9th National Convention on Statistics (NCS)
EDSA Shangri-La Hotel
October 4-5, 2004

Location, Shape and Dispersion of BOI-Registered Investments in the Philippines: Implications for Policy

by

David L. Llorito and Joyce Walter O. Palacol

For additional information, please contact:

Author's name:	David L. Llorito
Designation:	Research Head
Agency:	Today Independent Daily News, Inc.
Address:	55 Paseo de Roxas, Makati City
Telephone numbers:	813-1459; 813-1489; 813-0967
E-Mail:	dave_llorito@yahoo.com

Co-author's name:	Joyce Walter O. Palacol
Designation:	Program Officer
Agency:	Episcopal Commission on Indigenous Peoples
Address:	470 General Luna St., Intramuros, Manila
Telephone no:	527-4062
Fax no:	527-4155
E-Mail:	j_palacol@hotmail.com; j_palacol@yahoo.com

Location, Shape and Dispersion of BOI-Registered Investments in the Philippines: Implications for Policy

by
David L. Llorito and Joyce Walter O. Palacol[1]

ABSTRACT

This study was designed to apply centrographic analysis to address a policy issue in the Philippines concerning the location and dispersion of investments registered with the Board of Investments (BOI). Through EO 226, BOI has been giving incentives to attract investments and disperse them to the less developed areas of the country purportedly to generate economic activities and growth in these bypassed areas. Is the use of incentives as a policy instrument achieving the desired economic goal?

Centrographic techniques are statistical tools used to determine the location, dispersion, and shape of observations (Jones 1980). Using these tools, BOI-registered investments were analyzed at various levels of aggregation, namely by periods (i.e., 1987-1989, 1990-1995, and 1996-2001), by sectoral classification, by project size, by market orientation, by nationality or ownership, and by island groups. In general, empirical results show that investments registered with the BOI are indeed manifesting the tendency toward dispersal as manifested by the southward movement of the center of gravity accompanied by the expansion of the average and standard radii.

When analyzed based on sectoral classification, some types of investments have greater tendencies of locating farther and dispersing away from the primate city-region. This is clearly manifested in the case of investments in agriculture, food, and forestry as well as infrastructure, and service-oriented industries. When analyzed on a per island group, however, the centers of gravity of investments have remained within 10-15 kilometers away from the physical centroid of NCR over the 14-year period. Since Luzon garnered 80% of the total BOI-registered investments, the increases in the average and standard radii while the centers of gravity virtually remained in the same place (NCR) points to the continued concentration of investments in the NCR. Overall, BOI-registered investment largely remains to be a Luzon-Metro Manila phenomenon, indicating that the claim of industrial dispersal being generated by EO 226 incentives is not yet a very compelling argument.

Investments incentives are justified in terms of enabling firms to overcome spatial constraints like infrastructure bottlenecks, friction of distance, and policy distortions in locating into bypassed regions. Results indicate that economic factors (e.g., sectoral classification and market orientation) are still the overarching determinants of industrial location, thus rendering investments incentives an inappropriate policy tool for industrial dispersal and regional development. At best, the dispersal assumption of investments incentives appears to be good particularly for industries engaged in agriculture, food, and forestry as well as those in infrastructure and service-oriented industries. This may suggest that there might be some scope for policy makers to restrict the granting of incentives to agriculture, food and forestry as well as infrastructure and services especially in view of the worsening fiscal deficits being experienced by the country.

---

[1] Prepared by David L. Llorito and Joyce Palacol. Mr. Llorito has a masters degree in urban and regional planning from the School of Urban and Regional Planning, University of the Philippines (UP), and has extensive experience in policy research and advocacy on urban, regional, and environmental policy issues. A graduate of both civil and geodetic engineering from UP, Mr. Palacol's has advanced degrees in geographic information system and remote sensing also from the same school.

