



Acceptable and Unacceptable Growth of Industrial Agglomeration in Urban Environment. Baghdad as Case Study.

Hassan J.Hamem ^a, Sadia K.Hasan ^b

^a Department of Urban Planning Faculty of Physical Planning, Kufa University, IRAQ

^b Department of Urban Planning Faculty of Physical Planning, Kufa University, IRAQ

ABSTRACT

Recent empirical studies of agglomeration economies indicate that economic, social and physical policies are the driving forces affecting spatial distribution of urban environment. Industrial agglomeration is influenced by agglomeration growth and spatial concentration and localization and Physical economics has a strong effect on increasing workers in the manufacturing sector. This paper will be focus in the effect of industrial growth spatially on industrial concentration to determine the trend and size of industrial localization. Census data for industrial employment are used in Location Quotient and Employment Multiplier Analysis. The findings indicate that concentration indicators for two types of industries, basic and non-basic industries in Baghdad are divided in four levels. The first, basic industries are concentrated and recorded an increase in concentration and an acceptable growth in employment. The second, basic industries recorded a decrease in concentration and an acceptable growth employment. The third, non-basic industries recorded an increase in concentration and an acceptable growth in employment. The fourth, non-basic industries are non-concentrated and recorded a decrease in concentration and an unacceptable growth in employment.

Keywords: Agglomeration growth, Industrial concentration, Agglomeration Multiplier, Employment Multiplier

INTRODUCTION

After the urban industrial agglomerations grow and prosper by different economies, these economies in turn attract more organizers to move their industrial activities to settle within the influence areas of agglomeration. The facilities are available, especially, marketing outlets, qualified personnel, transport networks, communications and government administrative services. Accordingly, the urban economies often make the main cities become more suited to settling of industrial agglomerations than the rural and semi-urban (Hoshiar, 2006).



The market size will increase particularly in big cities, and on roads corridors which characterized by high movement densities. So with the typical production companies will try to balance between high wages and high rents by moving out of the city to the suburbs. In spite of the decrease in net revenues due to spatial competition in big cities, we continue to see high levels of industrialization in the major cities. There is main reason for this. There is a great disparity in the spatial distribution of infrastructure especially the road network linking city areas (Somik, et al., 2004). But the growing congestion and intense competition on urban services created internal forces formed a strong deterrent against industrial concentration in large cities. In fact, the forces of the localization and urbanization if work without arousing countervailing forces, the spatial concentration of industries will tend to increase without any hope to stop (Yukichi and Keijiro, 2000).

Metropolitan cities are extensive labor market with diverse skills, and this is one of the features that encourage industrial agglomeration in the urban environment. Companies often use many kinds of skilled and unskilled labor, and therefor may find work areas in the city center or the suburbs, and this work areas appear because of the low cost of travel and the diversity and the heterogeneity in skills. This diversity and concentration at work in the suburbs of the city, gives companies an advantage, it will benefit from the competition in the labor market by reducing wages (Ryosuke, 2007). So, heterogeneity works for the benefit of companies and it is working as a force attracting centralized (Fujita and Krugman, 1995). The impact of the agglomeration economies and localization economies on productivity at the long-term, will appear on productivity growth in denser areas firstly, due to improved production efficiency. Moreover, any area has more innovation will expand gradually outside of city center, toward the suburbs. This is because the effects of congestion is working as a force against agglomeration economies (Eiji and Inyong, 2007).

As the urban industrial agglomeration has advantages also there are disadvantages, diseconomies such as wages, rents, and the cost of congestion, pollution. There is no doubt, the wage difference affects economic development, and it is also the main reason for the movement of labor to suburbia, it happened because the competition on land use in the city center is too much high, which in turn cause an increase in land rents (Ludwig and Neer, 2008).



Greenfield factories prefer localized mostly near the large markets, because there is a positive relationship between amount of production and population in work-age, the workers ages in this area. The company will locate for new factories, the location which will get high profit, taking into account any financial benefits and gains in region, and even an expected to get it in future, the selection will focus on the site near the similar factories. Areas with diverse activities are attracting companies more than the specialized areas, companies will be sure from benefit in regions where agglomeration economies is high (Michael et al., 2007).

Population intensities are unhomogeneous spatially, so it is highest in urban areas and it is lowest in rural regions and also the demand, returns of potential selling are differing in markets, from a place to other (Richardson, 1969). Information about the future of the population in any region remain incomplete unless we know accurately, what will be the local economic activity for these populations in future (Klosterman, 199٠). There is no doubt of information about the population and the current domestic economic activity, will lead to make a better economic future for this area, especially local employment estimate, in industry sector.

