POTENTIAL ROLE OF TELECOM INFRASTRUCTURE IN BALANCED INDUSTRIAL DEVELOPMENT IN SAUDI ARABIA

Umar G. Benna
Dept. of Urban and Regional Planning, King Faisal University, Dammam, Saudi Arabia

ABSTRACT. The paper analyzes the spatial impacts of the Saudi national industrial policy and assesses the potential role of telecommunication (telecom) infrastructure in addressing the resultant imbalanced regional industrial development and the possibility of introducing a new information-intensive industrialization. The main findings reveal a concentration of most industries along a central spine extending from the Dammam-Jubail axis on the Gulf, through Riyadh, to Jeddah on the Red Sea. The regions to the north and south of this East-West central spine lags behind in industrial development. The paper suggests the use of telecommunication infrastructure, along with the traditional incentives, to achieve the transformation of a more balanced and more advanced form of industrial development.

1. THE INDUSTRIAL POLICY AND ITS SPATIAL IMPACTS

The Government of Saudi Arabia has relied on industrization as the key instrument for self-sustaining national development. The benefits of development have varied from one region of the kingdom to another. The Fifth Development Plan places special emphasis on more balanced regional development (11). The paper seeks to analyze the industrial policy, assess its effects on regional development, it also relates the pattern of telecommunication (telecom) infrastructure to the pattern of industrialization, and then advocates the use of telecom infrastructure to effect a more balanced regional development in the kingdom.

The central focus of the industrial development policy of Saudi Arabia is to diversify the economic base by expanding the non-oil sectors. Toward this end, a hierarchical industrial production system has been organized based on the sizes of factories, their complexity and products range. The strategy has sought to concentrate industrial development at three levels, each focusing on specific types of industries and each with a purposely created public agency to promote industrial development [1].

Located mainly in the new industrial cities of Jubail and Yanbu, the basic industries depend on oil, gas and heavy minerals as their raw materials. These heavy hydrocarbon and mineral-based industries are designed to produce mainly for export. In view of their size and export-orientation, they are mainly concentrated in locations close to their dominant raw materials sources, close to the oil producing areas in the Eastern Province, from where they can easily be exported to the world and the Gulf markets. These primary industries provide raw materials for the downstream industries thereby forming the main structuring and their integrating elements. In terms of ownership most of the

factories at this level are joint venture types established by experienced foreign companies and local firms to ensure access to advanced technology and stable markets. The development of these industries is promoted mainly by the Saudi Basic Industries Corporation (SABIC) which has provided finance and other forms of incentives to the hydrocarbon and heavy mineral industries on behalf of the government. Besides investing its own money, SABIC has also encouraged the private sector in different parts of the Kingdom to invest in the field of complementary industries. These basic industries form the first level in the hierarchical system [1, 11].

The second level consists of the secondary industries that are normally licensed by the Ministry of Industry and Electricity. Generally located in purposely built industrial towns, many of these industries use raw materials from the primary industries and from agriculture or other sources. Their products are essentially designed for national and regional markets and are aimed at import substitution. The Saudi Industrial Development Fund (SIDF) is responsible for the promotion of these industries. This agency provides the financial incentives such as interest-free loans to potential investors.

The third level is that of tertiary or service industries, which are usually located in estates provided by the municipalities. They consist of small scale light manufacturing factories and workshops, licensed by the municipalities and registered by the Ministry of Commerce. Their raw materials are mostly imported or are the products of the secondary industries, but their products are mainly for local markets. The Saudi Credit Bank is the main financing agency which assists those who were trained in government institutes and other private investors.

1.1 Regional Integration and Specialization

The spatial effects of the industrial policy are that industries in the Kingdom are highly concentrated in the most urbanized Central East-West axis linking the two port cities of Jeddah in the west and Dammam in the east; with Riyadh the national capital as its central point, as shown in Table 1 and Figure 1. Besides the growth poles created by these port cities, there are two purposely built industrial cities of Jubail and Yanbu. It can be observed that Riyadh, Eastern Province and Makkah Emirates have attracted higher proportion of licensed factories and employment than the combined share their total population would normally warrant. Their share in the number of the national licensed factories, employment and the capital invested in 1992 was 85.5%, 90.4% and 80.8% respectively [8, 2].

