

Metropolitan Transformation and Polycentric Structure in Mexico City: Identification of Urban Subcenters, 1989-2005

Adrián Guillermo Aguilar¹

Institute of Geography, Universidad Nacional Autonoma de Mexico

Josefina Hernández Lozano²

Institute of Geography, Universidad Nacional Autonoma de Mexico

Abstract³

The major purpose of this article is to identify urban subcenters that have arisen or continued to exist in Mexico City during the 1989-2005 period. We aim to examine to what extent changes in urban centrality have given way to a more polycentric urban structure.

One of the main conclusions reached is that there has been a clear tendency towards the formation of a multinodal structure of urban subcenters with notable urban employment concentrations. However, that structure is much more marked in the central city and first two metropolitan rings than in the third and fourth ones, where the presence of such nuclei is extremely limited. In the central city, we can see how employment nodes have multiplied, leading to spatial widening of the concentration of activities, while in the first couple of rings what predominates is “concentrated deconcentration” towards larger subcenters and the consolidation of economic corridors.

Keywords: Metropolitan transformation, polycentrism, urban subcenters, Mexico City, urban employment

¹ Ciudad Universitaria, 04510, Mexico D.F., adrian@servidor.unam.mx

² Ciudad Universitaria, 04510, Mexico D.F., mjose.hdez@gmail.com

³ Translated from Spanish, Susan Beth Kapilian, subeka2000@yahoo.com

I. Main Features of Polycentrism or Multinucleation

In general, polycentrism is the process by means of which a city gradually moves away from a spatial structure characterized by the presence of a single center or employment district towards a new one where there are various employment centers with the same or different hierarchical orders (García López 2006:46). These new centers that spring up, which are usually called “urban subcenters,” are territorial units that concentrate very high employment densities and become articulating nodes for the territory by generating trips towards them. So, for example, a commercial subcenter is a territorial unit to which the population is attracted for the purposes of shopping, work, and housing. Nonetheless, high job density in those nuclei may not be a sufficient argument to consider them as subcenters because we expect a subcenter not only to be a concentration but, above all, a reference point for the territory with a marked capacity for structuring it. More often than not, this structuring is expressed through interaction flows generated as of each point, e.g., flows of workers or flows of shoppers (Ruiz-Lineros and Marmolejo Duarte 2008:6). A very important point is that a subcenter influences densities of areas near it because clusters tend to be formed.

Population and employment deconcentration can occur, theoretically, according to two alternate models: disperse and polycentric, each with its own explanatory factors. And thus, in the case of the former, the center loses population and employment due to high land values, a drop in transportation costs, and congestion. As a result, there we find the occupation of peripheral land with fragmented, not very dense settlements. In the case of the latter, the loss of agglomeration economies in central zones is compensated for by a rise in peripheral concentrations or spontaneous or regulated subcenters. Polycentrism or dispersion can exhibit different possible equilibriums depending on the intensity of the centripetal and centrifugal forces coming into play: agglomeration economies, congestion, costs of transporting people and merchandise, land prices, urban planning policies, etc. (García López 2008:55).

One of the most common ways of defining subcenters is to consider employment concentration in small urban units. We can determine the relationship between these jobs and the population, for example, the number of jobs per thousand inhabitants. In

this case, our main problem is to define the cut-off points for a significant number of jobs per unit of land surface. To that end, we can define several different levels: those above the mean, those above the mean plus a standard deviation, and those above the mean plus two standard deviations. As regards the territorial pattern of emerging subcenters, there is really no universal rule. Apparently, agglomeration economies function mainly as a centripetal force curbing employment decentralization. Therefore, we can expect central zones to concentrate the largest number of jobs. If a particular subcenter concentrates a small number of jobs, then it is appropriate to locate it in the periphery, where land is cheaper, although the farther away the subcenter, the lower the number of employees willing to commute to the periphery (García López 2006:50-53).

