Spatio-temporal Changes in Economic Development: A case study of Sindh Province

Razzaq Ahmed[1] and Khalida Mahmood[2,*]

[1]*Department of Geography, Federal Urdu University of Arts Sciences and Technology, Karachi and* [2]*Department of Geography, University of Karachi, Karachi, Pakistan*

Abstract: This study has been conducted at a time when Pakistan is passing through an important phase of economic development and reconstruction. Devolution has become an important aspect of the planning and decision making process. Decentralization is being emphasized by both public and private sectors of development. In such a situation, present study focuses on the evaluation of the past and present patterns of the levels of development in various districts of the province of Sindh. This research will certainly contribute to an understanding of the development patterns in the province.

Key Words: composite index, level of development, ranking, socio-economic inequality, Z-score.

INTRODUCTION

Sindh has experienced considerable urbanization since independence in 1947, which has resulted in the explosive growth of urban centers like Karachi, Hyderabad and Sukkur. The growth of Karachi in particular has been phenomenal. Its exceptional growth as compared to the rest of Sindh, which is basically rural in nature, brings out unique patterns of socio-economic inequality. This pattern of development is so uneven that districts having urban centers represent a high concentration of a number of economic, social and political activities while majority of the districts is generally seen as relatively backward [4 and 20]. This study seeks to examine the existing pattern of development exhibited by the districts of Sindh.

SIGNIFICANCE OF THE STUDY

There has been no conscious effort towards systematic organization of such research structured on Sindh, determining patterns of uneven development in Sindh. It is believed that the insight gained from this study can be of immense help to planners and decision-makers and the exercise will facilitate policy-makers in allocating development resources in districts where the deficiencies are prominent. Comparable studies of this nature are rare in the literature produced in Pakistan. The purpose of this study is to evaluate the districts of Sindh in terms of their level of development and functional quality.

In the past, socio-economic data was used to measure the quality of districts [1, 3, 6 and 8]. Work of this nature on micro-geographic scale, follows the tradition of Thompson J.H. *et al*. 1962; Whitney, 1970 and Zaidi, 1961 [7, 24 and 26].

METHODOLOGICAL FRAMEWORK

To measure the level of development of the districts of Sindh, twelve variables have been employed on thirteen districts of 1981 and sixteen districts of 1998[1]. These variables are non-agricultural labor force, employment in manufacturing, immigration, own farm, cultivated area, population potential, manufacturing value added (rupees per capita), bank branches, doctors, literacy rate and share of urban population in 1981 and 1998. The period of seventeen years covered by these two censuses is not much but an understanding of the level of development of these districts can be had from this period [2, 3 and 18].

The data are derived from various censuses of population and agriculture for the year 1981 and 1998. Provincial development statistics of Sindh and socio-economic indicators at district levels have also been used in this study [10-15].

Ranking of districts was obtained first on the basis of Z-sum, and then ranking was done on the basis of composite score. By averaging the ranking position of each district, in terms of the above scores, its respective co-efficient has been derived. The districts obtaining top ranking co-efficients are visibly those which are significantly urbanized areas with well marked potential of economic activities.

A Z-score (standard score) for any specific value is the number of standard deviation that value is away (above or below) from the mean. Since standard deviation is never negative, positive Z-score indicates an observation is above the mean and negative Z-score shows an observation is below the mean. A Z-score of 0 is equal to a 50% probability of bankruptcy [19 and 25]. A Z-score is unit less, permitting

*Address correspondence to this author at the Department of Geography, University of Karachi, Karachi, Pakistan,
E-mail: kmahmood.ku@gamil.com

[1] Due to the non-availability of data at the district level, Karachi division as a whole has been taken as one unit in both years.

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a comparison of two observations relative to their groups, measured in completely different units. It may be found by calculating the formula.

$$(Z\text{-score})_j = \frac{x_{ij} - \bar{x}_i}{s_i}$$

Where $\bar{x}_i$ refers to the mean value of *i*th indicator, s_i the standard deviation of *i*th indicator and x_{ij} is the value of *i*th indicator in *j*th district.

The composite indicator is then constructed simply by assigning equal weights to all indicators and summing them. The higher the Z-sum the more developed will be the region.

$$(Z\text{-sum}) = \sum_{i=1}^{n} Z_{ij}$$

Where n refers to number of districts and Z_{ij} is the value of the *i*th Z-score of each district.

