

New Towns in National and Regional Development: Lessons from Jubail Industrial City in Saudi Arabia

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Abstract. New towns have been used as **instruments** for achieving national development policy goals as well as for achieving **more** specific regional and **urban** development objectives. However, recent studies on new towns have failed to give adequate emphasis to the multiple goals they can be planned to achieve. To redress this neglect, the **role** of Jubail Industrial City in Saudi Arabia's development is discussed in this paper using many variables including the **degree** of achievements of related **national**, regional and local planning goals and objectives, its planning and management styles, its achievements so far, as well as the types of problems and challenges it faces.

Introduction

Many studies have shown how the planning of new towns has been used as an instrument for achieving national development policy goals as well as for achieving more specific regional and urban development objectives [1-3]. However recent studies on new towns have failed to give adequate emphasis to the multiple goals they can be planned to achieve [4-7]. The use of new towns as development and planning instruments to achieve multiple goals are illustrated by one of the latest generation of new towns in a key OPEC-member country, other possible examples are **Ciudad** (Venezuela), Abuja (Nigeria) and Ras Lanouf (Libya). The role of Jubail Industrial City in Saudi Arabia's development is discussed in this paper using many variables including the degree of achievements of related national, regional and local planning goals and objectives, its planning and management styles, its achievements so far, as well as the types of problems and challenges it faces.

The New Town Concept

The idea of new town is not new. Successive waves of human civilizations had built many towns and cities to perform many functions, but mainly for internal or external colonization. The new town movement of this century began largely in response to industrialization and the resultant rapid urbanization and their consequences.

Many social reformers, professionals and professional institutions all contributed to the development and general acceptance of new town concept, but its greatest advocate was Ebenezer Howard (1850-1928). He pulled the divergent ideas at the time into his lectures and writings, which were compiled into a book with the title *Garden Cities of Tomorrow* in 1889 and the founding of the Garden City Association in 1899 [2]. The main ideas were that a garden city was to be built on agricultural land acquired at low cost, the ownership to be entrusted to a profit making company which should provide full range public facilities.

The development of new town concept can be divided into three stages [3]. The first stage was up to the end of World War II, during which the initial success was building of the British Garden Cities of Letchworth in 1903 and Welwyn in 1919. The idea was extended to the United States of America (U.S.A.) and the countries of the British Commonwealth where the plans of new administrative capital cities of Canberra, Ottawa, Khartoum and Kaduna reflected the prevailing planning concepts.

The second stage was the decade after the World War II, during which much construction took place, legislative recognition of urban development priorities, and the beginning of widespread interest in the development of new towns. In the area of planning legislation, perhaps the most influential was the British Town and Country Planning Ordinance of 1946, which was used as a model for the British colonies. The Ordinance provided for the planning, improvement and development of the country by means of planning schemes and planning authorities.

The third stage was 1960 and onwards when the significance of new towns and the need for urban growth policies have become internationally recognized. In Britain 10 new towns were started between 1961 and 1968. In the U.S.A. ten new communities were established in the same period and overall by 1976 about 30 new towns were being developed [2]. In the U.S.A. new towns were viewed as the answer to the failures of urban renewal programs, of subsequent sub-urbanization, and of the attempts to create ideal societies. In many developing countries, especially in Africa and the Middle East, new towns were seen as instruments of the achievements of social integration and economic development than the limited concern about physical environment. Most recent African examples, such as Abuja in Nigeria, Dodoma in Tanzania and Yormoussokro in Cote d'Ivoire, are capital cities reflecting the need for political integration. The examples from the Middle East, Jubail and Yanbu in Saudi Arabia, Sadat City and 10th Ramadan

in Egypt, and As Layoff in Libya, are industrial new towns which reflect the need to diversify their economic base.

Multiple objectives of new towns

The objectives and methods of implementing new towns' development tend to vary with the social-political traditions of the countries around the world. A brief review of the objectives set out for new towns to achieve, suggests that they range from macro or national to micro or regional/local. Thus although new towns may be planned to achieve national and regional purposes, invariably there is always a local objective. It is also fair to say that at whatever level their objectives are focused there are always impacts at the other levels that cannot be ignored. Thus if new towns are planned to achieve national objectives, there are regional impacts which its development will have and this needs to be taken into account. Likewise, if its initial objectives are focused at the regional level, there could be spill over national impacts which could be taken advantage of. This paper, therefore, argues that whatever the primary objectives of new towns are, there are secondary benefits which would normally come about and it is advisable that planners identify these and incorporate them in their plans.

National goals

More and more countries are realizing that the developments of their settlement systems need to be planned and developed as a group. This awareness has led many nations to formulate national urbanization policies or national settlement strategies in which new towns play crucial part [1]. Some of the goals new towns are designed to achieve at national level include, the following either combined or singly.

(a) *Colonization*: Experience has shown that there are two types of colonization new towns can help to achieve. The first is internal colonization by means of which a large, sparsely populated country can use new towns as instruments to incorporate an unsettled region into a national development process. Many natural resource-rich countries like Brazil and Russia have used new towns as instruments of national development in this way. The second approach is where a colonial power can use new towns as instruments to open up resource regions if the resources are in great demand by the colonial power. By this external colonization, spatial development or communication linkages can be developed or redirected in such a way as to benefit the colonial power. In many African countries the British and the French built new towns which provided maximum benefit to colonial economy and little to the local economy.