Thus, in the polycentric model, the number and size of the subcenters is a rather unclear issue. According to previous studies made of several cities, the number of subcenters is very low in some, whereas research on other cities has identified a great number of them. In certain cities, the role played by corridors and small clusters is significant, whereas in others we find many nodes with varying hierarchies (see Aguilar and Alvarado 2004:271-272). And, in general, these multiple centers are not identical, but rather vary in size, accessibility, the nature of their activities, and their shape and appearance. As Waddell et al. (1993:15) have stated, the urban landscape that evolves is “multimodal, multiaxial, and multi-form.”

Lastly, we should point out that although there seems to be an evident, widespread tendency towards deconcentration of population and productive activities throughout the metropolitan space, this generalized dispersion does not necessarily imply that jobs and activities are distributed evenly. As Gordon and Richardson (1996:291) have been wise enough to point out, what appears to be happening over time is that there are increasingly less pronounced peaks to be observed on any three-dimensional employment map and a greater number of larger peaks. This statement does not necessarily imply that agglomeration economies are decreasing, but rather that they are more accessible across a wider range of the urban space.

II. Population and Employment Redistribution in the Mexico City Metropolitan Area, 1990-2005⁴

Recently, there have been two important trends in population growth distribution in the Mexico City Metropolitan Area (MCMA). For one, downtown Mexico City has been depopulated and, secondly, there has been population redistribution towards the urban periphery, with high growth rates. These trends have been accompanied by deconcentration of economic activities towards the urban periphery, which appears to have diminished the economic importance of the MCMA's traditional center and paved the way for the emergence of new urban centralities (Aguilar 2002). Prominent in this process is deindustrialization of the urban economy and marked tertiarization, where the service sector concentrates the highest number of jobs.

Mexico City's traditional center has shown negative resident population growth rates over the past three decades, although since 2000, there seems to be signs of a certain degree of population recovery.⁵ As a matter of fact, the high proportion of inhabitants that have left the central city has contributed to population growth in the periphery where there is urbanization by the poor in the eastern part of the city, in municipalities such as Nezahualcóyotl and Ecatepec, as well as in the Iztapalapa delegation (Paquette and Delaunay 2009:104-105). From 1970 to 1990, population growth rate of the Mexico City's four central delegations was negative, at -2.02%, with the population going from 2.9 million to 1.9 million inhabitants. During the 2000-2005 period, that same rate was also negative, at -0.18%, but with a much lower population decrease of 14 821 inhabitants (see Table 1). In contrast, the central city's employment concentration has been increasing systematically: while in 1989, the number of jobs was 698 327, by the year 2004 that figure experienced a significant increase, reaching 1 146 506 jobs, i.e., an absolute increase of 448 179 jobs (see Table 2). In short, during the 1990-2005 period, the population in the central city grew at a negative rate of

⁴ In our analysis, population growth information refers to the 1990-2005 period because it is based on the corresponding data taken from Mexico's Population Censuses and Population Counts. Employment data is for the 1989-2004 period and has been drawn from the corresponding Economic Censuses.

⁵ In fact, during the 2000-2005 period, two of the four delegations (the Federal District has 16 of these) were already evidencing positive growth rates: the Cuauhtémoc delegation (0.20%) and the Miguel Hidalgo delegation (0.05%).

-0.93%, whereas employment was rising at three times that rate, i.e., 3.40%, thus exhibiting a rapidly increasing concentration (see Table 3).

Particularly during the past decade, the central city has been showing signs of recovery and greater dynamism. Among the principal reasons for this are the following: the application of the “Bando Dos” program which has promoted the construction of housing and commercial developments in the four central delegations and has led to an increase in population density; the implementation of urban revitalization programs in several portions of the historic center or downtown area (*centro historico*), including the construction of new housing; and considerable investment in offices and tourist and commercial activities. All of the above has maintained and stimulated economic concentration in this zone. Contributing to this tendency is wide spatial diffusion of major commercial areas and chains in the entertainment industry, especially movie theaters, in the central zone and in the city’s first and second metropolitan rings (Salazar and Sobrino 2010:608; Duhau and Giglia 2008:471). Thus, the central city has undergone transformation in which the service sector has become predominant, greatly exceeding commercial activity. While in 1989 the service sector accounted for 41.6% of all economic activity in this zone, the commercial sector concentrated 33% of that activity. Yet by 2004, the service sector had enhanced its share to 60.2%, whereas commerce had fallen slightly to 27.7%. Worthy of special note is the Miguel Hidalgo delegation, with the highest employment growth rates (4%), especially in the service sector (6.6%). Clearly, manufacturing has continued to decrease in the central city, shifting its location to more peripheral areas: during this same period, its share (25.4%) was virtually cut in half (12.07%) (see Table 2).

