Regional Inequalities and the Urban Industrial Agglomeration:

Case Study Baghdad, Anbar, Diala, Wast and Babylon.

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Abstract

This paper examines the impact of industrial agglomeration in the city of Baghdad, and in particular the trend of regional inequalities rates, between Baghdad and surrounding cities. To determine rates of change in regional inequalities. Is it increasing or decreasing? And to determine of cities that are the inequalities between them and Baghdad more than others. There is more than one method to calculate the regional inequality, but the more popular; Williamson method, namely weighted coefficient of variation (Vw), but the key indicators were Indicators spatial, indicators of industrial activity in study areas only. Are not used general indicators, just like Williamson used. The general trend of the changes was increasing of regional inequalities, but the most prominent of regional inequalities was the largest share of the cities closest to Baghdad.

Keywords: *Regional inequality, Industrial agglomeration*

1. Theoretical and empirical background

There has been considerable interest over the last two decades in examining the location and industrial concentration of agglomeration activity. In most cases, the antecedents of the underlying analytic and empirical work can be traced to the early work in regional science and location theory (Weber,1909; Lo¨sch, 1940;, Hoover,1948 , Hotelling, 1929; and Greenhut, 1975; Isard, 1956). As noted in Krugman (1991), Within assumptions Weber believes that three factors impact the determination of the industrial location, which are the transportation costs and labor cost - regional factors that decide the general pattern of positioning and spatial framework is essential and agglomeration and dispersal forces - domestic factors that decide the degree of dispersal within the overall framework.

There are many studies conduct to assess agglomeration, and the significant impact of urbanization economies on location decisions, in different countries (Michael et al., (2007),Yukichi & Keijiro .(2000). Such as Ludwig study, this study attempted to identify the factors affecting the locational choice of major manufacturing industries for the periods from 1960 to 1995 in Japan by using prefectural employment data,(,2006)low-technology & labor-intensive industries .

These industries - and many others like them - are characterized by a basic locational dynamic that leads persistently to the formation of agglomerations of capital and labor, representing key locales within the wider landscape of production and the impact of transportation costs and barriers to trade on the agglomeration process of manufacturing activity is the main concern of the economic geography literature, Ludwig & Neer ,(2008) ,Pierre & Zeng(2005) , Jeffrey et al., (2005), Fernandez(2008), Michael et al.,(2007), Mary(2005),Michael et al.,(2004), Richard & Paul (2004) he researched in agglomeration forces & tax impact ,Mei Wen(2004), Somik et al.,(2004), Arup (1999), Ryosuke(2007).

Fernadndez(2008) and his new model of sustainable development demands to realize a planning that defines and integrates the different subsystems and influential aspects. The aim of this work is to create a conceptual descriptive model to locate sustainable industrial areas, and the proposed criteria try to plane an industrial area which must be integrated into the urban development and it should take the business opportunities which are generated by the new model of social-environmental-economic development into the Spanish frame.

Researcher Found according to all previous studies above, to identify the factors affecting the locational choice, most or mostly did not come out a lot about the key factors proposed by Townroe (1971), workers - quantity and quality, transport and communications, location and construction, the government assistance, environmental factors, and the infrastructure, but within no more than a simple regulatory and legislative aspects of each country.

There is strong indication that the urbanization economies affected the locational choice (Yukichi & Keijiro ,2000). The majority of the intellectual contributions on the subject of industrial agglomeration and urban development include large urban centers, because the industry already stationed in these locations and secondary activities also trying to develop with the existing industries, in order to take advantage of economies of urban agglomeration, so appears strong association between urbanization and industrialization.

The developing countries after political independence, more factors have impact to increase this problem, fewness of finance resources to industrial development, economical dependency, economical changes & appearance of behaviors such as, Imitation, Demonstration, Conspicuous, all this factors which are pushing more to industrial centralize in the main cities specially in the capitals & ports (Hoshiar,2006) .