To illustrate the degree of specialization among the emirates, let us examine the capital invested. The highest capital investment in 1992 was in the sector of chemical and petroleum products (65% of national total) in which the three east-west central emirates had 80% of the sector total and out of the three Eastern Province had 64% and Makkah had 12%. The second highest investment (13% of national total) was the construction material production in which Eastern, Riyadh and Makkah emirates had 27%, 23% and 20% of the sector total. A review of concentration of industrial activities shows that Riyadh emirate had high investments in factories for wood products, textile, food and beverages, construction materials. Makkah emirate seems to specialize in factories for fabricated metal products, food and beverages, textiles and paper products.

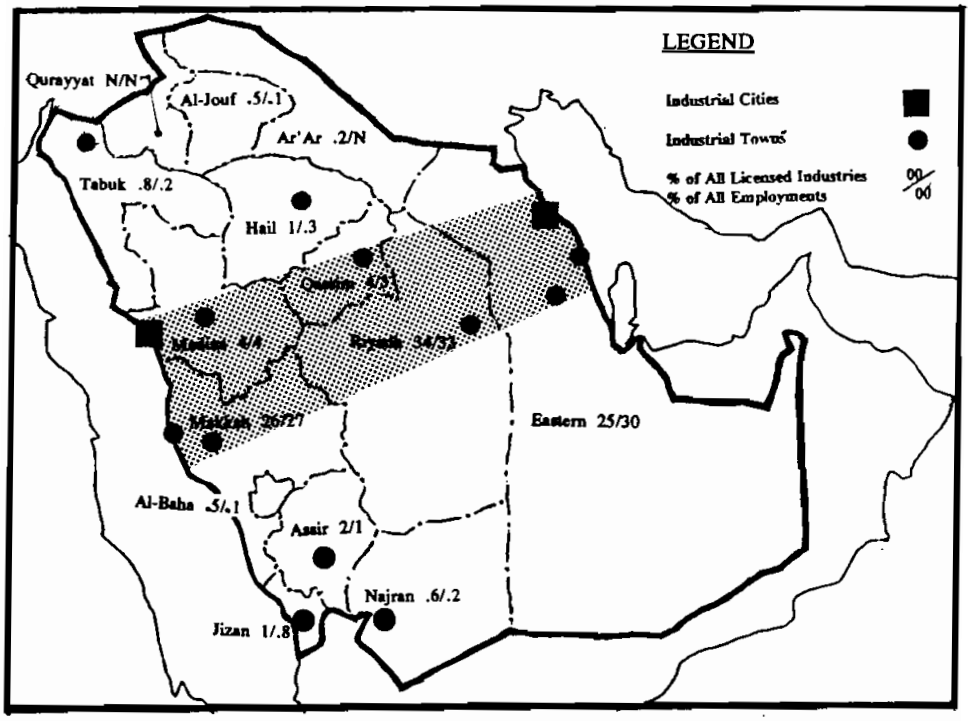

Figure 1: Distribution of Industrial Centers in Saudi Arabia

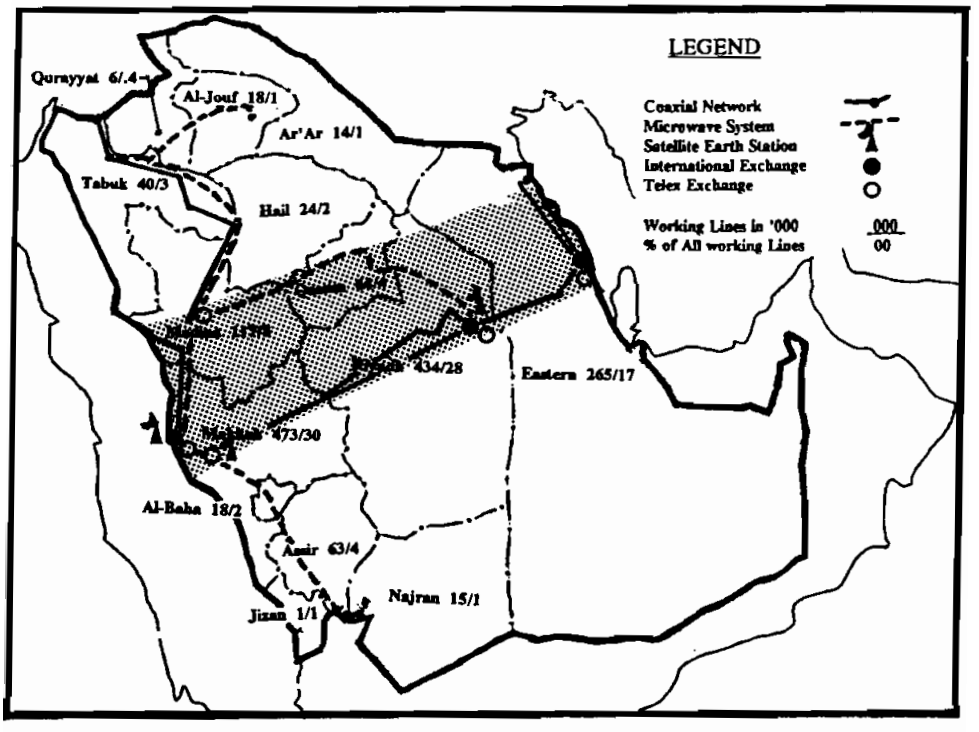

Figure 2: Distribution of Telecom Facilities in Saudi Arabia

The Eastern Province has, in addition to its dominance in chemical and petroleum plants, a concentration of factories for basic metals, construction materials, and paper products. In the growth of these industries the role played by the industrial towns in Dammam, Al-Hassa, Riyadh, Jeddah and Makkah appear to be significant. It appears also that the private sector has responded positively to the incentives provided by SIDF and similar agencies [8].

In the areas to the north and south of the East-West-Central axis, the licensed factories had shown little dispersal. The five Emirates to the north of the axis have a combined share of 17% in food processing, about 8% in chemical industries, about 13% in building materials and about 7% in the metal industries. The Emirates of Quraiyat and Ar'ar could only attract few industries. The situation in Emirates to the south of the axis was just as worse, they have a combined share of 11% in building material industries, 4% in food processing 2% each in chemical and metal industries.

