

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & MANAGEMENT A STUDY OF RECENT POLICESTATIONSEXTENSION IN KHARTOUM USING GIS

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ABSTRACT

As planning is so important in all fields, the Comprehensive Strategy conference has come to play a key role in the police axis. Aided by that conference, the needs of this axis have been studied and the means of performance within its ranks promoted, especially that security is regarded as the basic pillar for realizing glory, freedom and prosperity for this nation, a lofty goal that has to be achieved under the umbrella of the civilizational orientation adopted by the Sudan.

The Sudanese Police Forces was formed during the Condominium rule (1898-1956). Following Sudan Independence in 1956, the state started giving concern to up-grading the police with some laws issued in this regard top of which were the 1979 police Acts.

As for crime, Sudan is inhabited by a peaceful people of good morals. Civil war, fed by foreign factors, helped increase rates of migration to the capital, major cities and stable areas, thus increasing the need for police to control crime.

Crime in Sudan is of an individual nature and not the sort of organized style. Sudanese police enjoys a good fame on both the regional and international levels linked by agreements and relations within international recognized charters.

This paper explores the developments and distribution of police stations and its coverage in Khartoum state up to 2015 using GIS. The research targeted the 25 years in the period 1990 to 2015 to study. Khartoum city was taken as a sample of the three cities forming the state.

GIS package used to created maps, link the spatial data with metadata and analysis this data.

Results showed that Khartoum state containing 21 well distributed police stations. Police stations service coverage going decreasing compared with population growth.

Keywords: *GIS, GPS, Khartoum, Police stations.*

I. INTRODUCTION

The Sudan Police Force (SPF) had its beginnings in 1898 when a British army captain was placed in the central administration for police duties, and thirty British army officers directly responsible to him were detailed to organize provincial police establishments. The arrangement proved overly centralized, however, and complete decentralization of police control was introduced in 1901. As great differences arose in the standards and performance of the police in the various provinces, a modified form of administrative control by the central authorities was decreed in 1908, with the provincial governors retaining operational control of the forces. The SPF was officially established by the British in 1908 and was absorbed by the Sudanese government on independence in 1956.

It was technically and economically impractical for the police to cover the entire area of Sudan; therefore, a system of communal security was retained for more than seventy years. The central government gave tribal leaders authority to keep order among their people. They were allowed to hire a limited number of "retainers" to

assist them in law enforcement duties. This system was finally abolished by the Nimeiri government in the early 1970s.

Central police headquarters in Khartoum was organized into divisions, each commanded by a police major general. The divisions were responsible for criminal investigations, administration, training, public affairs, passport control, immigration, and security affairs. The main operational elements were the traffic police and the riot police. The 1979 legislation brought specialized police units, such as that of the Sudan Railways, under the authority of the SPF headquarters. The Khartoum headquarters maintained liaison and cooperation with the International Criminal Police Organization, Interpol, and with agencies involved in combating international drug traffic.

The government's new system of administration delegated many powers to the regional level, but law enforcement outside major urban areas remained provincially oriented. Thus, the national police establishment was subdivided into provincial commands, which were organized according to the same divisions found in the national headquarters. Local police directors were responsible to provincial police commissioners, who in turn were responsible to the SPF director general in Khartoum. Each provincial command had its own budget.

II. DATA COLLECTION

Study of police service development requires collection of data about police stations and establishment dates. These data were obtained from Police presidency of Khartoum locality.

To design a map showing the location of police stations in Khartoum State, hand-held GPS was used to observe the coordinates of each station. Results obtained were tabulated as shown in table (1) below.

Table: 1 Police stations in Khartoum

ID	Name	Location		Date*
		X(m)	Y(m)	
1	Albarary	453335.9	1724900	1962
2	Alkhartoum ganob	449018.4	1722791	1965
3	Emtedad Aldraja alola	450856.9	1722998	1968
4	Alsawary alkhartoum	450283.7	1720512	1969
5	The presidency of police in Khartoum locality	452931.3	1719706	1972
6	Alshgara	446076.1	1717900	1974
7	Alsahafa	450927	1717244	1979
8	Emtedad aldraja althaltha	450987.2	1719177	1980
9	Alkhartoum shareg	453142.9	1720556	1983
10	Alryad	454596.7	1722402	1984
11	Alcenaat	448640.1	1723424	B1986
12	Soba	459451.2	1714808	1990
13	Toti	447152	1726339	1990
14	Alkhartoum gareb - Alremela	447561.1	1721129	1991
15	ALsog almahaly	451188	1716755	2000
16	Allamab	446376.7	1719706	2001
17	Alkhartoum shamal	448103.7	1724744	2005
18	Securing central Alkhartom	449327.1	1724996	2006
19	Algeraf	456186.3	1718521	2010
20	Emtedad Nasir	453520.7	1723870	2011
21	Nozha	449865.5	1719511	2015

*Date: Date of establishment

Central statistical organization assisted in providing Khartoum state population data during the period from 1990 up to 2015 as shown in table (2).

Table: 2 Population growth in Khartoum

Year	population
1990	328753
1995	415099
2000	501444
2005	587790
2010	680906
2015	777381

III. RESULTS AND ANALYSIS

After obtained the special data of police stations in Khartoum locality, it was entered in GIS program as points coordinates to see locations and distribution of police stations service. Also, attribute data linked with spatial data. A map showing police stations distribution was obtained as shown in figure (1) below.



Figure: 1 Police Stations distribution in Khartoum

By reviewing figure (1) above, it can be noted that as well as the distribution of police stations is good, a lake in police stations can be noticed in the southern areas.