The general & exclusive sectors are devoting this regional\spatial imbalance. all development events in developing countries are confirmed this problems, such as exclusive sector prefers the main urban centers which have high locative economics , services, finance, marketing, transport, labor, energy etc.. In Mexico, the demand estimated in capital nearly more than (3-4) times from the total demand in all Mexico cities, (Ibid,2006).Conversely, rural areas do not offer few benefits other industrial plants due to lack of facilities management, transportation, communication and technology, particularly in developing countries, where the countryside is a large reservoir of low-wage workers or the main source of unemployment migrating from the poor rural to large urban centers (Shawkat, 2005).

Especially in Iraq, created the current situation of industrial concentration, many problems in the forefront of rural migration to cities, particularly migration to the capital Baghdad, which became the dream of every rural Iraqis, so over time, increased of Baghdad share of pollution and unemployment, which became in the vanguard, (MPDC, 2008). The statistics of (MPDC) Ministry of Planning and Development Cooperation noted in its annual report for the month of May 2008 that the rate of unemployment among workers aged 15 years and over was 28.1% for both sexes, is the unemployment rate for males 30.2%, while the unemployment rate for females and 26% unemployment rate recorded 30 % In urban areas while 25.4% in rural areas.

Million were registered and 234 thousand jobless people to work until the end of last July, while was operated 234 thousand and 433 jobless people during the same period. Iraqi cities in general are suffering and in particular the city of Baghdad, many of the problems associated with the environment from air pollution and the visual pollution. Industrial activities working on pollution of city air cause that, the Industries and locations near residential areas. Scattered industrial zones in the city and overlapping between industrial and residential land uses, non-use methods of industrial groupings, the result appear as impact on public health of the people.

Concentration of investments in Baghdad, concentration of population .More than six million people are living on an area of 5000Sq km, from 437072Sq km Iraq area, this is Baghdad today (Haidar, 2008). Metropolises Cities have many problems, are including, Housing problem, The problem of transportation & communication, Pollution problem, Low efficiency of basic public utilities, Deficiencies in services and Environmental & social problems, unemployment rates ,(NIP,2007). Because in Baghdad, there are higher industrial concentration, high pollution, high population density, high unemployment rates, in addition, Baghdad smaller territory in terms of area. So the problem in a nutshell, there are sharp regional inequalities among the capital Baghdad and other provinces and in particular the regions surrounding it.

2. Regional inequalities

We extract from a comparative analysis of the regional economy, among developing and developed countries, the regional inequalities in developing countries wider and more severe and deeper, this is evident from the comparative of inequality rates and analyzes the impact of regional variances. That is Identical with what is reached by Williamson **(**1965). This writer has concluded the following:

First, the countries that are less growth and more advanced, are characterized with lowest rates of regional inequalities, comparing with the middle-income countries (income average per-capita from national income). The latter suffers from high rates of regional inequalities relatively.

Secondly, increases of regional inequalities in countries are emerging growth; therefore the country is separating to smaller units.

Third, the prevailing inequalities between different regions within the same region are increasing, when the human resources are moving from poor regions to rich regions.

Fourthly that the factors that helped to widen the gap between different regions, during the early stages of development. These same factors will revert opposite directions, to help reduce the gap to its minimum.

Fifthly, inequality of regional income in the agricultural sector, has been estimated in some developing countries is two and a half than in the industrial sector. While estimated in some developed countries such as Japan twice in the industrial sector at a higher rate than it is in the agricultural sector.

2-1. Regional inequalities in developing countries

It became clearly from the study of truth reasons of regional inequalities in developing countries, these are due to several factors accumulated effects and contributed to this inequality, at two levels, inter and intra levels. To cite the most important factors:

First, the role of colonial foreign investment, since the early days of the economic control of the colonial rich. Investments focused in areas of natural resources and in the capitals and ports, and for the purpose of devoting all available possibilities in the production and export of raw materials necessary for the industries of western and international markets.