1. Introduction

The government has been using fiscal incentives as a policy measure to address spatial inequality or uneven development in the country since the late 60s. The use of fiscal incentives, however, has been getting critical reviews from policy analysts.[2] Manasan (1994) summarizes these criticisms in terms of *a)* foregone revenues due to fiscal measures such as tax holidays and duty exemptions given to firms; *b)* the capital bias of investment projects amidst labor abundance; *c)* the tendency of these incentives to reinforce primate city growth; and *d)* its supposed failure to disperse industries beyond the primate metropolitan region.[3]

One of the least explored areas in the debate on fiscal incentives is the question as to how far BOI incentives have catalyzed investments in areas beyond the primate metropolitan region. Manasan (1994) says that the location bias of BOI projects has been toward Metro Manila and its surrounding areas (i.e., Calabarzon). Percent distribution has been used as the basis for this conclusion. Percent distribution, however, provides a static interpretation of investment trends and may mask subtle yet important changes that may have taken place over time. These possible changes might have significant implications that are valuable to policy reform. The following questions for instance have remained unanswered: Where are these private investments located? Do they manifest dispersion or concentration patterns over time? Are there differences or similarities in location and dispersion patterns of investment projects among the three major island groups (Luzon, Visayas, and Mindanao), exporters and non-exporters, among various sectoral groups as well as among locally-oriented firms and export-oriented ones? Does nationality of investors matter in location decisions? What factors or variables explain those location patterns or trends?

II. Methodology

This study employed centrographic analysis to answer these questions. It covered 5,281 investment projects registered with the BOI under EO 226. Data analysis were done according to various levels of aggregation, namely (1) by sectoral classification (e.g., agriculture, food, and forestry; basic industries; consumer manufactures; engineering industries; and infrastructure and service-oriented industries); (2) by size (e.g., small, medium, and large in terms of capitalization); (3) by market orientation (i.e., export-oriented and domestic market

---

[2] See Rosario G. Manasan (1986). *Impact of BOIIncentives on the Rate of Return, Factor Prices and Relative Factor Use: A Comparative Analysis of Incentives under the Omnibus Investments Code of* 1981 *(PD* 1789) *and Investment Incentive Policy Act (BP391).* Makati: Philippine Institute for Development Studies. Staff Paper Series No.86-01. The same author has similar findings in Rosario G Manasan (1990)*. An Assessment of Fiscal Policy in the Philippines,* 1986- 1988. Makati: Philippine Institute for Development Studies. Working Paper Series No.90-06. Another study provides an Asian-wide perspective on the issue in Pernia, Ernesto M. (1993). *Urbanization, Population Distribution, and Economic Development in Asia.* Manila: Asian Development Bank. EDRC Report Series Number 58.

[3] See Rosario G. Manasan (1994). *Breaking Away from the Fisca/Bind: Reforming the Fiscal System.* Makati: Philippine Institute for Development Studies.

oriented); and (4) by ownership nationality (i.e., foreign and locally-owned). Overall trends in location, dispersion, and shape of investments were determined based on three periods, namely Aquino administration (1986-1991), the Ramos administration (1992-1997); and the Estrada-Arroyo administrations (1998-2001).

Centrographic measures are statistical tools needed used to describe three important features of spatial phenomena namely location, dispersion, and shape. Location is summarized as a point—the mean of y and x coordinates—to denote the "center of gravity" of investments. The x and y coordinates of investments could be weighted by a variable, say project cost, to produce the weighted mean center. Dispersion is measured by the standard distance deviation of the xy coordinates from the center of gravity[4]. Standard distance deviation, however, traces a circle and defines the distribution of investments around the center of gravity but does not capture the reality that distributions of spatial variables are usually skewed in a certain direction, a situation called anisotrophy. This problem is addressed by another statistical measure called standard deviational ellipse (SDE).[5] Movements in the center of gravity of investments, the standard distance deviation, and the standard deviation ellipse could be interpreted to mean changes in the location, dispersion, and shape of the variables or observations that could have profound spatial policy implications.

III. Summary of Findings

A. Due to data constraints, computations in this study are unweighted. Overall, the results indicate a gradual southern push of the mean location of investments away from Metro Manila. From 1987 until 1989, the center of gravity was about 102 kilometers south of Metro Manila. By 1990-1995, the center of gravity of investments is on average around 154 km south of Metro Manila. And by 1996 until 2001, the center of gravity of BOI-registered investments moved further southwards to 178 km (Table 1).

B. This movement away of the center of gravity or the mean location of investments from Metro Manila or NCR should not be interpreted to mean that investments are moving away from the primate region. The results indicate that Metro Manila and its spillover areas have remained as the dominant investment destinations. Yet their overall shares have been gradually declining brought about by significant inflows of investments into secondary centers like Cebu,

[4] In simpler terms, standard distance deviation is the standard deviation of each location point of investments from the mean center (x-bar, y-bar) or center of gravity.