It is observable that outside the Central Axis, only in Qassim is there a fully functioning industrial town, all others are still at various stages of development. There seems to be some correlation between the building of the industrial town and the rate of industrial production. It is hoped that when all the planned industrial towns are fully functioning, they will attract industries that will serve not only local and national markets but also world markets.

Table 1. Percentage Distribution of Licensed Industries and Telephone In Saudi Arabia

	INDUSTRIES**			TELEPHONE S*		
Emirates	Factories	Employment	Capital	Capacity	Working Lines	Coin Phones
Riyadh	34.2	33.3	11.4	26.8	27.7	26.8
Eastern	25.1	30.3	52	18.8	16.9	17.1
Makkah	26.3	26.8	17.8	29.1	30.2	26.7
Madina	3.9	4.4	15.8	7.2	7.8	9.0
Qassim	4.0	2.5	1.5	4.3	4.1	5.2
Assir	2.0	0.9	0.3	4.0	4.1	3.3
Al-Baha	0.5	0.1	N	1.2	1.2	1.2
Jizan	1.0	0.8	0.6	1.3	1.3	1.2
Najran	0.6	0.2	N	0.9	1.0	0.8
Hail	1.0	0.3	N	1.4	1.5	2.7
Tabuk	0.8	0.2	N	2.4	2.5	4.0
Northern	0.2	N	N	0.8	0.9	1.6
Al-Jouf	0.5	0.1	N	1.2	1.2	1.4
Quraiyat	N	N	N	0.4	0.2	N
Total	100 = 2,036	100 = 174,731	100 = SR138,461m	100 = 1,688,848	100 = 1,566,353	100 = 7,432

NOTES:- (1) N= Negligible amount (2) Quraiyat Emirate has been dissolved and merged with adjacent emirates in 1993

SOURCE:- **Min. of Industry & Electricity, 1412/13(1992)

* Min. of P.T.T, 1414 (1994)

2. THE ROLE OF TELECOM INFRASTRUCTURE IN INDUSTRIAL DEVELOPMENT

Governments, firms and individuals are becoming increasingly aware of the important role played by telecommunications in the development process at national, regional and local levels. The nature of this type of infrastructure includes the rapid and all-pervasive diffusion into all economic sectors of a whole host of convergent telecom related innovations such as computer networks, electronic point of sale and funds transfer systems, on-line information services, video-text network and many others. The

components of the infrastructure consist mainly of terminal equipment, links and switching systems, the innovative applications of which can initiate a wide range of interactions needed in rapid industrial development at various levels [3, 10].