Secondly, after political independence, continued stationing of the investments, resources and markets in the metropolitan regions are more sophisticated, for example in Egypt, the industrial concentration in an area of approximately 22 thousand square kilometers, and particularly in Cairo and Alexandria, unlike other provinces which did not reach this industrial concentration(Hoshiar,2006).

Third, Migration of active population from rural areas and small towns to main cities. In some Iraqi villages do not find only two main categories, children, their mothers and the elderly, some young women.

Fourthly, Moving of productive resources from regions are least developed to the regions are more advance, in response to the impact of known as Pietty, which underlines the attraction of resources to areas with more productivity and profitability. The movement of prices, wages and needs stimulation in main regions, increases the movement of resources towards these regions.

2-2. Williamson method

There is more than one method to calculate the regional inequality, but the more popular; Williamson method, namely weighted coefficient of variation *(Vw).* Williamson method depended on the three indicators, manpower, population and individual income from national income or personal income from national income in region and in country, he applied three formulas, the first is weighted, the second is unweighted, the third is Absolute .

When he applied the three formulas below, found that the first formula was more accurate and acceptance, and based on this experience, the researcher is trying in this study to determine the rate of regional inequalities in Iraq, particularly in study area, Baghdad and surrounding provinces. But research is using different indicators because the difficulty of recognizing, in the results of statistical studies of national income accurately. Because the national income in Iraq relies mainly on oil exports and oil exports are stalled because of the economic embargo which imposed on Iraq at the time.

If we assume that we have the data on oil exports. We will face another problem, namely, because the proceeds of Iraqi oil are indivisible at the regional level. This was the situation in Iraq, no one can question on oil revenues. So the researcher amended equation number one *Vw*, so that could be applied on value-added indicators of labor in manufacturing, and replaced this value rather than the average of individual income from national income in country and in region, and replaced the rate of labour

force in the region's to manpower in the country for the same industries rather than rate of the region's population to the country's population.

$$Vw = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}}$$

$$Vuw = \frac{\sqrt{\frac{\sum_i \left(Yi - \overline{Y}\right)^2}{N}}}{\overline{Y}}$$

$$Vmw = \frac{\sum_i \left(Yi - \overline{Y}\right)\frac{Pi}{Pn}}{\overline{Y}}$$

Vw: Weighted variance factor

Vuw: Unweighted variance factor

Vmw: Absolute variance

Yi: Average of individual income from national income in region (i)

$\overline{Y}$: Average of individual income from national income in country

Pi: Population in region (i)

Pn: Population in country

N: Number of regions

Source: Williamson J.G. (Regional Inequality and Process of National Development) in J. Friedman & W.Alnson(1975),*Regional Policy*. MIT. Cambridge.

3. Rates of regional inequalities in the study area

When applying weighted variance factor on statistics data of industrial labour income (added value of labour) and the rate of labour force in the region's to manpower in the country (study area) for the same industries. So the meanings of symbols in *Vw* as follow:

Yi: Average of individual income from industrial labour income in region (i)

$\overline{Y}$: Average of individual income from industrial labour income in country (study area)

Pi: Industrial labor in region (i)

Pn: Industrial labor in country (study area)

N: Number of regions

Table.1 Baghdad, Anbar, Diala, Wast and Babylon.

Private sector (small, mid, large-plants) MPDC 1990

Regions	Yi	$\overline{Y}$	$Yi-\overline{Y}$	$\frac{Pi}{Pn}$	$\left(Yi-\overline{Y}\right)^2$	$\left(Yi-\overline{Y}\right)\frac{Pi}{Pn}$	$\left(Yi-\overline{Y}\right)^2\frac{Pi}{Pn}$
Baghdad	1799	1745	54	0.53	2916	28.62	1545.48
Diala	1726	1745	-19	0.13	361	-2.47	46.93
Anbar	1693	1745	-52	0.11	2704	-5.72	297.44
Babylon	1661	1745	-84	0.15	7056	-12.6	1058.4
Wast	1645	1745	-100	0.07	10000	-7	700
Σ					23037	0.83	3648.25