III. Identification of Employment Subcenters: Methodological Concerns

To identify and analyze the evolution of employment’s polycentric structure in the Mexico City Metropolitan Area, we used a double-threshold method that has been applied by Garrocho and Campos (2007). Besides from being simple and clear, this method is considered to be appropriate for comparing the polycentric structure of a single city over time. It defines as employment subcenters all those areas or Basic Geo-

Statistical Areas (hereafter we will use the Spanish acronym, AGEB/AGEBs, which stands for Área Geoestadística Básica) that fulfill the following criteria:

- a) A magnitude of employment (i.e., number of jobs) higher than the mean plus one standard deviation for the city being studied.
- b) Tertiary employment density over the mean for the city being studied.

By doing so, we ensure that the subcenters identified will be atypical values evidencing high employment density and magnitude. The formula for identifying these subcenters is presented below:

$$D_{i, s} > D_{c, s, t}$$
$$M_{i, s} > (E_{c, s, t}) + (STD E_{c, s, t})$$

where:

D = Employment density (jobs per hectare)

i = Basic Geo-Statistical Area (AGEB)

s = Sectoral aggregation

t = Year being analyzed

M = Magnitude of employment (number of jobs)

E = Average magnitude of employment (number of jobs) per AGEB

STD = Standard deviation

For this study, we used the Economic Censuses taken in Mexico in 1989, 1994, 1999, and 2004 by the Instituto Nacional de Estadística y Geografía or INEGI (National Institute of Statistics and Geography, disaggregated to the AGEB level. The data was processed by major sector: commerce, manufacturing, and services.

Hierarchization of subcenters by sector. – After identifying the AGEBs considered as employment subcenters for the four above-mentioned years and separating the data by the three sectors of activity (commerce, manufacturing, and services), the following step was to rank that result for each sector. Our method consisted of differentiating the

AGEBs according to the criteria of one or more standard deviations (STDs) for the variable *magnitude of employment*. This is a straightforward technique enabling us to ascertain the functional specialization of the spatial units into which an area is divided; it is known as the Nelson Index.

The index is based on the properties of the standard deviation as a measure of dispersion to identify those values abnormally above defined thresholds. We used urban AGEBs as a spatial reference unit, first obtaining the average total number of jobs in our three main sectors. Then we calculated the limit values for each STD. The limit values for considering an area as specialized are defined as the mean plus one, two, or three or more STDs. In our study, AGEBs ranking higher than the mean plus one STD for the magnitude of employment in a particular sector are classified as *medium concentration*, while those ranking above the mean plus two STDs, as *high concentration*, and those with three standard deviations or more, as *very high concentration*.

IV. Identification of Urban Subcenters based on Total Employment, by Dominant Economic Sector and Metropolitan Rings, 1989-2004

In this section, we present the results of our statistical analysis to identify the most important subcenters in Mexico City's urban space. The following features were examined: economic sectors predominating in the subcenters identified; level of importance of that group of subcenters; land distribution pattern; and the mix of economic activities concentrated in these centers. This furnishes us with elements for determining the degree to which the city's urban structure is multinodal.

This article draws on a previous study (see Aguilar and Alvarado 2004) which explored the degree to which a polycentric structure could be identified in Mexico City's urban space using employment data from 1989 and 1999. In the study, the authors concluded that until the 1970s, there was clear predominance of a single, important central business district. Nevertheless, in the early twenty-first century, a polycentric structure best described urban employment distribution, although it was very limited in scope. In other words, at that time in the central city and the first metropolitan ring, a multinodal pattern with several important subcenters was detected. Yet, over a wider space, beyond 12 to 15 kilometers, there was a very small number of subcenters.