[5] Standard deviational ellipse (SDE) could be determined by bivariate distribution and is defined by the following: Bivariate distribution=SQRT[$\sigma^2x+\sigma^2y]/2$. In the computations of SDE, two standard deviations in the x and y directions are orthogonal to each other, defining an ellipse, also called "ellipse of density." To determine the "principal axis" of the ellipse the y-axis is rotated clockwise through the angle, θ, to determine subtle changes in the orientation of the distribution of observations. The ratio of the standard deviation of x-axis over the standard deviations of y-axis orthogonal to each other could represent the Coefficient of Circularity, Z, with limits of 0 and 1, i.e. 0 for completely linear and 1 for completely circular. One could also use the least squares method ($y=m_x+b$) to determine the principal axis.

Negros Occidental, Davao provinces, and South Cotabato. The southeastern movement of the mean location was accompanied, on average, by increases on average and standard radii, indicating the general trend toward dispersion. The shape all throughout is highly elliptical although the trend appears to indicate consistent increases in the standard distances about the principal axis, indicating a relatively gradual scattering away of investments along said axis.

C. When analyzed based on island groups, the results show that the center of gravity of investments in Luzon is within Metro Manila and this pattern has not significantly changed within 14 years. This indicates that despite negative externalities, NCR and its immediate surrounding provinces continue to be important investment destinations. It is apparent that NCR continues to provide strong agglomeration economies to investments. The only the difference, is that over time, the average and standard radii are expanding albeit slowly, indicating a gradual outward spread or dispersion of investments towards the outlying areas of Calabarzon, Bulacan, and Pampanga. Shape is also highly elliptical (Table 2).

D. In the Visayas, the center of gravity of investments has been closing in on Cebu province, indicating the strong influence being exerted by Cebu. While the changes in average radii have been uneven, the standard radii have been generally contracting, indicating the tendency towards concentration of investments in Cebu-Mactan-Mandaue circuit. This trend may signify that Cebu is in the process of consolidating itself as the premier or dominant investment destination in the Visayas. The shape of investments is also highly elliptical (Table 3).

E. In Mindanao, the centers of gravity of investments do not have a clear pattern. Prior to 1990s, it was about 114.9 kilometers north of Davao City; then it moved closer (83 km) to Davao City in the first half of the 1990s and it moved outwards again (102 km) in the second half until 2001. This could be explained by the fact that Mindanao spatial development is not polarized as compared to Cebu or Luzon. Besides Davao City and the Davao provinces, there are other significant investment destinations including General Santos City, Koronadal, Misamis Oriental, Cagayan de Oro City, Iligan City, and Zamboanga City. A significant percentage of these investments are in the AFF sector that is less dependent on the need to locate close to strategic urban centers. When compared to Luzon and the Visayas, investments in Mindanao have significantly bigger average and standard radii, indicating higher dispersal tendencies (Table 4).

F. Nationwide, analytical results based on sectoral groups appear to hue closely to theoretical expectations. The center of gravity of agriculture, food and forestry (AFF) investments is about 380 km away from NCR, the farthest among all sectors. It also has the largest average and standard radii, the largest standard distance about the principal axis, indicating that these

investments are the most dispersed. Investments in consumer manufactures (CM) are 33 km southeast of NCR, the closest among all sectors to the primate city-region. CM investments also have the least average and standard distances or the least dispersed, reflecting their need for getting close to the huge markets offered by NCR. Given the import-dependence of CM, it is no wonder why they need to locate close to NCR where they could have strategic access to sea and airports. Infrastructure and service oriented investments (ISOI) projects also manifested the tendency of locating away from NCR as well as the tendency to disperse widely. This behavior could be due to the pull of remote locations especially for projects in tourism and infrastructure. Engineering industries (EI) projects also tend to behave like CM projects essentially because of its need for highly-skilled, highly-trained human resources that are provided by leading if not primate urban agglomerations. Basic industry (BI) projects' locational behavior reflects its need for strategic ports and airports, which explains why the center of gravity is close to Calabarzon. Despite differences in the mean locations, all sectors have exhibited a southward push. What is also common among these sectors are their highly elliptical shapes (Table 5).

G. In terms of market orientation (Table 6), the results show that the center of gravity of export-oriented companies is closest to the NCR when compared to domestically-oriented ones. It is also the least dispersed. This points to the exporters' needs for urban services like export-import banking, government trade regulatory services, market information, strategic ports and services that in the Philippine context are usually urban-based, airports, among others. This is no surprise because most Philippine cities are port cities that are the legacies of colonial trade. Both categories are highly elliptical.