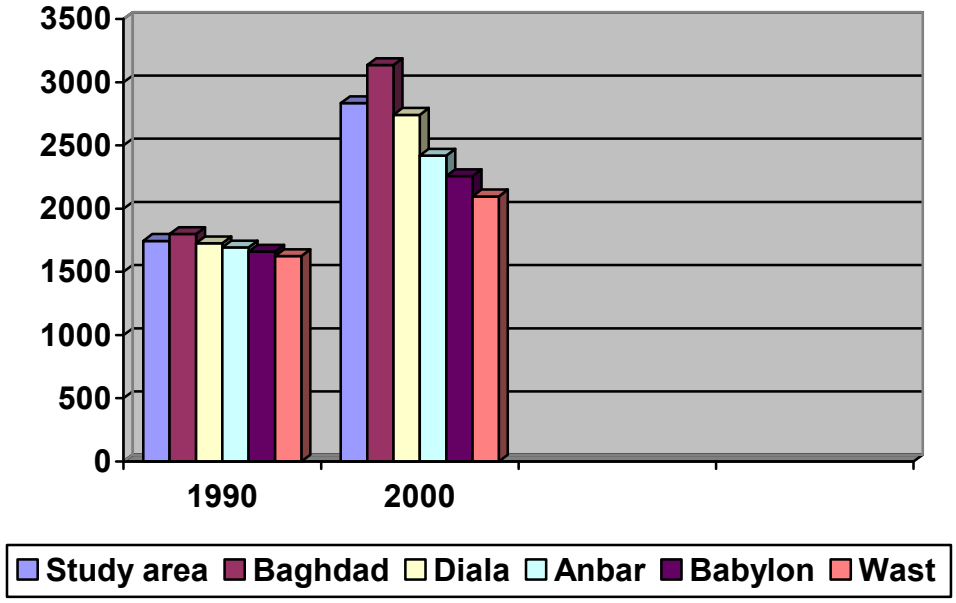

Figure-1 Industrial labour income in (study area)

Table.2 Baghdad, Anbar, Diala, Wast and Babylon.

Private sector (small, mid, large-plants) MPDC 2000

Regions	Yi	$\overline{Y}$	$Yi-\overline{Y}$	$\frac{Pi}{Pn}$	$\left(Yi-\overline{Y}\right)^2$	$\left(Yi-\overline{Y}\right)\frac{Pi}{Pn}$	$\left(Yi-\overline{Y}\right)^2\frac{Pi}{Pn}$
Baghdad	3136	2834	302	0.58	91204	175.16	52898.32
Diala	2742	2834	-92	0.11	8464	-10.12	931.04
Anbar	2419	2834	-415	0.09	172225	-37.35	15500.25
Babylon	2258	2834	-576	0.13	331776	-74.88	43130.88
Wast	2097	2834	-737	0.06	543169	-44.22	32590.14
Σ					1146838	8.59	145050.63