Government used to extend in security coverage so, it always try to establish new police stations. Development in police stations during 1991 up to 2015 was analyzed as shown in table (3) below.

Table:3 Percentage development in Police Stations in Khartoum

Years	No. of Police Stations	Percentage Development (%)
Before 1990	13	-
1991 - 1995	14	7.7
1996 - 2000	15	7.1
2001 - 2005	17	13.3
2006 - 2010	19	11.8
2011 - 2015	21	10.5

From the above analysis of development in police stations it can be found that by year 2015, 21 police stations were exists in Khartoum. The rate of development was approximately fixed during years 1991 to 2001 but, during 2001 to 2015 it was increased to reach 13.3% which, represent the maximum rate of development during all period of study.

Since 2005, extend in police station development began to decrease. Moreover, the minimum rate of development can be noted during 1996 to 2000.

Analysis of the development in police station extend compared with the population, carried out as coverage ratio as shown in table (4) below.

Table:4 Police stations coverage ratio

Year	population	No. of Police Stations	Coverage Ratio
1990	328753	13	1/25289
1995	415099	14	1/29650
2000	501444	15	1/33430
2005	587790	17	1/34576
2010	680906	19	1/35837
2015	777381	21	1/37018

The computed coverage ratio is noted to be in decreasing manner during all the periods of study. Figure (2) below demonstrates how police stations service coverage going decreasing.

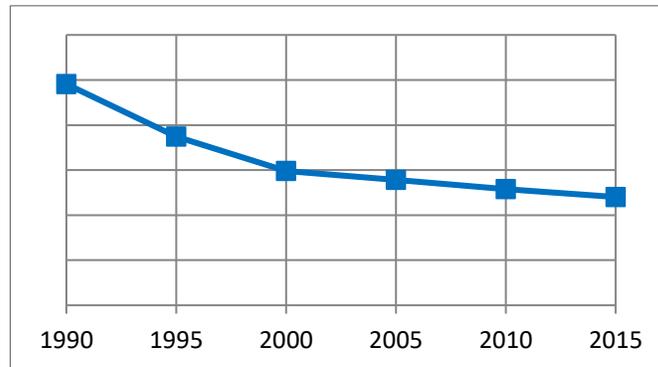


Figure:2 Police stations coverage ratio

Table (5) demonstrates a comparison of population growth with the police stations development. It can be noticed that during all periods of study, police stations development was less than population growth.

Table: 5 Percentage population development versus police stations development

Years	Percentage Development		Ratio
	population	Police Stations	
1990 - 1995	26.3	7.7	1:3
1996 - 2000	20.8	7.1	1:3
2001 - 2005	17.2	13.3	1:1
2006 - 2010	15.8	11.8	1:1
2011 - 2015	14.2	10.5	1:1

Finally distribution of police stations coverage of 3 Kilometers rang in 2015 was examined as shown in figure (3). From the figure, it can be seen that Khartoum is well covered by police stations in the range of 3 Kilometers.

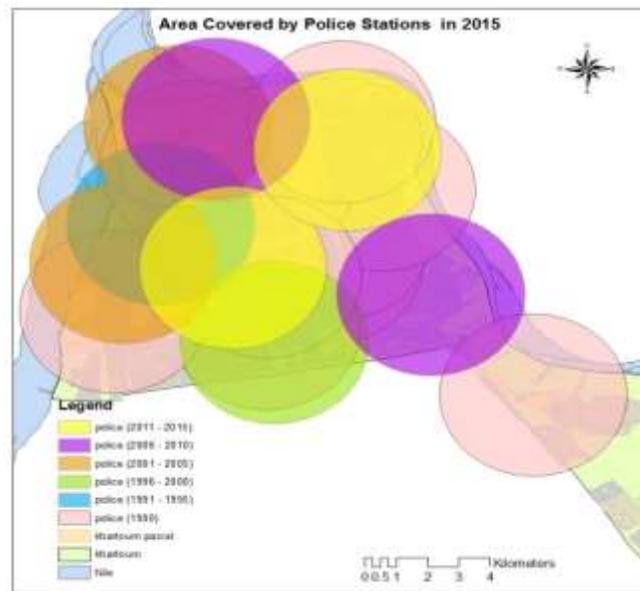


Figure 3: Distribution of police stations coverage.

IV. CONCLUSION

As security always represents the first element in development, this research work carried out to evaluate police security coverage in Khartoum during the resent 30 years. From the data collected and results obtained the following conclusions can be extracted.

- Khartoum contains well distributed 21 police stations. Although, lake is exists in the southern areas but it is well covered in the range of 3 Kilometers.
- 13.3% was the maximum rate of development in police station coverage which happened during the period 2001 to 2005, where, 7.1% was the minimum rate that registered during the period 1996 to 2000.
- Police stations development is less than population growth in all periods of study.
- Police stations coverage ratio going in decreasing manner.

REFERENCES

- [1] Esri, (1996), *Geographic information system*.
- [2] http://sudanimoscow.freeservers.com/United_Police.htm
- [3] http://www.photius.com/countries/sudan/national_security/sudan_national_security_the_sudan_police_for~1819.html
- [4] [https://sco.m.wikipedia.org/wiki/Khartoum_\(state\)](https://sco.m.wikipedia.org/wiki/Khartoum_(state)).
- [5] NagiZomrawi and Eimaneisa(2017), *Analysis of basic education extension in Khartoum state using GIS, Internation Journal of Trend in Research and Development*.
- [6] Peter A. Burrough and Rachael A. McDonnel (1998), *Principles of Geographical Information System, Oxford University Press Inc., New York*