(b) *De-concentration of metropolitan centers*: In many countries new towns have been used as means to de-congest large metropolitan areas. The first generation of new towns in England after the World War II were planned to de-congest London, and the satellite towns of Stockholm, Moscow, Osaka and Paris fall into this category [1].

(c) *National resource development*: New towns in resource regions are built with the objective of opening up the areas not to raise the region's level of living but to incorporate its natural resource into the national economy. Examples are Ciudad Guayana in Venezuela [8] and Kitimat in Canada's British Colombian coast [1].

(d) *Inter regional balance*: Sometimes new towns are developed with the objectives of raising the level of development in lagging region or of reducing inter regional disparities. The northeast region of Brazil is generally recognized as the largest and most populated depressed area in America and it is a good example of this strategy.

(e) *Administrative center development*: New town's development can be used as a political instrument for national integration; especially where the prevailing mechanism for integration is rather weak. A choice of suitable site remains a critical issue to its success. Examples include Brasilia in Brazil, Chandigarh in India, Islamabad in Pakistan and Abuja in Nigeria [9].

Regional development goals

The regional development goals need not be the same as the national development goals and therefore the roles of new towns in achieving these goals may be different. However for maximum effectiveness new town's development planning analysis requires a thorough examination of the region and of the national environment of which it is part. There is also the need to have a clear understanding of the nature of the links through which the two levels interact before deciding which goals are appropriate and how they can complement each other for effective regional and national development. Some examples of regional development goals that have been successfully applied in many countries around the world are discussed here.

(a) *Balanced development*: The development problems of many countries emerge from the great disparity between the fast growing metropolitan centers and their larger, but lagging peripheral areas. This disparity could be the result of spatial differences in production costs and difference in effective demand. Growth pole development strategy could help reduce this type of disparity. Another possible goal for a new town which is to serve as growth pole and to revitalize decaying region by establishing new types of economic activities.

(b) *Polarized growth*: The development of rural areas can be greatly enhanced by creating new towns to serve as service centers which are capable of attracting active and industrious population which would otherwise leave the rural areas to urban centers. The key to success is to encourage functional integration of socio-economic activities by means of institutional planning and effective coordination mechanism.

(c) *Restructuring*: New towns are sometimes developed with the objective of reorganizing the economy of the regions around metropolitan centers. Unlike satellite towns, these new towns are not usually intended to be self contained, but are planned to

form part of an urban region that is unified but not unicenter. The new towns around Paris, for example, were developed with the objectives of not so much to decentralize the physical growth of the city, but to re-establish the opportunity of choice for the population. These new towns were to offer as many types of employment and opportunities as possible, but at the same time were unable to choose places of work in other parts of the Paris region.

Urban development goals

The goals set for the urban development of a new town should be compatible with the regional and national goals discussed above. The selection of these goals should be based on a national process of consideration of alternatives. Lessons from previous experiences provide relevant insight into varying degrees of successes and failures in urban planning and implementation. These lessons can be of help to shape the major goals of the urban development plan. The aspirations and preferences of the potential inhabitants if they can be identified can help in shaping development goals. Other sources of planning goals are the prevailing official policy and programs at national and regional levels, analysis of natural and man-made factors so as to reveal the intrinsic potentialities and constraints of the site of the new town.

The main issue, again, is not only how to formulate goals that are congruent with the regional and national aspirations but also how to ensure that the specific sectoral objectives do compliment the general urban development goals. This can be achieved with the help of an effective urban management agency, to which our discussion shall now turn.

The Significance of Jubail

The Jubail Industrial City is one of the industrial new towns in the Middle East that are profoundly modifying the physical structure and economic conditions of their nations and regions. The experiences of Jubail in the process of planning and development would, however, be of interest to new towns development planners and decision-makers in many parts of the world beyond the Middle East.

The oil boom of the 1970's brought great opportunities and challenges to the Saudi Arabian government, in common with all OPEC members. For one thing, this great increase in national wealth has to be planned. Wisely, the national planning goals identified the need for the reduction of dependence on the export of crude oil through the diversification of its economic base. The bulk of the crude oil of the kingdom comes from the Gulf coast, although discoveries were made in the Riyadh region. The export of crude oil from the Gulf coast to the main markets in Europe and the U.S.A. through the Gulf and the Red Sea was circuitous and was becoming more dangerous. Earlier searches for an alternative route led to the construction of the TAPLINE (Trans-Arabian Pipeline) of

about 1200 km from Abqaiq, through Qaysumah to the Mediterranean port of Sidon. In the course of the construction of the TAPLINE many new settlements were created [10]. The civil war in Lebanon led to search for a new strategy of diversification, which included not only the export of crude oil but the export of oil products as well. This strategy led to the creation of two industrial cities; Jubail on the Gulf coast and Yanbu on the Red Sea coast and linked by the new crude oil and NGL pipelines, as shown in Fig. 1.