Rather, we could observe marked dispersion of employment with notable absences of subcenters towards the south and east of the second metropolitan ring and in the more peripheral zones (Aguilar and Alvarado 2004:304-305).

Here, to define “subcenters” our main criterion was the number of jobs in each ABEG, to then be able to pinpoint the largest concentrations that can be distinguished in its surrounding areas. We adopted a *perspective of total employment*, estimating the most significant job concentrations for all AGEBs in the Mexico City Metropolitan Area, taking into account the total number of jobs in the three economic sectors we analyzed (commerce, manufacturing, and services). As a result of our calculations, for example, for the year 1989 we identified 200 AGEBs that represented 6% of the total. In turn, these AGEBs contained 50% of total employment in the MCMA. For the year 2004, we selected 300 AGEBs where 48% of all of the city’s jobs were located (see Table 4). We grouped the selected subcenters⁶ according to the economic sector predominating in each AGEB, as well as to metropolitan rings so as to better identify their specialization and geographic distribution between 1989 and 2004 (see Maps 1, 2, and 3). If we look at the findings by metropolitan ring, we can note the following major features:

1. Central Business District (CBD). – The CBD covers the central city and is the area concentrating the highest percentage of subcenters and, therefore, employment throughout the entire period we studied. Of all the subcenters identified in 1989, the CBD contained 43% of the total number of jobs in those nodes, with 107 AGEBs. By the end of our study period (2004), these figures had risen to 52% of all jobs and 157 AGEBs, i.e., subcenters in the CBD not only did not lose their centrality as regards economic activities, but in addition, evidenced a sustained, significant gain (of over 456 000 jobs) during the period in a greater number of AGEBs (see Table 5). We should point out that the central city holds the most important concentration of employment subcenters in the Mexico City Metropolitan Area, with 52% of all jobs in those nodes in the year 2004.

⁶ When we refer to “urban subcenters,” we are actually speaking about those AGEBs which qualified as having the highest employment concentrations during each year studied.

Worthy of mention concerning the CBD is the presence of the service sector, which completely dominated this area: in 1989, forty-seven percent of those job concentration poles in the central city, with 51 AGEBs, were mostly devoted to services. And, by the year 2004, that proportion had increased to 64%, with 110 AGEBs. In other words, the number of jobs in the service sector skyrocketed by around 320% over a fifteen-year period, while that of all subcenters virtually doubled. Secondly, we observed nodes where the commerce sector was predominant, but their relative share of employment has been decreasing: so, after concentrating 32% of employment in 1989 in 38 AGEBs, by 2004 that share had dropped to 25% of all jobs and 29 AGEBs; however during all the study period, employment increased in absolute terms. This data reveals how the commerce sector has exhibited a greater tendency towards dispersion when compared to the service sector. Lastly, major poles of manufacturing activity clearly showed a decreasing trend in the central city, for their share of employment went from 26% in 1989 to a mere 11% in 2004. This trend can be viewed as “normal” since for several decades now, manufacturing has been moving away from the central city towards more peripheral areas (see Table 5).

If we attempt to identify the spaces that either gained or lost employment concentrations, in the CBD the Benito Juárez and Venustiano Carranza delegations were the ones to experience the greatest gains, with increases of over 60% and 40%, respectively. Within the Benito Juárez delegation, subcenters to enjoy gains were: Galerías Insurgentes, the zone where the World Trade Center is located, Del Valle Chrysler, and Torre Mexicana. In the Venustiano Carranza delegation, we can mention: the area where the Mexico City Airport is located and Magdalena Mixhuca Sports Facility. As regards the subcenters where the number of jobs dropped most significantly, in the former delegation we identified the Ramos Millán neighborhood and Municipio Libre, whereas in the latter, we found La Paloma and Avenida Ignacio Zaragoza (see Table 6).