The continued growth of the industrial agglomeration somewhere will lead to industrial concentration in this place, and both will be a general phenomenon has a strong impact on economic policy-makers, to encourage investment in poor regions and reduce the regional disparity through a more equitable economic policies spatially (Martin, 1999). This is because the regions which have more diverse economy, surely they have more attractive than specialized regions, this diversity will encourage companies to get site in agglomeration areas, as long as it maximizes profits (Michael et al, 2007). If the local economy is strong, it means there is forecasting of new jobs in future. The main question, how the agglomeration growth and spatial concentration help local economy to create new jobs in future? So, the research work focuses to study and analysis the positive directions of agglomeration growth and spatial concentration in Baghdad. Depending on location quotient analysis and employment multiplier analysis. Using location quotient to identify the most concentration industries and to estimate basic employment industries, then using employment multiplier analysis to predict change in total employment as a result to agglomeration growth and spatial concentration.



METHODOLOGY

LOCATION QUOTIENTS ANALYSIS

Location Quotient, most indicators are used in the analysis of the spatial structure of the industry, especially in the calculation and assessment of the relative specialization of the region in a particular industry, and the calculation of the viability of this specialization for long or short period. Therefore, the data must be provide through time series for some economic indicators such as employment, wages, added value, production,... etc. Must provide data on these indicators at the regional and national level for each industrial branch, most researchers prefer to rely on employment indicator, workers (Gekham, 1961). And for ease of access to or availability it in the official census of work. Some believe that the use of added value is best for it contains all the factors of production as a total value (Hamem, 1990).

Location Quotient is used to measure the industrial concentration for any industry spatially, by dividing an employment ratio this industry in region upon an employment ratio of the same industry in the country. Location quotient also is used to measure the strength of industrial concentration, comparing with the national average, then to diagnosis the size and trend of concentration for any industry between two periods. When LQ is equal to 1 or more than 1, that means, this industry is concentrated in this region. While, if LQ is less than 1, that means, this industry is not concentrated in this region or in this city. More specifically, industries which score LQ more than 1 such as 1.25, they have strong regional advantage. They can export the production surplus to the another regions. Specifically, industries which score LQ more than 1 such as 1.25, they have strong regional advantage.

They can export the production surplus to the another regions. While, the industries which score LQ less than 1 such as 0.75, that means, the industrialists have not regional advantage. Moreover, there are deficit must import from the another regions. The first which have LQ more than 1, they sate the regional need and create surplus for exporting. While, the second which have LQ less than 1, they cannot sate the regional need, so, the region depends on importing from the another regions to fill deficit.

Location Quotient (LQ) considers a famous tool and important tool to determine a spatial appropriate for any activity, so we can say that the site is appropriate or inappropriate for this activity, depending on the value of the site coefficient (Location Quotient). It has been



used extensively in the analysis of the site and regional development, and on this basis it calculates the site coefficient (LQ) for each industrial activity, (Izard, 1960). Through the site coefficient (LQ) can distinguish between basic industries and non-basic in the urban environment, and below are some mathematical formulas to calculate the coefficient of the location for exports and imports.

Mathematical formula for Location Quotients (LQ)

$$\text{Location Quotients } LQ = \frac{X}{Y} \dots\dots\dots 1$$

X = percentage of activity in region.

Y = percentage of total activity in country

For example , employment in the food industries

$$\text{Location Quotients } LQ = \frac{\frac{E_{ir}}{\sum E_{ir}}}{\frac{E_{in}}{\sum E_{in}}} \dots\dots\dots 2$$

E: employment, i: food industries, r: region, n: country

E_{ir} = employment in the food industries in region

$\sum E_{ir}$ = industrial employment in the region

E_{in} = employment in the food industries in country

$\sum E_{in}$ = industrial employment in country

EMPLOYMENT MULTIPLIER ANALYSIS

To find employment multiplier rely on the theory of economic base as follow:

Basic Industry : An activity that creates surplus in goods and services for export outside the region or the site coefficient (LQ) was bigger than the one

Non-basic Industry : An activity that does not create a surplus in the goods and services for export outside the region or the site coefficient (LQ) was less than one

Multiplier = the total employment (basic and non-basic employment) divide basic employment in the region.



Over time and due to the multiplier effect, the region can increase the basic employment, which in turn will generate a total increase in total employment, which in turn will revive the regional economy (Avrom, 1991).