The composite index has been obtained by arranging variables in terms of the magnitude of each variable [7]. The magnitude of each variable gives each district a rank in terms of the level of development. The greater the number, the lower the rank represents the lower level of development [8 and 23].

DISCUSSION

Sindh is flanked by the Arabian Sea and the Rann of Kutch in the south. It has Punjab in the north, Balochistan in the west and India in the east. The surface configuration of Sindh is simple. There are four major relief elements: Khirthar range and the Sindh Kohistan in the west, the Thar Desert in the east and the Indus valley lying in-between the hills and the desert [21]. Khirthar range marks the boundary between the province of Sindh and Balochistan. The Indus valley has been divided into western and eastern sections by river Indus. The low-lying plains south of Thatta are identified as the old Indus Delta [22].

East of the Indus, there are two limestone ridges. The larger of these extends southward for about 40 miles from Rohri. It consists of nearly horizontal numulitic limestone scarped on the western side at a height of about 200 feet above the plain. The other one, in the south is known as Ganjo Takkar. It is on the northern most hill of this ridge where the city of Hyderabad is located. Ganjo Takkar is flat-topped and scarped on all sides. To the south it rises abruptly to 200 feet above the plain. Some other smaller detached hills occur in the old delta area, significant among which are the Makli Hills and Pir Patho in Thatta district. Isolated hills of granite rising to 1,169 feet above sea level are found on the northern edge of the Rann of Kutch in Nagar Parkar area of the Tharparkar district. They are known as Kalinjhar hills.

River Indus is the most important single feature that dominates the province of Sindh. It enters into Sindh plain near Kashmor, 60 miles south of Mithankot. From Kashmor to the Arabian Sea, the plain stretches over an area of 23,000 square miles and slopes towards the south at an average rate of 3 inches per mile. In this section, the river is so markedly aggrading that its own bed lies above the general level of the plain. Between the twin cities of Sukkur and Rohri, the river flows through a gap or gorge in the limestone rocks. An elaborate system of artificial embankments (locally called bunds) serves as protection against the recurrent floods.

The climate of Sindh is typically arid, except in the south where maritime influences become more conspicuous. The most striking features of the climate are high summer temperatures and low and variable rainfall. Rains occur mostly in the summer season. But the variability, both in amount and time, is very high. Winter rainfall, though scanty, is useful for crops especially wheat.

Sindh's population has grown from 4.1 million in 1941 to 4.6 million in 1951, 6.4 million in 1961, 13.9 million in 1972, 19 million in 1981 and 29.9 million in 1998. In terms of population, Sindh now ranks second among the provinces of Pakistan. Sindh is the most urbanized province of Pakistan where 51.25 percent of the total population lives in areas recognized as urban [12]. Karachi has maintained its rank as the biggest city of Pakistan since 1947 going up to 9.2 million in 1998 followed by Hyderabad (1.1 million) and Sukkur (0.3 million). These three major cities together account for more than three fourth of the total urban population of Pakistan and 35.8 percent of the total population of Sindh.

A well known fact of agriculture in Sindh is the old-fashioned practices. Low per-acre yields of the crops, age old agricultural practices, prevailing poverty and ignorance, indefinite land tenure, salinity and water logging, small land holdings and age old customs prevent any real improvement. Very few farmers follow any pre-designed cropping rotation. The most common systems are continuous cotton with a winter fallow, and continuous wheat with a summer fallow. Recent decades have witnessed activities to improve agriculture through new crops, land reforms, better implements, improved irrigation and management. Use of tractors and other farm machinery is becoming increasingly common. Even with these developments, the per-acre yields tend to remain low.

The introduction of perennial irrigation caused significant increase in agriculture between the years 1931 and 1961. Perennial irrigation was introduced through Sukkur Barrage in 1932. To enhance the agricultural activity, two more barrages were constructed, one at Jamshoro and the other at Guddu in the Upper Sindh. The province of Sindh is blessed by a number of mineral and power resources such as coal, oil and gas, which are contributing to the development of industries both light and heavy.