H. Size does matter a bit in the location and dispersion patterns of investments (Table 7). When compared to medium-sized or larger projects, the mean location of small ones is the closest to NCR and the least dispersed as indicated by its lower average and standard radii. Apparently, having fewer financial resources to overcome friction of distance and other constraints like infrastructure bottlenecks, most of them have to locate closer to urban agglomerations to take advantage of urbanization and localization economies. About 94% of these small investments are export-oriented, indicating their requirements for strategic urban services.

I. There seems to be a view that nationalities of investments, whether foreign or Filipino-owned, have no bearing on the location decisions and dispersal tendencies of these firms. Given the tendency that they are less informed regarding the business environment in various parts of the country, they are likely to take cues from local ones in their location decisions. The results have shown otherwise. The center of gravity of investments by foreign firms is just about 102 southeast of Manila, indicating that these investments are poured largely into large urban agglomerations of NCR, Calabarzon, and Cebu. Its

average and standard distances are also smaller indicating that foreign investments are less dispersal inclinations when compared to local ones. The center of gravity and the standard radii of Filipino-owned or controlled firms are more than double that of foreign investments (Table 8).

IV. Conclusion

When analyzed based on sectoral classification, the results show that some types of investments have greater tendencies of locating farther and dispersing away from the primate city-region, as indicated by the distances of their centers of gravity. This is clearly manifested in the case of investments in agriculture, food, and forestry as well as infrastructure, and service-oriented industries where access to large urban markets is not primordial consideration. This is in sharp contrast to the projects in consumer manufactures and knowledge-intensive projects (i.e., engineering industries) where access to consumers, advanced infrastructures, and skilled human resources are paramount. Nevertheless, when analyzed on a per island group basis, the centers of gravity of investments in Luzon have remained within 10-15 kilometers away from the physical centroid of NCR over the 14-year period. Considering that Luzon garners 80% of the total BOI-registered investments, the increases in the average and standard radii while the centers of gravity virtually remained in the same place (NCR) simply points to the slow deconcentration of investments away from the NCR. The gradual spreading out indicated by increasing average and standard radii is largely due to spillover effects of investments toward immediate surrounding provinces (e.g.. Bulacan, Valenzuela, Batangas, Cavite, Laguna, Rizal). This explains the reason why the average and standard distances of Luzon's investments are significantly smaller than Visayas and Mindanao.

On a nationwide basis, the influence exerted by the Greater Metro Manila area (i.e., NCR, Calabarzon, Bulacan, and Pampanga) as the dominant investment destinations is still strong. Changes in the center of gravity at the national level simply came from the pull exerted by the minor gains of urban centers in the Visayan (particularly Negros Occidental and Cebu) and Mindanao (particularly the Davao provinces, Cagayan de Oro- Misamis Oriental area, and General Santos City-Koronadal area). This indicates that the gains of these dispersal tendencies accrued primarily to a few secondary urban centers in the Visayas and Mindanao. Two generalizations could be formed by these trends. The first is that BOI-registered investments largely remain to be a Luzon-Metro Manila-Calabarzon phenomenon, indicating that the claim of industrial dispersal may not yet be a very compelling argument. And second, the slow dispersal trend simply reflects the tendency for gradual differential urbanization, where concentration in Metro Manila appears to be on the process of being reproduced albeit at a slower pace in a few urban centers in the Visayas and Mindanao.

V. Implications for Policy

This major finding could point to the possible compromise policy on fiscal incentives. The debate on fiscal incentives is currently cast in two opposite poles. On one hand, the increasing fiscal deficit points to the removal of investment incentives as one solution. On the other, policy makers may find it difficult to remove fiscal incentives because of cutthroat competition for foreign investments globally. The results point to the practicality of restricting fiscal incentives to projects that are manifesting rapid dispersal tendencies. These are projects in the agriculture, food, and forestry as well as in infrastructure and service-oriented industries.

For local government units in the NCR and adjacent provinces, the results could mean that there is less sense for them to provide additional incentives of their own as some types of investments like consumer manufactures and engineering industries are naturally attracted to locate in strategic urban areas due several factors including agglomeration economies as well as access to advanced infrastructure facilities, advanced information networks, skilled human resources, and sophisticated financial and business services. In the same manner, some types of industries–like agriculture, food, and forestry and infrastructure–are naturally attracted to growth areas outside the primate city/region.