At the national level there seems to be a correlation between the development of national communication systems and the wealth of nations as expressed in Gross National Products. They are a major contributing factor to economic growth and industrial expansion. Investment in telecom is associated with high financial rates of return, which the World Bank experiences show to be between 15% and 35% on invested capital [3]. Many studies have tried to assess the real value of telecom; Voronov [4] suggested that national planners allocating investment priorities should evaluate the contribution of telecom to increases in Gross Domestic Product, industrial output and the quality of life. Hardy [5] indicates that the benefits of trunk telephone are 4.3 times higher than costs, while Parker [6] found that the benefits are 6 to 7 times higher than the cost. The general conclusion is that development in telecom has a highly positive effect on the overall process of economic and social development. It helps greatly in the planning and operation of transport, the scheduling and monitoring of production processes, the management of money, training and education and in government.

At the regional and local levels, telecom can be an effective, but so far neglected, tool for the planning industrial development. The recent advances in electronic mail, teleconferencing, video, mobile telephones and access to data banks have turned telecom into a powerful incentive in making investment decisions since they facilitate cooperation and control over distance. In the industrialized countries there is a growing tendency to relocate manufacturing and space-consuming services in rural districts, while in the developing countries' planners and industrialists are using them as incentives to locate new plants in rural areas. Similarly the availability of home electronics, pay-by phone, shopping from home, entertainment, games etc. have the potentials of being used to reduce rural-urban migration and encourage relocation to the country side [10].

The development of industrial centers can greatly be enhanced by an effective telecom network and by the recent progress in remote monitoring and control of machines and processes. Good communications are not only a means of saving management travel time and enabling factories and offices to operate efficiently in apparent isolation, but also an essential tool for plant automation, the control of processes, the optimization of inventory levels, the co-ordination of management functions and decision-aiding tool used in defining strategic and operation modes. On-line access in real time, audio and visual, to information on all major aspects of manufacturing has become a major asset of management [10].

There are many and diverse ways by which telecom system can promote industrial development. Some of these ways have been mentioned above but the following need to be emphasized as they are particularly relevant to the proposals outline below of how to redress the problem of imbalanced industrial development. (a) If the telecom flow is effectively and efficiently used, an industrialist can greatly reduce capital assets to run his business because heavy reductions in time, costs, material, labor and land can be achieved [10]. (b) Make-and-sell approach can easily be replaced by the advanced strategy of sense-and-respond to changing customer needs, by an increased investment in information

technology capabilities to reduction in time and space needed in acquiring, interpreting, and acting upon information in response to customer demands. (c) "Just-in-time" production system can increase turn over and reduce space for warehousing and hence reduce capital and running costs. (d) Electronic funds transfer does not only shorten time but also reduces the amount paid as interest in the process. (e) Computer aided design can greatly reduce design time, and can easily be transferred to remote offices electronically thereby saving money. (f) At the national level, Saudi Arabia may be able to substantially reduce the size of its imported industrial and related manpower.

2.1 The Development and Distribution of Telecom Network in Saudi Arabia

The unification of the Kingdom of Saudi Arabia and its subsequent integration demanded rapid communication system. The Founder of the nation, King Abdul Aziz, started the telecom development. by setting up telegraph network by radio stations in 13 towns including Makkah, Riyadh, Jeddah, Al-Hassa, Najran and Jizan. From the time of unification to mid-1960 most of the effort were in providing telephone network within the main cities of Makkah, Jeddah, Taif, Madinah. In 1968 the first inter-city system of 12,650 lines covering over 23 cities including Dammam and Al-Khobar was commissioned. In the First Plan the intelsat network opened up the Kingdom to the international communications and the various parts were linked by cable and microwave system, telex and direct-dialing system [7].