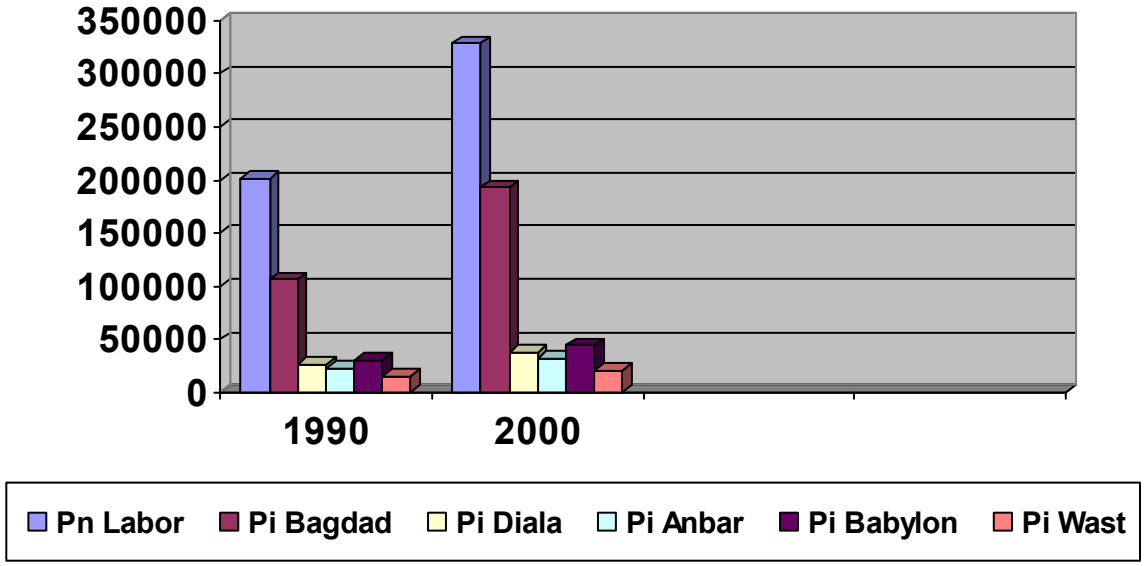

Figure -2 Industrial labor in study area

Study area is composed of five provinces, Baghdad is the capital region, have small area but populated and more densely of industrial activities, then the larger area of Anbar province in Iraq, Diala, then Wast and Babylon. In applying the weighted variance factor, depending on statistics for 1990 and 2000, users three previous symbols above, was the coefficient of regional inequalities in 1990, respectively , *Vw* = 0.034 , *Vuw* = 0.013 , *Vmw* = 0.0004. While was the coefficient of regional inequalities in 2000, respectively, *Vw* = 0.134, Vuw = 0.16, Vmw = 0.003. *Vw*. Equation, number. 1 more accurate and acceptance, so we will rely upon (*Vw)* to calculate and compare regional inequalities during the periods 1990 and 2000.

The inequality factor was equal to (Vw=0.034) in 1990. It was found that inequality has reached (*Vw*=0.134) after ten years in 2000. This (*Vw*) means that the inequality has increased by a large amount to 0.134/0.034=3.94; it means regional inequalities increased four times in 2000 than in 1990. This is a strong indication, it means there are considerable defects in the process of regional planning, that would aggravate the situation unless reconsider everything in the matter of regional balance to track the causes of inequalities problem and to narrowing regional inequalities among regions. When we going back to the figure -3 show (*Vw*) that regional disparities record high and clear in 2000.

It underlines the widening inequality gap, scoring average of industrial income in Baghdad, the highest rate of 3136 dinars even greater than the average of the national income 2834 dinners in 2000 at the same industries, see figure -1 and Table.2. Baghdad also achieved a growth rate of higher wages when a growth rate it reached 74% in 2000.

This is strong motivation for migration of skilled labour and unskilled to Baghdad, which widens the gap of regional inequalities in study area. While the Wast governorate rate of growth in wages amounted to 27% for the same period in 2000 and return to the table 2, note that the wages average are similar relatively in the provinces close proximity around Baghdad , except some minor differences. There is still gap in wages increased in favor of Baghdad, meaning that the wage average in Baghdad more than the wages of other areas in ratio 47%. This, in turn, also emphasizes regional inequalities in study area, see table2 & 3.

Table.3 Coefficient of Variation in Three ways

Period 1990-2000

Vw,Vuw,Vmw / ***years***	***Vw***	***Vuw***	***Vmw***
1990	0.034	0.013	0.0004
2000	0.134	0.168	0.003