To sum up, in the central city we discovered a multiplication of employment nodes giving way to a *spatial widening of the concentration of activities*. This, in turn, shaped the largest subcenters and led to the consolidation of economic corridors such as

Insurgentes Avenue and the Paseo de la Reforma, thanks to the contiguity and continuity of AGEBs with high job concentrations.⁷

2. First Metropolitan Ring.- Here we also noted a constant increase in the total number of jobs in the subcenters identified as having experienced a gain of 134 138 jobs throughout our study period. However, we have to admit that the relative share of these nodes in the entire city exhibited a slight drop, going from 38% to 30% during that same period. But even so, subcenters in this ring concentrated 30% of all jobs in the MCMA in 2004. We must stress that the nodes in this ring concentrated a very high number of jobs in the manufacturing sector: in 1989, a total of 254,718 jobs in 46 AGEBs were mainly devoted to manufacturing. By the year 2004, however, there was a drop, with (186 040 ?) jobs recorded in 41 AGEBs. Despite this downward trend, the first metropolitan ring contains the nodes with the highest number of jobs in manufacturing in the entire city. As for the other two sectors, our data showed that commercial activities have been increasing, whereas the service sector has become much more relevant, to the extent that in 2004, the commerce sector was only dominant in 9 subcenters, representing 25% of total employment, while services predominated in 31 subcenters, accounting for 37% of all jobs in this ring.

When trying to pinpoint subcenters that either gained or lost jobs, as we did in the case of the CBD, we can note the following: the Álvaro Obregón delegation stands out as having experienced a gain of 71%, and the subcenters with the highest gains were: Santa Fe and the Barranca del Muerto area. Those losing employment concentrations were the Las Águilas area, Avenida Camino Real a Toluca, and Avenida Laminadora. The delegation evidencing the greatest loss was Gustavo A. Madero, with a 54% drop in employment, and losing subcenters such as: Torres Lindavista, Nueva Industrial Vallejo, and Global Computing, Avenida Urbano Fonseca. Even so, several subcenters in this delegation experienced gains, such as: Parque Lindavista and Martín Carrera (see Table 6). In the Gustavo A. Madero delegation, the largest share of this gain-loss dynamic was to be found in the manufacturing sector.

⁷ In this regard, Salazar and Sobrino (2010:601) have stated that the central city has tended to take the shape of a polycentric structure, not one with scattered subcenters but rather, a widened CBD.

In short, we observed two different trends in this metropolitan ring: on the one hand, we were able to note a proliferation of subcenters, albeit to a much lesser extent in terms of their number than in the central city, with marked dispersion and the presence of the service sector, to a large extent in the southern portion of this ring, on major thoroughfares such as Periférico Sur and Insurgentes, as well as in the Santa Fe district. On the other, large manufacturing poles persisted, especially in the ring's northern portion, in Azcapotzalco and Naucalpan.

3. Second Metropolitan Ring.- This ring is similar to the previous one in terms of employment: concentration in employment nodes has been on the increase, although these subcenters only held 16% of jobs in all nodes identified for the MCMA in 2004. In the subcenters identified for the entire study period, manufacturing predominated according to the number of jobs: in 2004, activities in this sector were most significant in 30 AGEBs with a total of 122 197 jobs, representing nearly 50% of jobs in the nodes included in this ring. Yet manufacturing actually showed a downward trend during this period. Whereas at the beginning of our study period, the service sector ranked third among the poles selected, by the end of this time span those activities ranked second, and were thus more important than those of the commercial sector, which showed greater dispersion in a larger number of subcenters.

As for spaces that experienced either gains or losses, in the first place we can mention the Ecatepec Municipality, which showed a 10% drop during this period, associated particularly with subcenters such as: Kimberly Clark Plant in Ecatepec, Ferrosur La Viga, and Grupo Jumex Vía Morelos. But there are also subcenters that gained in employment: La Costeña Vía Morelos, Plaza Aragón, and Industrial Xalostoc. Especially noteworthy as a space gaining employment was the Tultitlan Municipality, with an increase of 80% and important nuclei gaining jobs such as: Industrial Tultitlan and ProLogis Park. Subcenters that lost jobs included Avenida Industrial and Tultitlan (see Table 6).

So we found a tendency similar to that of the first metropolitan ring, with a scattering of commercial and service activities in a greater number of subcenters, but also an expansion of existing subcenters or areas quite close to them, such as

Ecatepec, Atizapán, and Xochimilco, and relative stability in the number of manufacturing nodes continuing to exist in this metropolitan ring, such as the cases of Cuautitlán and Tlalnepantla.