The planning and development of the industrial towns of Jubail and Yanbu are an important instrument for the achievement of the goal of the diversification of the economic base of the Kingdom. Jubail, the larger of the two, represents the cornerstone of this strategy of national economy diversification through industrialization. We shall therefore concentrate our discussion on its lessons and ignore Yanbu. Our assumption is that the main argument for Jubail can equally be applicable to Yanbu. Besides their common planning and development agency, and the similarities in their goals, both Jubail and Yanbu have a "twin-city" status, because there are older settlements with the same names. However, the new industrial cities are completely separate from the older settlements. The industrial cities have clear boundaries, with considerable degree of autonomy, more resources and opportunities to influence the tempo and pattern of development of their immediate regions. Thus close to the industrial city of Jubail is the old Jubail Municipality, the development of which is not guided by the Royal Commission but by the Ministry of Municipal and Rural Affairs.

Another important national development goal of Saudi Arabia is that of balanced society. This implies the development of a high level physical and social infrastructure accessible to all Saudi citizens. From this perspective the development of Jubail is in response to wider national need than purely economic objectives.

At the regional level, the selection of the site for the industrial new town of Jubail reflects the crude oil resource-specific nature of the project. It also reflects the need to reduce the polarization of the population infrastructure and industries in Dammam metropolitan area by creating a more balanced regional development. The third regional objective Jubail seeks to achieve is the utilization of the crude oil and natural gas resources of the Gulf for a broad regional cooperation in the development of the petro-chemical industry [11].

Thus the objectives directing the development of Jubail city are tied to national and regional goals and are not limited only to the welfare of its inhabitants. Seeking to raise the living standard of Saudis, diversification of the main source of national income, transfer of technology, increasing Saudi employment opportunities are all part of the national objectives.

Development agencies

The high quality of development achieved in Jubail so far could be attributed to the

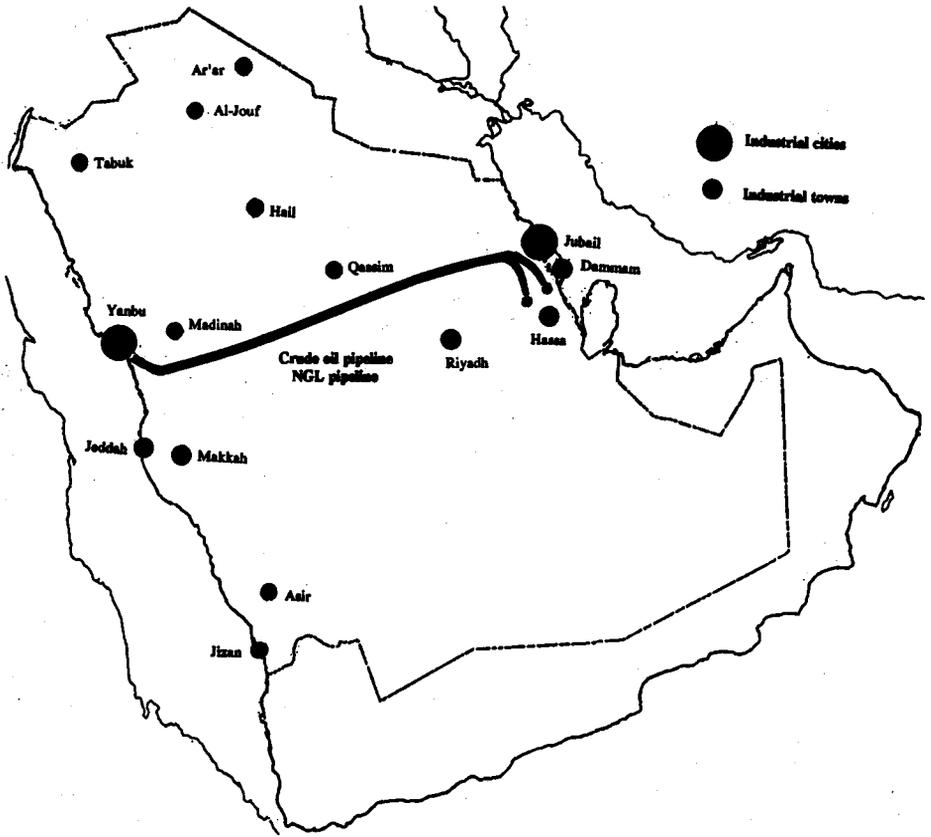


Fig. 1. Kingdom of Saudi Arabia: location of Jubail and Yanbu industrial cities.

successful integration of planning and decision-making among the responsible development agencies.¹ The four main agencies responsible for the planning, development and management of Jubail Industrial City are the Royal Commission for Jubail and Yanbu (RCJY), the Ministry of Industry and Electricity (MIE), the General Organization for Petroleum and Minerals (PETROMIN), and the Saudi basic Industries Corporation (SABIC)². There are at least two other development funding agencies which need to be mentioned. All these agencies seemed to have streamlined their administrative procedures, coordinated their regulations and controls, and have designed appropriate feedback mechanisms to monitor development.