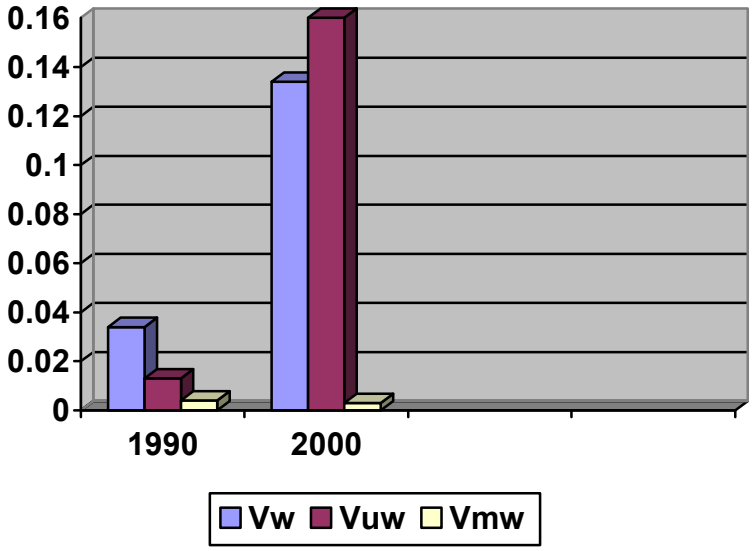

Figure-3 Regional inequality in the study area

3-1. Analysis

The equation *(Vw)* number one is the most accurate and acceptance, so it was used to account for regional variations for the period 1990 and 2000. So as to realize the inequality fact between Baghdad and every province alone, to arrive to the region, who scored highest rate of inequality between it and Baghdad, and thus take into account more than others when put plans in the future to solve this inequality.

Table .4 Trend of changes in Regional Inequalities

period 1990-2000

Vw / ***Years***	***Vw.BD*** Baghdad-Daila	***Vw.BA*** Baghdad-Anhar	***Vw.BB*** Baghdad-Babylon	***Vw.BW*** Baghdad-Wast
1990	0.022	0.024	0.029	0.029
2000	0.081	0.092	0.109	0.103

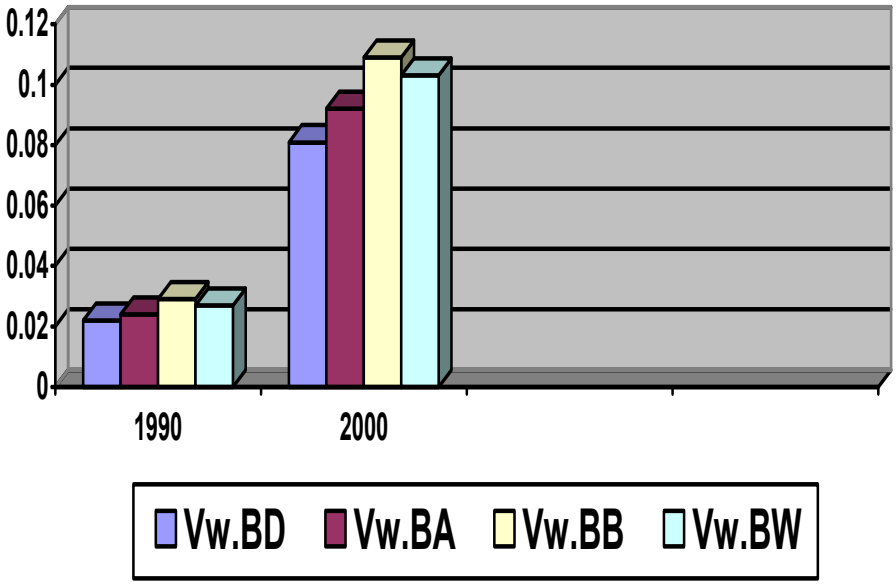

Figure -4 . Regional Inequalities - Central Region of Iraq

In clear beyond any doubt there are large regional inequalities relatively, between Baghdad and the rest of the study regions. So Babylon province registered, which is closest to Baghdad, the biggest inequality factor (0.029) in 1990, then followed the rest of the governorates respectively Wast (0.027), Anbar (0.024) and Diala (0.022), see fig 1 & 2. Baghdad had an impact just like attractive pump, attracting resources and investment.