In the Visayas, this study expects the continued build up of agglomeration economies in Cebu-Mandaue-Mactan areas, serving as a magnet for investments in said area. Cebu's neighbors could benefit by providing complementary industries, services, or functions. One promising aspect that these island provinces could possibly complement Cebu is eco-tourism. Cebu could also serve as a market for their agricultural products. Mindanao could not expect to imitate Metro Manila or Cebu in terms of types of industries to be attracted. Mindanao's future apparently lies with investments in agriculture, food, and forestry as well as infrastructure and services. The primary goal is integrating it with the dynamics of emerging urban centers to accelerate intra-regional trade and island-wide economic interactions while at the same time improving economic linkages with the rest of the country and the world.

Table 1. Centrographic Measures of BOI-Registered Projects: Overall Trend			
Category	**1987-1989**	**1990-1995**	**1996-2001**
1. Number of firms	1257.00	2,607	1417
2. Total Project Costs ('000,000 Pesos)	57,480.86	713,778.07	734,826.51
3. Centrographic Measures			
3.1 Location			
Mean Center (Y-axis)	967.60	926.29	901.18
Mean Center (x- axis)	377.71	402.70	417.04
Distance of Center of Gravity from Manila	102.50	154.00	177.80
3.2 Dispersion			
Averaged distance from Center of Gravity (km)	180.21	239.12	292.24
Standard distance from Center of Gravity (km)	250.93	309.22	345.24
3.3. Shape			
Standard Deviation: Principal Axis (km)	39.43	55.52	65.85
Standard Deviation: Minor Axis (km)	244.00	292.00	322.00
Coefficient of Circularity	0.16	0.19	0.20

Table 2. Centrographic Statistics of BOI-Registered Projects: Luzon, 1987 – 2001			
Category	**Year Clusters**		
	87-89	**90-95**	**96-2001**
1. Number of firms	1052	2052	1055
2. Total Project Costs ('000,000 Pesos)	51,267.89	512,667.71	631,916.04
3. Centrographic Measures			
3.1 Location			
Mean Center (Y-axis)	1,057.56	1,051.15	1,052.26
Mean Center (x- axis)	325.12	326.89	328.47
Distance of Center of Gravity from Manila (km)	2.00	4.64	6.22
3.2 Dispersion			
Averaged distance from Center of Gravity (km)	23.90	42.58	50.57
Standard distance from Center of Gravity(km)	54.85	84.91	97.26
3.3. Shape			
Standard Distance about the Principal Axis (km)	21.78	37.36	41.39
Standard Distance about the Minor Axis (km)	48.00	77.00	88.00
Coefficient of Circularity	0.45	0.49	0.47

Table 3. Centrographic Measures of BOI-Registered Projects: Visayas, 1987 - 2001			
Category	**Year Clusters**		
	87-89	**90-95**	**96-2001**
1. Number of firms	140	327	178
2. Total Project Costs ('000,000 Pesos)	3,688.22	129,985.75	52,194.69
3. Centrographic Measures			
3.1 Location			
Mean Center (Y-axis)	604.39	600.48	611.31
Mean Center (x- axis)	600.10	621.46	623.52
Distance of Center of Gravity from Cebu City	48.00	34.00	36.00
3.2 Dispersion			
Averaged distance from Center of Gravity (km)	70.20	66.36	81.28
Standard distance from Center of Gravity (km)	109.46	81.91	101.83
3.3. Shape			
Standard Distance about the Principal Axis (km)	15.85	23.37	30.33
Standard Distance about Minor Axis (kms)	103.00	79.00	95.00
Coefficient of Circularity	0.15	0.30	0.32

Table 4. Centrographic Measures of BOI-Registered Projects, 1987-2001: Mindanao			
Category	**Year Clusters**		
	87-89	**90-95**	**96-2001**
1. Number of firms	65	228	172
2. Total Project Costs ('000,000 Pesos)	2,524.75	71,124.61	54,576.54
3. Centrographic Measures			
3.1 Location			
Mean Center (Y-axis)	293.92	269.79	267.82
Mean Center (x- axis)	749.88	771.17	751.22
Distance of Center of Gravity to Davao City (km)	106.00	76.00	90.00
3.2 Dispersion			
Averaged distance from Center of Gravity (km)	136.34	122.53	135.72
Standard distance from Center of Gravity (km)	149.00	137.78	149.61
3.3. Shape			
Standard Distance about the Principal Axis (kms)	47.77	52.38	53.30
Standard Distance abMinor About the Minor Axis (kms)	158.00	123.00	123.00
Coefficient of Circularity	0.30	0.43	0.43