As part of the Government re-organization, the Ministry of P.T.T. was created and entrusted with the responsibility of developing and management of telecom in the Kingdom [7]. Its earliest task was to upgrade the national network to cope with the development and growth in the Second Plan of 1975-1980. During this period, a firm base for a modern telecom network was established. Further developments occurred under a series of planning expansion projects, TEP 1-5 (Telephone Expansion Projects) and the SAIK (Saudi Arabian Intra Kingdom network) 1 and 2 transmission project. TEP 6 in this series seeks put Saudi Arabian Telecom system among the most advanced in the world. This project seeks to establish a high speed, high reliability Synchronous Digital Hierarchy (SDH) fiber optic cable links across the Kingdom, fully digital exchanges capable of handling Integrated Service Digital Hierarchy (ISDN) traffic, new satellite earth station facilities, new international digital cable links and the addition of about 1 million extra telephone lines. For sometime the Saudi Telecom has been under pressure due to increased demand, for example as of August 1992, about 250,000 applications for new lines were being held by Saudi Telecom and the number kept on increasing. As part of TEP 6, Saudi Telecom has awarded a contract for 1.5 million new lines and 200,000 mobile lines. These expansion projects and the upgrading of the existing system are expected to advance the general economic growth of the kingdom.

The services offered by Saudi Telecom include facsimile, telex, messaging, leased lines and an X.25 data network. Because Saudi Arabia represents about 45% of the Gulf computer market, the distances between cities are relatively long, and the major companies have several branches across the Kingdom and run their businesses on data processing systems, data communication is a major activity area for the P.T.T. While much of the demand for data communication is being met by the PTT through its Al-Waseet (X.25 packet switching) and At Tareeq (conditioned data lines), some of larger institutions have installed private high speed networks, with better performance than the

public network. Before the introduction of Al-Needa pager service in 1992, keeping in contact while on the move was limited to just a few thousand users of mobile telephones. Now Saudi Telecom's mobile system can handle up to 20,000 users and is one of the most densely used in the world [7].

The distribution of the Saudi Telecom network, as shown in Table 1 and Figure 2, is fairly even with greater emphasis on the East-West central axis and also along the more urbanized Red Sea coast. However there is a tendency of concentration of the number of working phone lines in the three emirates with high concentration of industries. In 1994 Eastern, Riyadh and Jeddah Emirates had 75% share of all working lines [9].

3. CORRECTING THE IMBALANCE

The strategy for correcting imbalance in the industrial development should be based on natural endowment and national needs based on a well-defined long-term strategic vision, as the Japanese Ministry of International Trade and Industry (MITI) did so successfully [2]. The strategy may include, but not limited to, two main components; namely extension and upgrading of the present system. The first relates to extension of the present hierarchical system to encourage the main industrialists to open branch plants in the designated industrial towns of the lagging regions. Additional industrial towns may be opened in locations purposely chosen near the boarders so as to achieve the objectives of both national defense and to promote drive for export. A number of incentives as discussed elsewhere [1], especially the availability and subsidy of telecom can be developed to encourage manufacturers to open branch plants controlled from distant locations by means of efficient telecom system. Regions like nations start by importing technology, encouraged by suitable incentives, the efficient producers in the industrial cities of Jubail and Yanbu can open branches in the industrial towns, thereby experiment on vertical and horizontal integration. Short distance expansion strategy may be easier in most cases. With the concentration of institutions and networks in the central-spine, it may be better to encourage investors to open branch plants in the industrial towns immediately to the north and south of the central spine.

The second component is the upgrading or transforming the industrial technology into high-technology in the two industrial cities of Jubail and Yanbu. In this option the existing growth and development in these cities will be allowed to continue but new and knowledge intensive type of technology is to be added in the adjacent area as "add-on". The main purpose is to introduce and nurture innovations in these centers, or a combination of internal industrial transformation and a high-tech area add-on. At the lower level the link between the industrial towns should be strengthened using telecom-led infrastructure so as to encourage more intense interaction between the industrial towns of Jeddah, Makkah Riyadh, Dammam, Al Hassa, and Madinah in the central spine and those of Hail, Tabuk, Assir, Najran and Jizan at periphery. This relationship can be forged and strengthened through the telecom system network. The coordinated efforts of the national industrial development institutions mentioned earlier, namely MEI, SIDF, SCB, Saudi Telecom as well as the private sector represented by the Chamber of Commerce and Industry will be needed to ensure success.

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