The huge coal reserves of Thar, Badin, Lakhra, Sonda and Thatta (184.658 billion tones), comprise 98 percent of total coal deposits of the country. After the discovery of

the world's largest lignite reserves in the Thar in 1992, spreading over an area of more than 9000 square kilometer, Pakistan has emerged as one of the leading countries – seventh in the list of top 20 countries of the world [17]. Government is making all efforts to develop this huge deposit for power generation. Exploration of Thar coal will supplement the existing energy output in the country that is sufficient to meet the country's fuel requirements for centuries. Granite deposits are also available in the Nagar Parkar area of Tharparkar district. It consists of 15 billion tones reserves and covers 1000 square kilometers area [17].

Sindh is the most industrialized province of Pakistan. Industrial development has taken place in the province since the emergence of Pakistan. At that time Karachi was the only industrial center of the province. A number of steps were taken to establish industrial estates and zones in the province. Kotri is one good example. Other major centers are Hyderabad, Nawabshah, Sukkur, Khairpur, Gharo and Thatta. Currently more than 50% of Pakistan's industry is located in Sindh [16].

Ranking of the Districts

In terms of economic resources, Sindh is the richest province in Pakistan. Karachi boasts of two national seaports from where over 90 per cent of Pakistan's international trade originates. Sindh contributes over 67% of national revenue. It produces 48% of country's total gas, 39% of electricity, 62% of crude oil and 31% of coal. Sindh has an equally impressive production ratio of industrial goods and agricultural commodities in Pakistan and is the biggest hub of services sector in the country [9].

For ranking the districts of Sindh, Z-sum and composite index have been employed separately for 1981 and 1998 censuses. To get the overall rank of each district, ranking coefficient method has been applied [8]. In both the analyses, Karachi stands out with top rank. It depicts its economic status in the entire province, being the hub of all trade and commercial activities [5]. The magnitude of Karachi in both analyses highlights the developmental lead that it has gained. Jacobabad, Tharparkar and Thatta are at the bottom of the development ranking.

According to Z-sum ranking of 1981, Karachi is at the top followed by Hyderabad, Sukkur, Khairpur, Dadu and Nawabshsh. Jacobabad scored the lowest position, while Thatta and Badin stand out second and third from the bottom respectively (Table **1**). The composite index of 1981 reveals that once again Karachi is at the top position followed by Sukkur and Hyderabad while Sanghar and Khairpur have 4th rank. The district of Sanghar is an exceptional case; it has 7th position according to Z-sum but occupies 4th position in composite index ranking. Districts showing the poor level of development are those which are either located in the north or south of the province, such as Jacobabad, Shikarpur, Thatta, Tharparkar etc. (Table **1** and Fig. **1**). The juxtaposition of the ranks of Hyderabad-Sukkur and Nawabshah-Dadu are clearly observed in both the analyses.

Table 1. District Ranking 1981

District	Z-sum	Ranking (a)	Composite Index	Ranking (b)
Karachi Div.	23.47	1	32	1
Hyderabd	6.24	2	44	3
Sukkur	4.38	3	41	2
Khairpur	-0.47	4	80	4
Dadu	-1.04	5	89	6
Nawabshah	-1.91	6	87	5
Sanghar	-2.31	7	80	4
Tharparkar	-3.03	8	91	7
Shikarpur	-3.28	9	94	8
Larkana	-3.75	10	102	9
Badin	-4.84	11	109	10
Thatta	-5.64	12	114	11
Jacobabad	-7.56	13	129	12