So the region is the closest, most vulnerable to attracting, it means moving of productive resources from regions are least developed to the regions are more advance, in response to the impact of known as Pietty, which underlines the attraction of resources to areas with more productivity and profitability. The movement of prices, wages and needs stimulation in main regions, increases the movement of resources towards these regions. After ten years in 2000, the rate of regional inequalities were recorded increasingly widening gap between Baghdad and surrounding provinces, so that the direction of regional inequalities remained in the same spatial direction of the impact, but more frequently.

The closest provinces were recorded inequalities rates the largest, respectively, Babylon (0.109), wast (0.103), Anbar (0.092), then Diala (0.081). The continuation of the increasing regional inequalities is foreshadowing to the complex results and costly, now and in future. So indicated that with the continuing widening of regional inequalities, it means the innovation rates will vary between different regions, then less susceptibility and spread of technological transformation and economic development (Brookfield, 1975). This implies deterioration in the flow of human resources, capital, information technology; goods and services, from the regions are more developed into the most underdeveloped regions. See tables 3, 4 and figure 5.

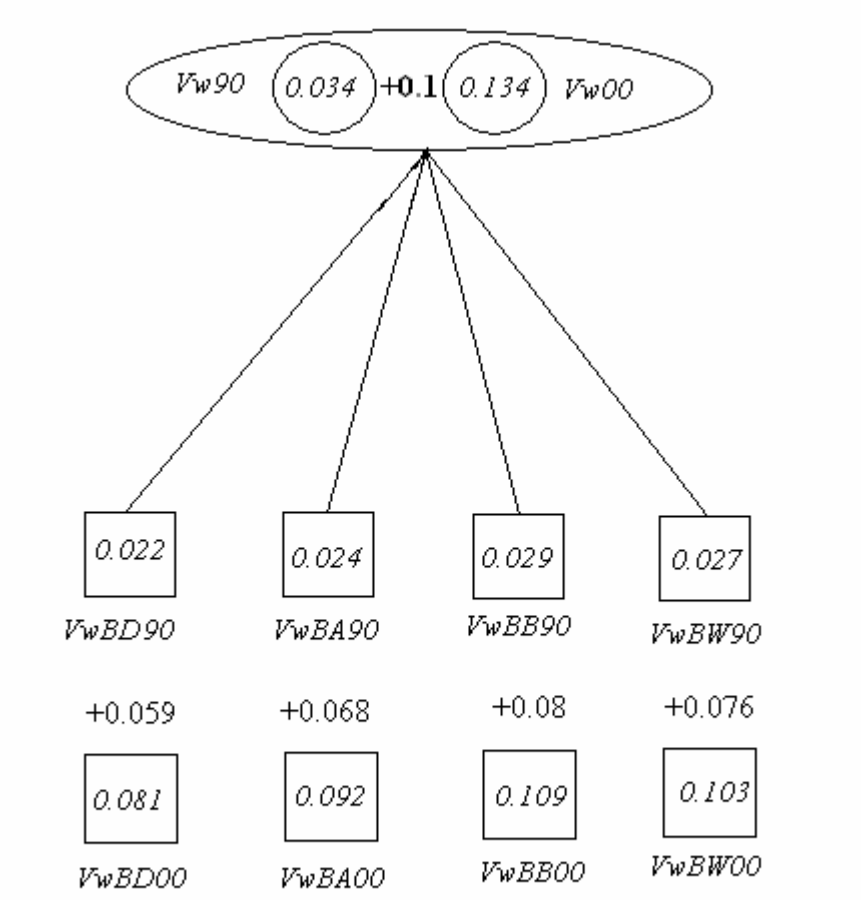

Figure-5.Regional Inequalities - Central Region of Iraq

4. Conclusions

The selection of industrial location is a fundamental decision that determines the future balance of the industrial activity with the environment. For a long time, industrial location selection have only considered the existence of basic infrastructures, proximity to raw materials or markets. This is what it have generated high rates of inequality persist in increasing in the study area for a period of ten years from 1990 to 2000, the regional inequalities doubling four times between Baghdad and closest regions.