The RCJY is the agency directly responsible for all aspects of the construction, and operation of basic physical and social infrastructure facilities required by the industrial complexes and the permanent communities. The agency came into being by means of a Royal Decree issued on September 21, 1975 [12]. A number of measures were taken to ensure speed and autonomy of decisions and actions unhindered by bureaucratic red-tapes known in government departments. One of these measures is financial autonomy, where substantial powers are granted to the Royal Commission over existing administrative and financial regulations. The degree of RCJY's influence within the Saudi government is illustrated by the fact that initially its chairman was King Fahd himself while the Minister of Planning was the vice-chairman. The other members of the board are usually very influential technocrats heading the ministries and agencies which play

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- 1 The achievements in Jubail are remarkable: (a) when seen against the experience of new town development by public agencies in other parts of the world in this century and (b) when the scale of the project is considered in terms of speed and quality of development, Jubail might be compared to Brasilia. However, while Jubail initiated and inaugurated within a decade along with other projects of national significance, the movement of the Brazilian government to a more central location had, in fact, been in its constitution since 1889 but once it started in 1957, the planning and the development of the city took less than a decade but other major projects were put on hold [26]. By contrast, many similar new towns faced other problems that affected their developments. W.B. Griffin's 1912 plan for Canberra provided site for the parliament, but the permanent building was only inaugurated in 1988 and "after a half century of wrangling, the Australian government eventually decided to site their Parliament House on precisely the site Griffin's plan had reserved for the park" [27]. The scale of construction was such that it was reported in the *Guinness Book of World Records* as the world's largest construction project [15].
 - 2 When plan-making and plan-implementation is the responsibility of one agency like the RCJY, the length of the chain of command and the possibility of politicization is reduced. As the landowner as well as the controller of development, the RCJY has been able to maintain effective control of land-use development. The overlapping memberships of the board of governors key development actors (such as RCJY, PETROMIN, SABIC, SIDF, REDF), greatly help in terms of coordination and control as well as getting adequate allocation of resources for development. Usually membership consists of the chairman, the chief executive, high ranking officials from the supervising ministry and other relevant ministries, and noted community figure, usually a member of the Chamber of Commerce. This allows integration, development, decision-making both horizontally and vertically. Other integration mechanisms include national plan which forms the foundation of policy coordination, regular inter-agency coordinative meetings, periodic evaluation of the effectiveness of agencies' organizational structure.

significant role in national development. The status and composition of the members of the agency ensured its effectiveness in resource mobilization to meet its planned target.

The MIE is responsible for the formulation and coordination of industrial and electricity affairs of the Kingdom. It also reviews licensing decisions on all applications by industrialists planning to operate manufacturing facilities in all industrial parks and provides them with the necessary incentives. While the RCJY has urban development functions and the MIE has the industrial development responsibility, the government established two other agencies through which it participates directly by establishing certain key industries that are either central to national interest or the sizes of investments are too large for private venture capital. PETROMIN and SABIC share a major responsibility in the basic industries of Jubail. The role of PETROMIN has been to construct and operate oil refineries and bulk storage facilities through joint venture agreements with foreign partners. SABIC, on the other hand, installs and operates petrochemical and energy-intensive industries usually through joint venture with Saudi or foreign private investors.

The development of the community facilities in Jubail is expected to be largely by the private sector investors. Two development-funding agencies are actively engaged in providing financing to individuals and firms engaged in building Jubail. The Real Estate Development Fund (REDF) manages a large public fund for providing government assistance to those who want to develop various categories of housing. The Saudi Industrial Development Fund (SIDF), on the other hand, supports and promotes private industrial development in two ways. It grants medium to long-term non-interest bearing loans to new industries or existing firms wishing to expand their activities, replace or modernize their industrial equipment. It also provides marketing technical, financial and administrative advice to industrial firms.

The RCJY, like its international cousins (such the Ciudad Development Corporation in Venezuela, the Federal Capital Development Authority in Nigeria and the Milton Keynes Development Corporation), is a special development agency created by central government and imposed on the locality. This is a technique of new town building outlined by Ebenezer Howard but modified and strengthened to meet Saudi Arabian conditions.

The role of private sector

The Howard technique does not exclude private funding of new town development. In fact many new towns in the U.S.A. (such as Irvine, Roston, Columbia) were built by private developers, and their approach to funding and organization reflected this technique. Thus from its inception, the RCJY had a clear picture of the expected role of the private sector, largely because of its nature as an industrial city. It was quite clear that its responsibility was to provide the basic urban services and city administration as well as coordinating the activities of the numerous institutions involved in the development of

Jubail. The responsibility of the development of industries and communities rests with the private and public investors. The RCJY is actively encouraging private developers to build commercial and residential accommodations to meet the increasing requests from the potential tenants. To meet the initial housing needs of Jubail, the RCJY however built most of the first stock dwelling units, but the long term-goal has been to encourage the private sector, through the Chamber of Commerce to invest in commercial and residential development. Clearly the role of the private sector in the provision of housing and office accommodation increases with time. The private sector participation in the provision of social services such as health and educational facilities is actively encouraged.

The measures taken by the government to support the private sectors' participation in the various sectors of urban development will be discussed later. However, various types of incentives have been initiated to encourage private investments in the industrial, residential, commercial areas. It is hoped that in the future, when their organization is more developed, private investors will be confident enough to move into some aspects of social and physical infrastructure development.

The development plans

The comprehensive development plan for Jubail Industrial City was drawn up in 1978 by Bechtel, an American Engineering Company, which was also appointed to give managerial and technical assistance in its implementation. The plan was updated in 1984 by Candilis-Denco of Greece and a further updating by the RCJY staff was carried out in 1994. Both the original plan and its subsequent updates, based on the rich international experiences, represent well-composed settings for advanced urban images reflecting the cultural, social values and aspirations of the Saudi people.