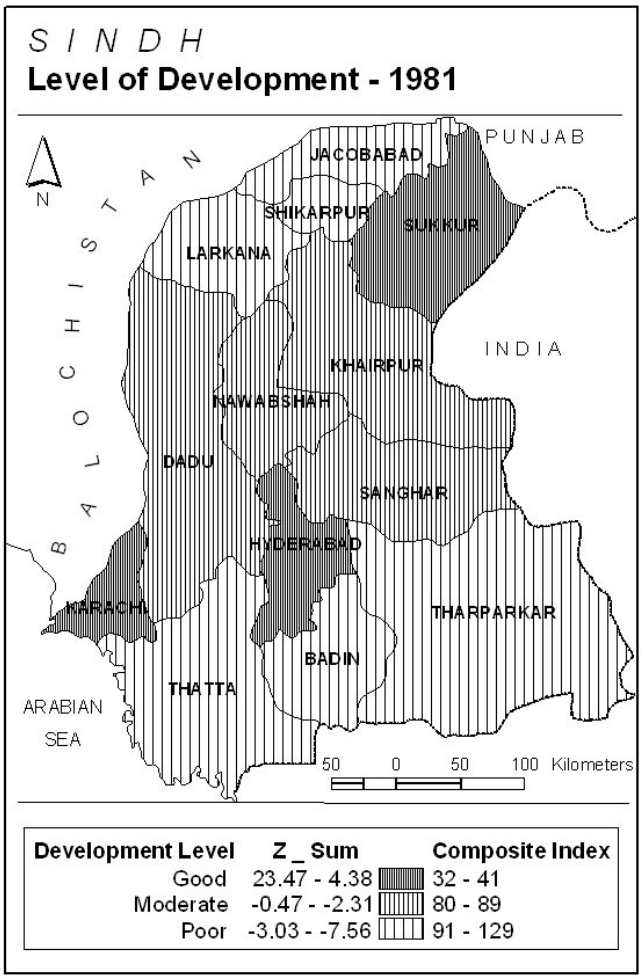

Fig. (1). SINDH: Level of Development - 1981.

The 1998 Z-sum analysis depicts that Karachi, Hyderabad and Sukkur have the same relative position as in 1981. But Nawabshah has jumped from 6th to 4th position, after the separation of Naushero Firoze as a separate district. The newly developed district of Ghotki scored 5th position. Sanghar falls to 13th position in 1998 from 7th in 1981. Badin, Jacobabad and Tharparkar are at the bottom of the ranking (Table **2**). The composite index for 1998 gives almost the same picture of the development as the previous one, with the exception of Ghotki and Shikarpur (Table **2**). Once again, Karachi stands out at the top with the highest level of development reflecting its role as the most significant economic, trade, financial and commercial center of the province.

Table 2. District Ranking 1998

District	Z-sum	Ranking (a)	Composite Index	Ranking (b)
Karachi Div.	20.63	1	49	1
Hyderabad	6.37	2	52	2
Sukkur	5.73	3	68	3
Nawabshah	2.74	4	70	4
Ghotki	0.91	5	104	8
Dadu	0.44	6	96	5
Khairpur	0.39	7	96	5
Naushero Firoze	-0.54	8	101	7
Shikarpur	-1.10	9	100	6
Larkana	-1.67	10	107	9
Mirpurkhas	-1.98	11	113	10
Thatta	-2.72	12	119	11
Sanghar	-5.90	13	127	12
Badin	-6.25	14	136	14
Jacobabad	-7.91	15	133	13
Tharparkar	-8.78	16	161	15

Tables **3** and **4** show the ranking coefficients of 1981 and 1998 respectively which reveal that the top three districts have obtained the same ranks in both the years. Nawabshah shows a slight improvement in 1998 (Figs. **1** and **2**). The districts which show a decrease in the level of development between 1981 and 1998 are Sanghar and Tharparkar. Districts falling in the middle of ranking order are Khairpur, Dadu, Naushero Firoze and Ghotki. The districts occupying the lower level of ranking order are Shikarpur, Thatta, Sanghar, Jacobabad, Badin and Tharparkar.

Administrative changes and the bifurcation of districts both have adversely affected the level of development in 1998. Tharparkar is the most adversely affected district which has slipped considerably from 8th position to the lowest in the province. The reason for this drop is the separation of Mirpur Khas, the higest revenue generating taluka from its parent Tharparkar district. The other affected district is Sukkur which has dropped one rank from the previous position due to its bifurcation. Nawabshah has improved its position from the previous one. This improvement can be attributed to the separation of Naushero Firoze district. Karachi remained the top district of the province in both the analyses.

Table 3. District Ranks 1981

District	Z-sum Ranking (a)	Composite Index (b)	Ranking Coefficienta+b/2
Karachi Div.	1	1	1
Sukkur	3	2	2.5
Hyderabd	2	3	2.5
Khairpur	4	4	4
Sanghar	7	4	5.5
Nawabshah	6	5	5.5
Dadu	5	6	5.5
Tharparkar	8	7	7.5
Shikarpur	9	8	8.5
Larkana	10	9	9.5
Badin	11	10	10.5
Thatta	12	11	11.5
Jacobabad	13	12	12.5