4. Third Metropolitan Ring.- What is most noticeable in this ring is the small number of subcenters and their low employment concentration in comparison to rings one and two: ring three had only 9 subcenters with 32 488 jobs in 2004, accounting for 2% of all nodes identified in the city. In this period, we observed that manufacturing activities were deconcentrated towards nodes in this ring as of the 1980s. Subsequently, in the 1990s, commercial activity entered some nodes. And by 2004, subcenters evidenced similar figures for both of the above-mentioned sectors. In contrast, there were very few in which the service sector was dominant.

As for spaces that gained jobs, the Cuautitlán Municipality is outstanding, with an increase of 61% in subcenters where the number of jobs rose, such as: Luna Parc Cuautitlán and Leche Alpura en Avenida México-Teoloyucan, while Ford Cuautitlán and Symrise Cuautitlán are some of the nodes that lost jobs. In this metropolitan ring we note, in the first place, a tendency towards deconcentration of manufacturing in the early part of our study period and, later on, deconcentration of the commerce sector, always with limited dispersion of the service sector towards localities in the ring. At the end of this period, new subcenters emerged in the ring's eastern portion, particularly in: Chalco (Plaza Chalco), Chiconcuac, and Texcoco, with a dominance of commerce, as well as in the northern part of the ring, in Tepetzotlán (Industrial Parroquia), where manufacturing was the main economic activity.

4. Fourth Metropolitan Ring.- It is quite clear that in the 1980s and 1990s, this ring did not have subcenters with significant employment concentrations. It was not until the year 2004 that a single subcenter appeared, with mostly manufacturing activities and 5 138 jobs. We are referring to the Tizayuca Industrial Zone in the Tizayuca Municipality. This confirms that although manufacturing is a sector that has tended to decrease in importance throughout the MCMA, as of prior decades it has evidenced a high degree of dispersion towards all of the metropolitan rings in very selected nodes.

5. Summing Up the Main Trends.- We found that inside the different delegations and municipalities of the MCMA, there is a complex mix of gains and losses of the number of jobs in the three economic sectors at different points in time. Based on the above-mentioned examples, we noted, in general, frequent employment gains in the service sector in the central city and first metropolitan ring; gains in jobs in commerce in all of the rings except number four; and a mix of gains and losses of jobs in manufacturing from the first to the fourth ring, in distinct subcenters.

We should underline the decisive role played by the city's main roads and highways for the location of the major urban subcenters we discussed above. For instance, looking at Map 2 we can clearly see how several of the principal employment agglomerations are to be found on certain stretches and in well-identified nodes of the most familiar of these roads. That is true of the following: inside the second metropolitan ring and towards its northern portion, the exit to the highway to Querétaro; towards the northeast, the México-Pachuca Highway, from the zone of Tlalnepantla and Ecatepec going towards Tecámac and, to a lesser extent, the Vía López Portillo and the highway to Atizapán de Zaragoza. In ring four and towards the far east, nodes start to become prominent along the Texcoco-Acolman highway and the exit of the highway to Puebla in the area of Chalco. Inside ring one, we cannot fail to mention the Periférico in several stretches of the northern and southern parts of the ring; in the northern zone, Avenida Vallejo and Avenida Ceylán; towards the northeast, portions of the Calzada Misterios and Avenida Eduardo Molina; in the zone of Santa Fe in its connection with Lomas Altas and Interlomas; Avenida Insurgentes, of course, in several different stretches, and Viaducto Tlalpan towards the southern portion of the ring. Outstanding in the CBD are Paseo de la Reforma, Avenida Insurgentes, and Avenida Universidad. In Map 2 we can also confirm how the centrality of the CBD has been shifting towards the east and south of the MCMA with subcenters that have widened in those directions.