The master plan consists of two major urban land uses; one is 80 square km industrial area and the north-west is a 90 square km community site, as shown in Fig. 2. The industrial area, based on irregular grid, consists of four industrial parks, primary, secondary support and light manufacturing. The economic heart of Jubail is the export-oriented primary industrial park which is planned to house twenty large capital and energy-intensive industries utilizing the Kingdom's rich hydrocarbon resources as fuel and feed stock for a broad range of refined petroleum products, petrochemicals and metals. The secondary industries park consists of a variety of operations producing upgraded feed stocks for domestic and international markets. In the support and light manufacturing industries park are located in smaller industries and commercial enterprises. Their role is to produce goods and services necessary for the construction industry and the operation of the primary and secondary industries.

The community is planned to grow along a large peninsula and on a coastal land surrounded by sheltered bay. The forty kilometers of continuous shoreline land with prevailing breezes provide ideal locations for housing, recreation and community facilities.

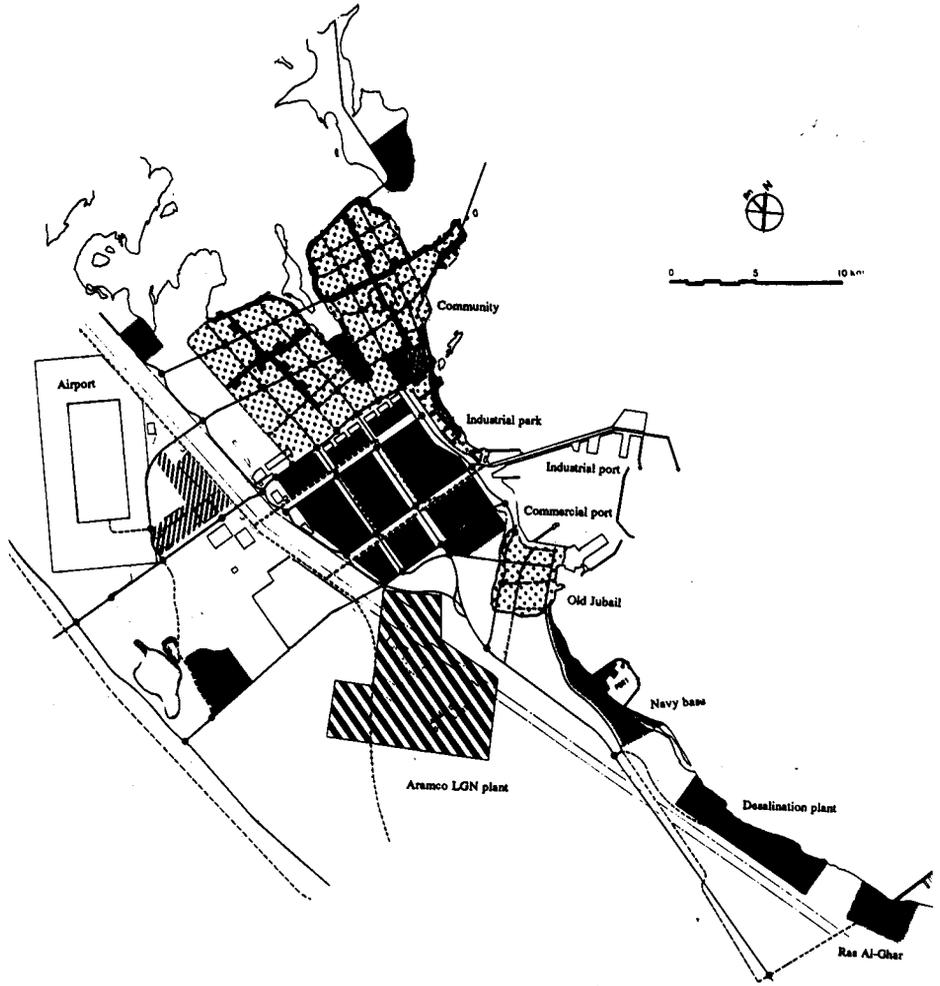


Fig. 2. Jubail Industrial City and its sub-region.

As shown in Fig. 2, the plan uses the "district" as the basic residential element consisting of four sectors, each consisting of a number of neighborhoods, each of which has a center of size and composition related to its population (2000-3000 people). To gain maximum accessibility, each district (of about 50,000 people) was clustered around a primary network mode. The community structure consists of the city or sub-regional facilities, communal center, government center, cultural center and marina, and a recreational complex including a hotel are situated in four independent locations. These are supported by eight districts, of 27 sectors, and about one hundred neighborhood centers.

The general concept is comprehensive based on the Garden City tradition with emphasis on organicism, cooperation, public land control and hierarchical cellularity. The plan sought to create one of the world's leading petroleum and mineral based industrial centers. As for the attention to the design and construction details, it is claimed that in the entire city every detail from the largest petrochemical refinery facility to the smallest tree or shrub has been planned, designed and raised from the desert floor in precise defined stages. It is one of the most highly engineered communities ever and one of the largest construction projects in the world [13].

Plan implementation instruments

The plan implementation instruments for the industrial parks area differ from those used in the community. A wide range of incentives are given to industrialist who want to invest in Jubail. There are also procedural guidelines and development control regulations to ensure compliance with the approved master plan.

