the frontier and segregation within the TMA and beyond.

Taipei metropolitan area is seen expanding in two distinct directions - from the eastern edge of Taipei City (Neihu and Nangang districts) toward Xizhi, Keelung and Ruifang, and from the southern edge (Wenshan District) southward toward Xindian. These areas are growing into high density living areas and buildings. The cause effect of this high-density development is due to the population increase rate in these areas and the easy access with the MRT. Additionally, land development is concentrated on remaining vacant land surrounding built districts or where the population density was high. The most prominent is the capital city of Taipei, where no single centrality is identified. The mixed urban activities are not coherent to the city plan. The population density has shown a decrease in growth rate, most notably in the core of Taipei city. One sees the extension of the metropolitan proper southward toward Taoyuan County, while the regional development always faces an important disparity (HOU 2000) between north and south or between east and west.

#### **4. Conclusions**

The ordering principle for a new frontier in Taipei Metropolitan area assumes a mechanism for organizing the patterns of human settlement as well as the economies of production and distribution thru urban inter-linkage and easy access to and from the frontier. Taipei Metropolitan possesses the potential for an inter-linkage, even amidst the uneven geographic growth which accentuates the polar differences of “center” and the “periphery”. The phenomenon of geographic concentration of specific sector and economic activity as well as population convergence in the metropolitan areas implies the underlying characteristic expounded beneath that can be utilized. Taipei Metropolitan exhibits the inter-linkage, even amidst the uneven geographic growth which accentuates the polar differences of “center” and the “periphery”. This is accomplished thru the inter-linkage of the MRT service.

Today, TMA's growth exhibits a loosening core and divergent expansion toward the peripheral area, pushing the core frontier even further. The development of the Nankang Software Park and completion of several MRT lines has aided the easy movement from the core toward the periphery. The metropolitan core of Taipei witnessed a less dynamic growth than the national average, while its peripheral area experienced an increase that is above than the national numbers. Higher densities do facilitate the use of public transport, walking and cycling, making it more efficient to provide services and promote urban vitality. Size and growth rate of urbanization thru the population concentration highlight the presence of an intense redistribution, accentuating the need for inter-linkage in the frontier land of Keelung. Within the Metropolitan area, urbanization continues and extending the core further and strengthening the connection from periphery toward the center of the urban network. Areas such as Suhling, Sinchuang and Tucheng (New Taipei City outer ring) greatly benefited from the MRT access and witnessed a population growth during the past decade. Overall, New Taipei city has become the most active connector while Taipei city is witnessing a slight decrease and Keelung city remains stagnant.

Taipei's urban functions are closely tied to national economic policies. Both local and national factors have played important roles in mediating this transformation. In this process, it is flowing from the local to the global as much as from the global to the local. While the metropolitan area undergoes a significant population sprawl, linked to these phenomena, one observes a demarcation inside the metropolis with population spread from the central part to the peripheral area, thus forming a direct inter-linkage action. The expansion eastward and southward does correlate with the MRT line services in that area and the high-density development encouraged by the public sector thru FAR variance and other economic incentive for development. The issue of convergence of urban services and urban structure within the TMA has had an impact on the local urban network as well as hollowing out certain pockets within the frontier territory, and calling for a concise and more efficient linkage between the three administrative areas of TMA. The political evolution of democratization and associated restructuring in Taiwan's governance are translated into the uneven development and the urban sprawl increases the connection between the different agglomeration and metropolises. This, in turn, expects further response from the public sector to provide the suitable public facilities and services for the changing population structure and density.

While we find a positive relation between clustering and inter-linkage thru network connectors such as the MRT service, the conclusive result in this paper finds a general link between frontier inter-linkage and urbanization, however, it is important to note that not every inter-linkage provision or implementation policy is suited for all locations nor should be assumed that it will indeed push the frontier further. Further detail study should be conducted to see the cause effect of this inter-linkage.

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