To confirm the trends we have attempted to outline in the above analysis, it would be interesting to discuss employment within the city that is not included in the subcenters we have been describing, i.e., jobs in the rest of the MCMA. In Table 7, we present this data by economic sector, comparing it throughout the 1989-2004 period. We found that in the rest of the MCMA, the number of jobs increased in both the

commerce and service sectors to a rather similar degree (a bit more than 350 000 jobs), but their spatial patterns were different. So, for its part, commercial activity increased its percentage of employment –which indicates a marked trend towards territorial dispersion in all of the rest of the metropolitan area and outside the largest concentrations, i.e., the subcenters identified above. However, the service sector exhibited just the opposite tendency, whereby its percentage dropped in the rest of the city during our study period, a sign of its strong tendency towards concentration, especially in the subcenters we have identified and analyzed. Lastly, the percentage of jobs in manufacturing in the rest of the MCMA, as was the case of the commerce sector, increased. Nonetheless, the rise in the number of jobs for this sector during the study period was very small (a little more than 70 000). For that reason, we noted a trend towards “concentrated dispersion,” that is to say, these jobs are scattered, but in a reduced number of nodes.

V. Conclusions

Evidently, in the past twenty years there has been a widespread tendency towards deconcentration of population and productive activities in the Mexico City Metropolitan Area, but this dispersion pattern has not involved an even distribution of employment and economic sectors. We have observed a clear trend towards the evolution of a polycentric structure of urban subcenters with marked employment concentrations. However, that structure is much more noticeable in the CBD and in the first two metropolitan rings than in the third and fourth ones, where the presence of nuclei of that type is very limited.

We should stress that in Mexico City, the location of employment in the traditional central business district is still very significant and has been increasing. That statement applies, above all, to financial, commercial, and service activities. Our analysis has shown how during our study period (1990-2005), population in the CBD grew at a negative rate of close to -1.0%, while employment rose at a rate triple that, i.e., 3.4%, evidencing a rapid pace of concentration.

Given this deconcentration of economic activities, we have confirmed processes typical of the MCMA described in prior studies: deindustrialization of the urban economy

and a predominance of tertiarization, whereby the service sector has the highest number of jobs; at the end of this period, manufacturing was ranking third in terms of the percentage of jobs and the service sector dominated the CBD and first metropolitan ring, while commerce became the leading sector in rings two to four. We found clear evidence that commerce has tended more towards spatial dispersion than services, which have been slightly more concentrated in the CBD and first two rings, while manufacturing is mostly located in peripheral zones.

According to our estimation of major job concentrations for all AGEBs in the MCMA, taking into account total employment in the three economic sectors (commerce, services, and manufacturing), we identified the following urban subcenters: 200 AGEBs in 1989, representing 6% of the total and containing 50% of all jobs in the MCMA; and, in 2004, we found 300 AGEBs concentrating 48% of all job positions in the city. From our analysis of these subcenters, we can conclude the following: the CBD not only has not lost centrality in terms of the presence of economic activities, but has actually exhibited sustained, significant gains in the number of jobs during our study period. Moreover, it is the location with the largest concentration of employment subcenters in the entire Mexico City Metropolitan Area, with a little over 50%.

Therefore, in the CBD we can see a multiplication of employment nodes giving way to *spatial widening of the concentration of activities*, which shapes larger subcenters and helps consolidate economic corridors according to the contiguity and continuity of AGEBs with high employment concentrations. As a result, concentration has been shifting towards the eastern and southern parts of the city.

Subcenters in rings one and two have the highest employment concentrations among all of the city's subcenters, with 46% of the total. In both rings we find a proliferation of subcenters, as well as the highest concentrations of nuclei mostly engaged in manufacturing, the number of which remain constant. That is not true of service subcenters. They have multiplied according to a more concentrated pattern than commercial nuclei which, in turn, tend more towards dispersion. Particularly noteworthy is the fact that in ring two, there are a rather limited number of new subcenters. What we have found there is expansion of existing subcenters or the rise of several new ones, but

quite close to the locations of previous subcenters, and so this involves a tendency towards consolidation of earlier concentrations.

In metropolitan rings three and four, we noted a small number of subcenters –and, with that, a limited capacity for attracting jobs. Even so, the emergence of the first significant subcenters in the city’s northern and eastern zones has been observed in very densely populated, poor, recently urbanized areas, such as Chalco, Texcoco, and Chiconcuac.