Multiplier = Total Employment / Basic Employment

(Basic Employment) Multiplier = Total Employment

Therefore, any change in the basic employment will generate change in total employment

Using Location Quotients to Estimate Basic Employment

When LQ equal one, that means the region does not have a surplus for export, production in region is just to satisfy domestic consumption

When LQ equal more than one, that means, production in region is satisfy domestic consumption and there is a surplus for export, this activity or industry considers a basic activity.

When LQ equal less than one, that means, production in region does not satisfy domestic consumption and there is not a surplus for export, this activity or industry considers a non-basic activity. The location quotient equation can be used to estimate basic and non-basic employment.

$$(e_{ir} / \sum e_{ir}) / (E_{ir} / \sum E_{ir}) = 1.0 \dots\dots\dots 3$$

$$(e_{ir} / \sum e_{ir}) = (E_{ir} / \sum E_{ir}) \dots\dots\dots 4$$

$$e_{ir} = (E_{ir} / \sum E_{ir}) * \sum e \dots\dots\dots 5$$

Where e_{ir} in this equation is non-basic employment and basic employment is actual minus non-basic employment (Avrom, 1991)

Agglomeration Multiplier as an Employment Multiplier

There are three mathematical formulas about employment multiplier is presented in economics base theory. The golden rule in the economic base theory, that the non-basic labor generated by the change in the basic labor, and this is what means multiplier effect.



Total Employment= Basic Employment + Non-basic Employment

$$T = B + N \dots\dots\dots 6$$

Multiplier Effect = Non-basic Employment generated (by Basic employment)

ME = Non-basic Employment generated (by Basic employment)

OR:

Basic employment multiplied by Non-basic employment per basic employee

OR:

Basic Employment x Multiplier minus Basic Employment

OR:

Basic Employment (Multiplier - 1)

The first formula of multiplier

$$T = B + N \dots\dots\dots 6$$

$$\text{Multiplier 1} = T/B \dots\dots\dots 7$$

(Multiplier: Total employment generated per basic employee)

The second formula of multiplier

$$\text{Multiplier 2} = 1/ 1- (N/T) \dots\dots\dots 8$$

The denominator: leak coefficient (large coefficient, small multiplier)

N / T = retention coefficient (large coefficient, large multiplier). This equivalent coefficient of the propensity to domestic consumption.

The third formula of multiplier

$$T = B + ME \dots\dots\dots 9$$

$$\text{Multiplier 3} = 1+ (N/B) \dots\dots\dots 10$$



In this formula the emphasis is on the N/B ratio and the role of the first formula, namely to isolate and preserve the basic component in the resulting total employment (Thomas Ott, 1999)

Multiplier Effect = $B(N/B)$11

ANALYSIS AND DISCUSSION

To predict the industrial agglomeration growth and spatial concentration for any area, such as Baghdad, there are two reliable methods. Employment Multiplier analysis and Location Quotient analysis. Location Quotient analysis is used to measure the concentration levels of industries in study area and to identify the most concentration industries from others, also to identify between the basic employment and non-basic employment. Employment Multiplier analysis is used to analyze how agglomeration multiplies as employment grows under impact of basic employment in industrial sector, and to predict the concentration directions to multiply industrial agglomeration as a total employment multiplier.

In this study will be using Location Quotients to identify between basic industry and non-basic industry in study area. Moreover, this identifying between basic employment and non-basic employment in industrial activity which help to find agglomeration multiplier as an employment multiplier. Therefore, any industry gets Location Quotients more than one, it considers basic industry and it will create multiplier impacts , agglomeration multiplier as an employment multiplier. While, any industry gets Location Quotients equal one or less than one, it considers non-basic industry and it will not create multiplier impacts on spatial agglomeration and concentration in industrial sector.

So, in this study , depending on previous identifying between basic and non-basic industries, the following industries consider basic industries (the manufacture of food , drinks and tobacco, The manufacture of clothing, leather, yarn and fabric, Manufacture of metal products, machinery and equipment), because their $LQ > 1$. In this case the another industries ,(the manufacture of paper and wood, the manufacture of chemical and oil refining, manufacture of construction materials (cement bricks), other manufactures, consider non-basic industries, because their $LQ = 1$ or < 1 (table 1)