Table 4. District Ranks 1998

District	Z-sum Ranking (a)	Composite Index (b)	Ranking Coefficient a+b/2
Karachi Div.	1	1	1
Hyderabad	2	2	2
Sukkur	3	3	3
Nawabshah	4	4	4
Dadu	6	5	5.5
Khairpur	7	5	6
Ghotki	5	8	6.5
Naushero Firoze	8	7	7.5
Mirpurkhas	11	6	8.5
Larkana	10	9	9.5
Shikarpur	9	10	9.5
Thatta	12	11	11.5
Sanghar	13	12	12.5
Badin	14	14	14
Jacobabad	15	13	14
Tharparkar	16	15	15.5

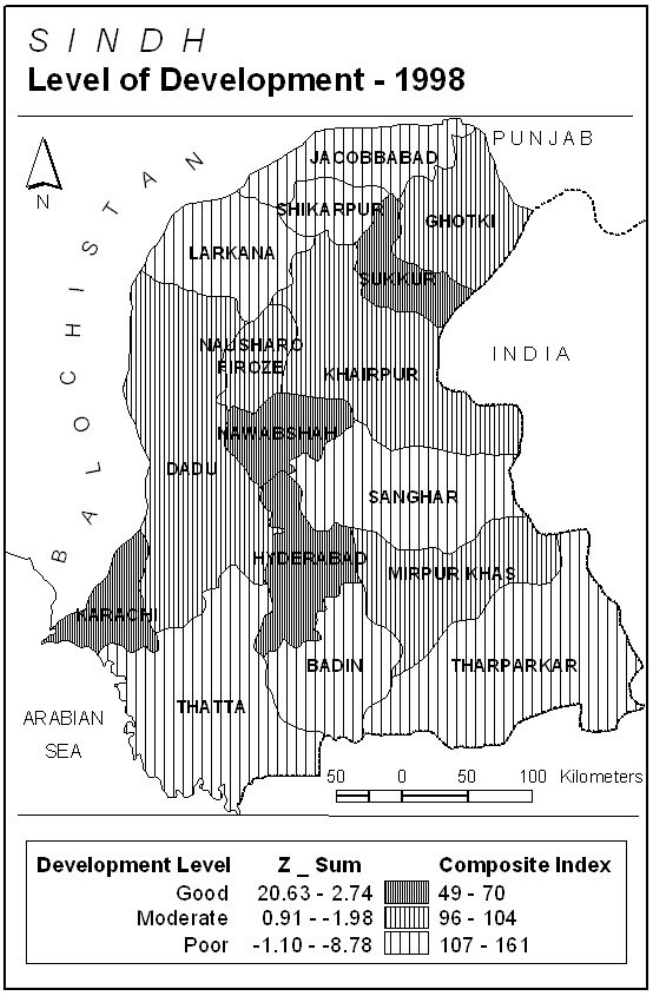

Fig. (2). SINDH: Level of Development - 1998.

CONCLUSION

An interesting picture emerges out of this analysis. The study focuses on multidimensional aspects of development covering various sectors like employment, education, income, urbanization, health, agriculture etc. The results clearly show that there has been an increase in the economic progress during 1981-1998 period. Large urban centers alone represent high level of development but a few other districts with a rural-urban mix also show increase in the developmental level. Notably Nawabshah has entered into the upper level of development while Mirpur Khas has entered into the intermediate level of development, due to its exceptional agricultural production and income.

In 1981 two pockets of poor development have emerged in the province of Sindh. One is located in the north, which includes the districts of Shikarpur, Jacobabad and Larkana. The other is in the southeast, consisting of Sanghar, Thatta, Badin and Tharparkar districts. Though the northern area of the province has a good agricultural potential but poor planning, misuse of natural resources and improper development strategies have pushed this area down in economic development. If the policy makers and planners pay attention to the above-mentioned problems, this area can show significant improvement in the development process, as it is a fertile and well-irrigated area of Lower Indus Basin.

In 1998, another pocket of poor development has emerged in the eastern part of Sindh, that is, Sanghar district. Whereas its adjacent districts such as Nawabshah and Naushero Firoze have attained higher levels in the development process (Fig. **2**). The district of Mirpur Khas, after its separation from the southern district of Tharparkar, has been able to achieve moderate development level according to Z-sum and composite index.

The results of the analysis provide a realistic picture of the present position of economic development in the province of Sindh. The methods employed here can be gainfully used in studies of other areas in the Asian and African countries.

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