Thus, clearly the CBD has enhanced its position as regards employment concentration, but there has also been a shift of activities away from the center, following in general a pattern of “concentrated deconcentration” that is much more widespread than in rings one and two, and very limited in rings three and four. Therefore, dispersion is not the rule. Deconcentration is much more evident in the manufacturing and commercial sectors, and much less so in services which, other than in the first two rings, has shown a limited tendency towards territorial dispersion. Each of these sectors of productive activity requires different kinds of agglomeration economies: hence their behavior is very uneven. Large agglomeration economies are working well in central areas for advanced corporate services, whereas other types of agglomeration economies retain their appeal in traditional industrial zones, for example, in the north of the city, where gains and losses are frequent. For their part, the commercial and service sectors with suburban offices employing less skilled workers appear to depend upon more modest agglomeration economies present in different locations throughout the city, which accounts for their more disperse distribution.

Therefore Mexico City is an example of a megacity which has evolved from a monocentric form towards a very limited polycentric structure. Accelerated growth of housing developments in its periphery has not been accompanied by significant employment concentrations that could constitute prominent urban subcenters comprising a more integrated whole. The dynamic of globalization and the shift in economic activities favoring services have intensified a “concentrated deconcentration” pattern just outside the central city, but not beyond that area.

VI. Bibliography

Aguilar, A. G. (2002), "Las megaciudades y las periferias expandidas. Ampliando el concepto en Ciudad de México", *EURE* 28(85):121-149.

Aguilar, A. G. and C. Alvarado (2004), "La reestructuración del espacio urbano de la Ciudad de México. ¿Hacia la metrópoli multinodal?", in: A. G. Aguilar (coord.), *Procesos metropolitanos y grandes ciudades. Dinámicas recientes en México y otros países*, H. Cámara de Diputados LIX Legislatura/UNAM/CONACYT/Miguel Ángel Porrúa, Mexico City, pp. 265-307.

Duhau, E. and A. Giglia (2008), *Las reglas del desorden: Habitar la metrópoli*, Universidad Autónoma Metropolitana (UAM-Azcapotzalco)/Siglo XXI Editores, Mexico,

García-López, M. A. (2006), *Estructura espacial del empleo y economías de aglomeración: El caso de la industria en la Región Metropolitana de Barcelona*, Universitat Autònoma de Barcelona, Departamento de Economía Aplicada, doctoral dissertation.

García-López, M. A. (2008), "Quince años de suburbanización en la Barcelona Metropolitana, ¿se está dispersando la población?", *Investigaciones Económicas* 32(001):53-86.

García-López, M. A. and I. Muñoz-Olivera (2007), "¿Policentrismo o dispersión? Una aproximación desde la nueva economía urbana. *Investigaciones Regionales* 11:25-43.

Garrocho, C. and J. Campos (2007), "Dinámica de la estructura policéntrica del empleo terciario en el Área Metropolitana de Toluca, 1994-2004", *Papeles de Población* 052:110-135.

Gordon, P. and H. W. Richardson (1996), "Beyond policentricity: The dispersed metropolis, Los Angeles, 1970-1990," *Journal of the American Planning Association* 62(3):289-295.

Paquette, C. and D. Delaunay (2009), "Movilidad residencial y política de redensificación: El área central de la Ciudad de México", *EURE* 35(105):95-112.

Ruiz-Lineros, M. and C. Marmolejo-Duarte (2008), "Hacia una metodología para la detección de subcentros comerciales: Un análisis para Barcelona y su Área Metropolitana", *XXXIV Reunión de Estudios Regionales, Política Regional Europea y su Incidencia en España. Economía, Sociedad y Medio Ambiente*, Baeza-Jaén, November 27-29, Spain.

Salazar, C. E. and J. Sobrino (2010), "La ciudad central de la Ciudad de México: ¿Espacio de oportunidad laboral para la metrópoli?", *Estudios Demográficos y Urbanos* 25(3):589-623.

Waddell, P., B. J. L. Berry, and I. Hoch (1993), "Housing price gradients: The intersection of space and built form," *Geographical Analysis* 25(1):5-19.