Industrial area development instruments

The instruments used to implement the plan for the industrial Area of Jubail are mainly positive types which include the provision of physical infrastructure, financial incentives as well as administrative and other incentives [13].

a) *Physical infrastructure*: This package includes land and utilities. Investors with approved industrial licenses can get industrial land in the industrial park at very low rent. The graded lots of various sizes in all the parks have paved access roads with full on-site utility hook-ups. The services that are heavily subsidized for the industrial park users are portable and fire-fighting water, cooling water supply and discharge, sanitary and industrial waste and effluent disposal, electricity, telephone and industrial gas. Realizing the critical nature of good transportation system to industry, the planning and development of the city have ensured that effective and economic transport of manufactured goods to domestic and world markets, ensured for efficient and orderly movements of goods and materials to all industrial sites, and provided for safe and orderly movement of people within, entering or leaving the city.

b) *Financial incentives*: These consist of two types; tax relief and financial loans.

Some of the tax relief granted to investors include exemptions from custom duty and company tax. Normally custom duties are imposed on virtually all imported goods, but exemptions are allowed on imported machinery, spare parts and raw materials. There are also generous company tax holidays for new industries. Financial loans of up to 50% of the total project cost can be granted to the private investors by the SIDF and the Saudi Credit Bank for a term of between five and ten years without interest. For the public sector investors such as PETROMIN and SABIC, the Public Investment Fund was established to private industrial development finance.

c) Administrative and other incentives: An administration and Public Services Center is located in the park to provide complementary services such as administrative and commercial services, security, fire fighting and other services and convenience facilities. Other forms of non-site related incentives include licensing which is a form of protection and is obligatory for new and joint-venture industries. Government licensing assures protection and assistance but also implies compliance with valid regulations. Another form of incentive is that, in making large purchases by the government, preference is given to Saudi products over foreign goods of similar quality.

Community area development instruments

The type of development instruments used in the community include various kinds of incentives of physical nature, financial and those of administrative nature [12, 13].

a) Physical infrastructure: All land in Jubail is owned by the RCJY which leases it out for various lengths of time. The provision of serviced plots for various types of functions based on the approved comprehensive plan is a very important urban guidance instrument. Provision of access roads, water, sewer, electricity and telecommunication on a hook-up system is very important in guiding development. Also an important development incentive is the assurance given by the direct government investments in well-serviced residential districts where commercial and public facilities - such as schools, mosques, recreational and health - are provided and well maintained. While in many countries urban services are paid for with property tax, all improvements in Jubail and other urban centers are as of now funded by the government, because there is no property or other form of land tax levied on the consumer.

b) Finance: Through the REDF interest-free loans are available to provide finance to individual and corporate citizens willing to build in the community areas. The private loans have a limit of 300,000 Saudi Riyals (SR=\$0.27) which is usually repayable over a 25 year period. The Fund also provides investment loans to corporate entities for commercial loans, the limit of which is set for 10 million Saudi Riyals and repayable within 10 years. Additional incentives of discounts for borrowers who repay their loans earlier than schedule.

c) Other instruments: Most of these are positive measures which seek to alter the

free-market conditions so that it becomes more attractive for landowners to develop according to planning and government policies. The pattern and timing of provision of both physical and social infrastructures is an effective instrument used to guide the orderly development of Jubail Industrial City.

Achievements, Problems and Prospects

Achievements

The achievements of Jubail Industrial City can be assessed by its contribution in national, regional and urban development. At national level it has helped in the diversification of the national economy, greatly assisted in technology transfer and attempted to redress the problem of inter-regional imbalance. At the regional level its major contribution is the introduction of a new growth center on the Gulf coast. At local level, it can be seen as a laboratory for making industrialization and environmental enhancements reinforce each other and as a living experiment of a modern and vibrant community respecting Islamic values.

National level

It may be recalled that the primary purpose of building Jubail Industrial City is to assist toward the diversification of the Saudi economy. This goal can be said to be substantially achieved on the basis of the criteria of degree of attainment of planned targets.

First, it must be acknowledged that Jubail is now fully functioning industrial city and this in itself is the very important achievement. It has an effective city management agency which is well funded with well researched comprehensive development plan and a set of regulatory instruments. In 1992 its total population was 91,000 people with all that makes for comfortable modern living [14].

There is also commendable success in the implementation of the industrial plan as shown in Table 1. The number of industries at various stages of development included 18 primary, 19 secondary and 122 support and light manufacturing, all with an estimated value of US \$16.2 billion. Land utilization shows that the primary industrial area had 72%, but only 22% and 46% of secondary and support/light manufacturing leasable areas were leased as of December 1993 [12]. Similar to these land utilization results, the products output in the same period showed 75% of the planned primary industries were producing for sale in local and world markets, but investments in secondary industries in particular and also in light manufacturing were disappointing for reasons to be discussed later. The careful planning and nurturing of primary industries through massive injection of capital and effective control in all aspects of their operations ensured this success.

Jubail is making significant impact not only on the Kingdom's economy but also on the global market. For example, according to the Royal Commission the industries in Jubail

currently provide over 5% of the petrochemical products found in the world market [15]. Moreover contribution of the oil sector to the Kingdom's Gross Domestic Product (SR 440 billion) has decreased from 39% in 1991 to 34% in 1993. The industrial sector, with a total of 2,013 mostly light industries and total investments of SR 123 billion, has been one of the major contributors to the Kingdom's diversification achievements so far. The total foreign investments in these industrial projects reached 757 with total value of SR 70 billion [16].