Table.1: Industrial Location Quotient in Baghdad for the Period 2000 – 2010

Industrial categories	2000					2010				
	Iraq	%	Baghdad	%	LQ	Iraq	%	Baghdad	%	LQ
Manufacture of food , drinks and tobacco	46028	17.71	24252	23.5	1.32	41125	15.3	12668	17.1	1.1
Manufacture of clothing, leather, yarn and fabric	46676	17.9	24992	24.2	1.35	35883	13.3	19213	15.2	1.1
Manufacture of paper and wood	20632	7.93	8503	8.2	1.03	19098	7.1	7870	6.2	0.87
Manufacture of Chemical and oil refining	37018	14.2	11036	10.6	0.74	23010	8.5	6859	5.4	0.63
Manufacture of Construction materials(Cement bricks)	37047	14.2	16834	16.5	1.16	30770	11.5	13981	11	0.95
Manufacture of metal products, machinery and equipment	70704	27.2	17011	16.4	0.60	117088	43.5	56341	44.3	1.01
Other manufactures	1750	0.6	633	0.6	1	2237	0.8	898	0.8	1
Σ	259855	100	103261	100		269211	100	126830	100	

Source of employment: Ministry of Planning, industrial census for the period 2000 - 2010

Agglomeration Multiplier as an Employment Multiplier

T10= 126830, B10= 97222, NB10=29608

The first formula of multiplier

$$T=B+N$$

$$\text{Multiplie1}=T/B =126830/97222=1.3$$

The second formula of multiplier

$$M2= 1/[1-(N/T)]$$

$$M2= 1/[1-(29608/126830)]$$

$$M2= 1/[1-0.23]$$



$$M2= 1/[0.77]$$

$$M2= 1.3$$

The third formula of multiplier

$$T = B + ME$$

$$T=97222+ (97222 \times 1.3)$$

$$T= 97222+126389$$

T= 223611 Jobs. New total employment after impact of employment multiplier, or agglomeration multiplier indirectly.

POTENTIAL GROWTH OF AGGLOMERATION

The Potential total growth of employment in industrial sector in Baghdad was %76.3; this is a growth ratio close to the double. This is a strong indicator of the rapid increase of industrial agglomeration in Baghdad. Interestingly, the majority of industries had a growth rate of employment is relatively close to each other and with the overall growth of the industrial sector in Baghdad. If we exclude the other industries that have a growth rate %99.22. The convergence rate of growth of industries with each other and to the overall growth rate of industry sector. This is a strong indicator, it leads to clear reality, that the all industries are under the influence of a strong factor pushes for the growth of the industrial agglomeration, namely the high density of population in Baghdad and the diversity of skills were the main factors to employment growth directly, and in the same time to growth of the industrial agglomeration indirectly for all industrial branches. This confirms the arguments of Ryosuk (2007), metropolitan cities are extensive labor market with diverse skills, and this is one of the features that encourage industrial agglomeration in the urban environment.

POTENTIAL INDUSTRIAL CONCENTRATION

The Potential growth of the industrial agglomeration in the all industrial branches in Baghdad is not sufficient evidence to increase the rates of industrial concentration in all industrial branches. Industries that were already settled and concentrated in Baghdad which recorded employment multiplier and got LQ more than one or equal one are still at the same case, $LQ > 1$ or $LQ = 1$, such as (Manufacture of food , drinks and tobacco, Manufacture of clothing,

leather, yarn and fabric, Manufacture of metal products, machinery and equipment and Other manufactures). While, industries which have $LQ < 1$ are still at the same case, after to calculate employment multiplier, such as (industry of paper and wood, industry of Chemical and oil refining, industry of Construction materials (Cement bricks), (table2).

Table.2: New Share and Potential Growth Under the Impact of Employment Multiplier 2010

Industrial categories	Baghdad	%	New share	Potential growth %	Potential concentration (LQ)
The manufacture of food , drinks and tobacco	12668	17.1	38238	76.47	1.1
The manufacture of clothing, leather, yarn and fabric	19213	15.2	33989	76.90	1.1
The manufacture of paper and wood	7870	6.2	13864	76.16	0.87
The manufacture of Chemical and oil refining	6859	5.4	12075	76.04	0.63
Manufacture of Construction materials(Cement bricks)	13981	11	24597	75.93	0.95
Manufacture of metal products, machinery and equipment	56341	44.3	99059	76.17	1.01
Other manufactures	898	0.8	1789	99.22	1
Σ	126830	100	223611	76.30	

Source of employment: Ministry of Planning, industrial census for the period 2010

This confirms the logical and scientific results to calculate of employment multiplier does not impact the results obtained from the actual data of the concentration .The meaning, there are harmony and conformity in the concentration findings for all industrial branches between the results of the actual data and the expected data. The main result is that the industrial agglomeration will increase rapidly in industries which have high industrial concentration, while the industrial agglomeration will remain fixed in industries which have low industrial concentration or that it will decrease over time in Baghdad.