Table 5. Centrographic Measures of BOI-Registered Projects by Sector, 1987 – 2001					
Category	Sectoral Classification				
	AFF	BI	CM	EI	ISOI
1. Number of firms	969	781	1,604.000	811	1116
2. Total Project Costs ('000,000 Pesos)	32,978.007	480,421.239	17,982.123	101,888.778	839,497.355
3. Centrographic Measures					
3.1 Location					
3.1.1 Mean Center (Y-axis)	730.434	942.740	1,032.680	1,013.137	883.449
3.1.2 Mean Center (x- axis)	514.462	401.006	340.713	351.869	422.929
3.1.3 Distances of CG from MM centroid	380.00	140.10	32.80	53.80	204.30
3.2 Dispersion					
3.2.1 Averaged radius (kms)	357.092	222.663	73.844	90.086	278.849
3.2.2 Standard radius (kms)	392.196	291.024	139.798	171.826	327.294
3.2.4 Standard - Ave. radius (kms)	35.104	68.361	65.954	81.739	48.444
3.3. Shape					
3.3.3 Standard Distance: Principal Axis (kms)	80.875	52.449	18.811	25.489	74.139
3.3.4 Standard Distance: Minor Axis (kms)	383.767	286.275	138.527	169.925	318.786
3.3.7 Coefficient of Circularity	0.211	0.183	0.136	0.150	0.233

Table 6. Centrographic Measures of BOI-Registered Projects, 1987 - 2001: Locally-Oriented vs. Export-Oriented Firms		
Category	Locally-Oriented	Export-Oriented
1. Number of firms	1,647	3,631
2. Total Project Costs ('000,000 Pesos)	1,302,597.25	203,296.61
3. Centrographic Measures		
3.1 Location		
Mean Center (Y-axis)	843.35	968.59
Mean Center (x- axis)	448.35	378.80
Distance of CG from MM	246.00	102.00
3.2 Dispersion		
Averaged distance (kms)	322.75	175.01
Standard distance (kms)	359.35	258.07
3.3. Shape		
Standard Distance: Principal Axis (kms)	76.64	41.69
Standard Distance: Minor Axis (kms)	350.00	246.00
Coefficient of Circularity	0.22	0.17

Table 7. Centrographic Measures of BOI-Registered Projects, by Size, 1987 - 2001			
	Small (P15 M and below)	**Medium (P15 M - P60 M)**	**Large (P60 M - Above)**
1. Number of firms	2120	1081	1232
2. Total Project Costs ('000,000 Pesos)	11,962.184	34,446.633	1,459,676.623
3. Centrographic Measures			
3.1 Location			
Mean Center (Y-axis)	935.146	886.688	892.059
Mean Center (x- axis)	398.390	428.741	418.212
Distance of CG to MM	144.000	200.000	192.000
3.2 Dispersion			
Averaged distance (kms)	222.372	289.558	278.776
Standard distance (kms)	283.683	343.237	331.021
Standard - Average Distance (kms)	61.311	53.679	52.245
3.3. Shape			
Standard Distance: Principal Axis (kms)	50.419	56.358	73.966
Standard Distance: Minor Axis (kms)	267.000	330.000	324.000
Coefficient of Circularity	0.189	0.171	0.228

Table 8. Centrographic Measures of BOI-Registered Projects, 1987 – 2001 by Nationality/Ownership[1]		
	Foreign Firms	**Local Firms**
1. Number of firms	980	3892
2. Total Project Costs ('000,000 Pesos)	396,148.885	1,026,437.656
3. Centrographic Measures		
3.1 Location		
Mean Center (Y-axis)	972.751	914.090
Mean Center (x- axis)	374.908	409.042
Distance of CG from MM (km)	100.000	166.000
3.2 Dispersion		
Averaged distance (kms)	159.839	256.018
Standard distance (kms)	235.597	316.933
3.3. Shape		
Standard Distance: Principal Axis (kms)	45.480	58.476
Standard Distance: Minor Axis (kms)	173.082	310.000
Coefficient of Circularity	0.263	0.189