Another measure of Jubail's achievement is the degree of confidence it has recently generated in the industrial investors, both local and foreign. Most of the primary and secondary industries are built through joint ventures with investors from various parts of the world including USA, China, U.K., France, Germany, Italy, Finland, Japan, Taiwan and Korea. There is also evidence that SABIC, one of the key investors in Jubail, is in its own right rapidly emerging as one of top global conglomerates. The Chemical Insight, a British petrochemical industry publication has, for example, recently ranked SABIC as the third best performer worldwide in global petrochemical industry and ranked twenty-fourth in term of sales. The good performance of the company is further reinforced by its decision to pay the sum of SR 2.0 billion in dividends to shareholders at the rate of SR 20.0 per share, which amounts to 20 percent of the face value of its share. This gives the Saudi Government SR 1.4 billion and its private investors SR 600 million in profit [17].

Acquiring advanced industrial technology is an important national goal. To achieve this aim SABIC, based primarily in Jubail, has initiated a series of heavy-industry and down multi-faceted stream industries programs based on joint ventures. Through these joint-ventures, it has succeeded in achieving the transfer of the state-of-the-art technology to the Kingdom from a wide variety of international sources. Important criteria used in

Table 1. Development of Jubail industrial park, December 1993

Status	Types		
	Primary	Secondary	Light manufacturing
Operational	16	4	73
Under construction	0	5	18
In planning/design stage	2	4	24
Proposed	0	6	7
Total	18	19	122
Expansion program under way	10	-	-
Capital investment estimates	US\$14bn	US\$1.8bn	US\$0.38bn
Land utilization			
o Total leaseable area (hectare)	2,720	654	505
o Leased to active industries (Ha)	1,945	141	231

the choice of joint venture partners included access to advance technology and their willingness to train Saudi staff at their operations around the world [18].

The Jubail Industrial College has been designed to offer comprehensive training programs in various technical disciplines in support of national industrialization and technological development goals. The main aim of the college is to provide high quality, job-oriented education that will produce qualified technicians able to meet the needs of industry. For training the personnel on the multi-million dollar 'Hi-Tech' equipment used in the Kingdom's modern industries, the Jubail Industrial College approached Honeywell Turki Arabia Limited. This arranges for specialized training for its graduating students [19, p. 13]. As a result Honeywell has built a facility in Jubail which is its third largest training center in the world. This is not intended to make Jubail the "technopolis of the Middle East" but it suggests future possibilities.

Jubail Industrial City has clearly made a significant contribution to the achievement of the Kingdom's stated goals of economic diversification and industrialization. It has also become an important technology and innovation center and at the same time it has made great contribution towards the development of the technological space of the Kingdom.

Regional level

The role of Eastern Province in national development is significant and the role of the emerging Jubail sub-region in the restructuring and the development of the Eastern Province is very important. In terms of industrial specialization Eastern Province is a dominant national force. As shown in Table 2, its share of employment (as registered by the General Organization for Social Insurance) is higher than the national percentages in the manufacturing, construction and mining and petroleum sectors. In the manufacturing sector Eastern Province had 44% share of the total capital invested in 1986, and has been increasing. In terms of number of industries and employment places, it had 23% and 27% respectively. The increase can be illustrated by the fact that in 1992 its sectoral share of the capital invested, number of factories and manpower in the nation had gone up to about 52%, 25% and 30% respectively [20]. The regional economic stability does not only depend on the sectoral distribution of employment but also on the stability of the demand that supports particular employment sectors. Thus the worldwide demand for oil and oil products makes Eastern Province an important pillar of the Kingdom's economic stability.³

The economic function of Jubail Industrial City is mainly associated with manufacturing industry. About 30% of the city's employment was engaged in manufacturing, as indicated in Table 2 [21]. This does not only help to increase the

3 The areas of the world with the highest rates of economic growth (China, South-East Asia and Latin America) have not been known to have enough oil to meet their needs. As their population increases, and their living standards increase their demand for oil obviously will increase. On the other hand, Saudi Arabia is the leading oil exporting nation to the world and most of the oil production is from the Eastern Province.

Table 2. Percentage employment* distribution: National, regional and sub-regional 1992

Sector	National	Eastern Province	Jubail sub-region
Agriculture & fishing	1.1	0.3	0.1
Mining & petroleum	5.6	15.1	2.7
Manufacturing	11.4	12.8	30.2
Utilities	3.6	3.1	4.0
Construction	28.2	31.7	18.8
Commerce & hotels	21.7	17.9	27.1
Transport & communication	5.1	5.2	1.2
Finance & real estate	4.8	3.6	4.7
Social & community services	18.5	10.4	11.2
Total	100	100	100
	100=1,108,343 workers	100=368,667 workers	100=42,123 workers

Source: [21]

*The workers are only those who were registered with General Organization for Social Insurance (GOSI).

Kingdom's industrial economic base but it also helps to diversify it with the production of petro-chemicals, steel and aluminum products, fertilizers, home appliances and furnishings, electrical parts and many others. Also in the sectors of utilities, commerce and hotel, as well as in finance and real estate, Jubail Industrial City had higher share than both the Eastern Province and the nation, as the Table shows. The high percentages in these sectors reflect the needs of the rapidly growing energy-intensive and capital intensive industrial city.