Baghdad recorded growth of wages amounted to 74%, while the Wast which is closer to Baghdad recorded growth of wages amounted to 27% for the same period 2000 for the same activities. Meaning that Baghdad is more growth and evolution but the other regions most deflation or low growth rates, and with the continuing of regional inequalities phenomenon, thereby weakening the absorption capacity of the provinces around Baghdad, to absorb the surplus production of Baghdad.

This in turn will increase the difficulties of transition or developmental proliferation, from Baghdad toward these regions spontaneously or without intervention, is resulting to continue in regional inequalities, and even more continue widen. These are what actually happened in the study area, in Baghdad is dominion of centripetal factors at the same time in the other regions is dominion of centrifugal factors.

we need a new model with new location factors (economic, social and environmental)in the industrial location selection and to solve the problems of industrial concentration ,which is the main reason in generating of regional inequalities. This new model with new factors help us to ensure the sustainable development in all regions, which coincides with the reduction of regional inequalities.

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Appendix A. Rates of regional inequalities 1990

$$Vw = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{3648.25}}{1745} = \frac{60.40}{1745} = 0.034$$

$$Vuw = \frac{\sqrt{\frac{\sum_i \left(Yi - \overline{Y}\right)^2}{N}}}{\overline{Y}} = \frac{\sqrt{\frac{2648.25}{5}}}{1745} = \frac{\sqrt{529.65}}{1745} = \frac{23.014}{1745} = 0.013$$

$$Vmw = \frac{\sum_i \left(Yi - \overline{Y}\right) \frac{Pi}{Pn}}{\overline{Y}} = \frac{0.83}{1745} = 0.0004$$

Vw.BD90: between Baghdad & Diala. 1990

$$Vw.BD90 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{1592.41}}{1745} = \frac{39.90}{1745} = 0.022$$

Vw.BA90: between Baghdad & Anbar.1990

$$Vw.BA90 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{1842.92}}{1745} = \frac{42.92}{1745} = 0.024$$

Vw.BB90: between Baghdad & Babylon.1990

$$Vw.BB90 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{2603.88}}{1745} = \frac{51.02}{1745} = 0.029$$

Vw.BW90: between Baghdad & Wast.1990

$$Vw.BW90 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{2245.48}}{1745} = \frac{47.36}{1745} = 0.027$$

Appendix B. Rates of regional inequalities 2000

$$Vw = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{145050.63}}{2834} = \frac{380.85}{2834} = 0.134$$

$$Vuw = \frac{\sqrt{\frac{\sum_i \left(Yi - \overline{Y}\right)^2}{N}}}{\overline{Y}} = \frac{\sqrt{\frac{1146838}{5}}}{2834} = \frac{\sqrt{229367.6}}{2834} = \frac{478.92}{2834} = 0.168$$

$$Vmw = \frac{\sum_i \left(Yi - \overline{Y}\right) \frac{Pi}{Pn}}{\overline{Y}} = \frac{8.59}{2834} = 0.003$$

Vw.BD00: between Baghdad & Diala. 2000

$$Vw.BD00 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{53829.36}}{2834} = \frac{232.01}{2834} = 0.081$$

Vw.BA00: between Baghdad & Anbar. 2000

$$Vw.BA00 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{68398.57}}{2834} = \frac{261.53}{2834} = 0.092$$

Vw.BB00: between Baghdad & Babylon. 2000

$$VwBB00 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{96029.2}}{2834} = \frac{309.88}{2834} = 0.109$$

Vw.BW00: between Baghdad & Wast. 2000

$$Vw.BW00 = \frac{\sqrt{\sum_i \left(Yi - \overline{Y}\right)^2 \frac{Pi}{Pn}}}{\overline{Y}} = \frac{\sqrt{85488.46}}{2834} = \frac{292.38}{2834} = 0.103$$