CONCLUSIONS

Manufacture of food, drinks and tobacco, also manufacture of clothing, leather, yarn and fabric, they have recorded a significant stability and spatial localization . That had come as a



natural result of increasing demand for the huge human mass in Baghdad, because it is a large consumption market for food products, clothing and tobacco. These are the most important reasons for localization and concentration in Baghdad. In other words, the growth of these industries is an acceptable spatially.

Manufacture of metal products, machinery and equipment, they consider major source in compensation for all missed employment in the other industries branches. Therefore, they have recorded positive increase in actual growth of employment. Besides that, they are considered settlement industries spatially. That is very clear example to the industrial concentration and localization in Baghdad. In other words, they have an acceptable growth spatially.

Other manufactures, these include local handicrafts, folk industries such as (The gold jewelry industry, Hand-made carpet industry, Hand-made furniture industry, Manual footwear industry, Local clothing industry). They have recorded stability, settlement and a slight increase in employment. The reasons were, these industries require special skills of workers; they are often family skills or family legacy from skills. Moreover, they consider an acceptable industries spatially or they have an acceptable growth spatially.

Manufacture of paper and wood and manufacture of construction materials (Cement bricks), they have recorded decline in localization and they have not contribution in new jobs. Moreover, many of them have been migrated outside Baghdad because they have been polluted the urban environment. On the other hand, these industries require wide area which it unavailable in Baghdad, because Baghdad area is small relatively. Therefore, they consider an unacceptable industries spatially or they have an unacceptable growth spatially in Baghdad.

Manufacture of Chemical and oil refining, most of these industries are public sector industries, they have recorded decline in localization and they have not contribution in new jobs and they are polluting the urban environment. Despite that, they are still continue agglomerating in Baghdad. They have occupied wide areas near the residential areas, such as Aldorah refinery in Aldorah town, south-west of Baghdad and Altajee refinery in Altajee town, north of Baghdad. Therefore, they consider an unacceptable industries spatially or they have an unacceptable growth spatially in Baghdad.



REFERENCES

- Avrom Bendavid-Val, (1991). Regional and local economic analysis for practitioners. Praeger, New York.
- Fiji Yamamura & Inyong Shin, (2007). Dynamics of agglomeration economies and regional industrial structure: The case of the assembly industry of the Greater Tokyo Region, 1960–2000. *Structural Change and Economic Dynamics*, 18,483-499
- Fujita, M., Krugman, P., 1995. When is the economy monocentric? Von Thünen and Chamberlin Unified. *Regional Science and Urban Economics* 25, 505–528.
- Gekham.V.M. (1961). The Geography of Industry in the United State. *Journal of Industrial Geography* .Vol.11.No.6.
- Hamem.Hassan.J. (1990). Industry Movement Criteria. Master's Thesis in Urban and Regional Planning - Baghdad University, Institute of Urban and Regional Planning.
- Hoshlar.M,(2006). Analysis of Urban and Regional Economic. DARSFA, Amman, Jordan.
- Isard, W. (1960). *Methods of Regional Analysis* . New York: John Wiley & Sons.
- Klosterman, Richard E. 1990. *Community and Analysis Planning Techniques*. Rowmand and Littlefield Publishers, Inc. Savage, Maryland. See Chapters 9-13
- Ludwig Chincarini, Neer Asherie (2008). An analytical model for the formation of economic clusters. *Regional Science and Urban Economics*, 38,252-270
- Martin, Philippe (1999). Public policies, regional inequalities and growth. *Journal of Public Economics* 73 , 85–105
- Mayer, W., and S. Pleeter. (1975). "A Theoretical Justification for the Use of Location Quotients." *Regional Science and Urban Economics* 5: 343-355.
- Michael P. Devereux a, Rachel Griffith b, Helen Simpson (2007). Firm location decisions, regional grants and agglomeration externalities. *Journal of Public Economics*, 91,413-435
- Richardson, H.W,(1969). *Regional Economics*. Weidenfeld and Nicolson, Part A.
- Ryosuke Okamoto,(2007). Location choices of firms and workers in an urban model with heterogeneities in skills and preferences. *Regional Science and Urban Economics* 37, 670–687
- Somik V. Lall, Zmarak Shalizi, Uwe Deichmann(2004). Agglomeration economies and productivity in Indian industry. *Development Economics Journal*, 73,643-673.
- Thomas Ott, (1999). *Economic & Business Geography*. A Learning Web, Gunter Krumme.
- Yukichi Mano and Kejiro Otsuka (2000). Agglomeration Economies and Geographical Concentration of Industries: A Case Study of Manufacturing Sectors in Postwar Japan1. *Journal of the Japanese and International Economies*, 14,189-203