The creation of the Jubail and Yanbu projects is "intended to reduce the existing polarization of population, infrastructure and industry in such centers as Jeddah, Riyadh and Dammam by creating a balanced regional development" [7, p. 79]. The processes of construction and management of the city have led to the growth of its immediate region and have helped to achieve this goal. The emerging Jubail sub-region now consists of Al-Jubail old town, the Aramco NGL Plant, the naval shipyard with its compound, the King Fahd Industrial Port and the Saline Water Conversion Corporation's (SWCC) desalination plant and its community, see Fig. 2. The significance of the Industrial City to the sub-region can be illustrated by the fact that more than 58% of the 91,000 population generated by the city in 1992 was accommodated there and 28% lived in old Jubail and the remaining 14% were commuters from the sub-region, Qatif and Dammam [14]. As the hub of the sub-region, the rate of employment in the Industrial City is most likely to restructure the spatial system of the Gulf coastal region and the whole of the Eastern Province [22].

The chances of such restructuring are high. The region has a more balanced industrial structure than any region in the Kingdom. Most of the nation's heavy industries are

located in Industrial Jubail and all of them are rapidly expanding to meet market demands. Most of the secondary and light manufacturing industries in the Eastern Province are located in Jubail, Dammam (industrial parks 1 and 2) and in Hofuf. This balanced industrial structure is likely to result in the formation of networks connecting innovative entrepreneurs and organizations of various sizes and orientations. From these intense activities will emerge a dynamic spatial system which will encourage the free flow of information and eventual generation of innovation. The pre-requisites of such dynamic development already exist, very good air, road and sea links to both national and international markets, with very good recreational and cultural facilities to attract and retain workers of all grades. The region is increasingly attracting various types of organizations (social, financial and industrial) and institutions (universities, institutes and research agencies) which can create the conditions for the continuous generation of ideas and their investments in a process of production and distribution of goods and services.

Jubail experience has shown that new towns can be very useful instruments for regional and economic restructuring and for colonizing sparsely populated regions. However, the development of Jubail sub-region and its larger the Gulf coastal region need to borrow from the experiences of similar urbanized regions along large water bodies, for example the north-eastern coast and the shores of Lake Michigan in the U.S.A. and the shores of Lake Geneva in Europe. The area would eventually require a comprehensive regional development strategy which should consider both the short- and long-term needs and identify new niches that should be explored.

Local level

The main achievements at the local level can be grouped into three. The first is the setting up conducive planning and development agency with sufficient powers and resources to carry out the tasks assigned to it. The second is the advanced planning and design strategy adopted by the RCJY which is based on sustainable urban development ideas where industrial development and environmental protection reinforce each other. The third is unique community development promotion.

The RCJY has developed an effective municipal planning and development system. The agency was able to do this as a result of its enabling document which thought to achieve the government's goal of decentralization. The planning, development and management of the industrial municipalities of Jubail and Yanbu by a single agency has introduced into the Kingdom a series of innovative municipal practices and services. Against the background of municipal planning and development tradition which is centralized and where most of the municipal functions are planned and administered by the field units of central ministries, the structure and functioning of RCJY as a planning and development agency is innovative. The training of its personnel is indeed an important function on any progressive organization. However, in the case of Jubail, this

responsibility is carried further. As the development of the Jubail Industrial College suggests, this responsibility extends to the planning and implementing programs designed to promote the technological skills of Saudi youth. This includes skills that will be needed not only in the industrial production but also in the planning, development and the management of urban services. This unique situation of RCJY as a municipal planning and development agency which has adequate powers and resources, should be replicated or at least some of its key features and lessons should be applied to other municipalities.

The basic community goal for Jubail Industrial City "is to create through the efficient allocation of resources (land, labor and capital) an attractive social, economic and physical urban environment for the future residents" [23, p. 29]. There seems to a compelling evidence that the industrial achievements have been made without the unpleasant environmental side effects that have plagued heavy industrial concentrations in other urban centers of the world. The neighborhoods consist of modern well-designed communities that offer all pre-requisites for a high standard of living, guided by religious and customary traditions.

Other local goals of the Royal Commission are to achieve maximum benefits of industrialization with maximum environmental planning benefits. Two types of instruments were used to achieve these objectives. The first type consists of what might be called preventive instruments such as the setting up of an early warning system, which includes identification of special wildlife and archeological areas to be protected. Another measure is the use of appropriate plant design criteria for environmental pollution prevention and control purposes. A further measure is industrial facility inspection to ensure that factories comply with environmental regulations. The tool of pollution control by monitoring is also used to constantly monitor ambient air quality, industrial effluent, ground water quality and other environmental factors. The main elements of the monitoring program include stations for air monitoring, water sampling, landfill and noise monitoring, and advance laboratory and computer models. All these are preventive and control measures which have greatly reduced the level of pollution expected in the industrial city.

The second type consists of policies and programs of investments which seek to enhance the quality of the environment in the city and its sub-region. Jubail is not world famous for its extensive and generous landscaping of residential and industrial areas as well as parks, beaches and recreational areas. Attempt to make the desert bloom required massive investments in environmental research and development which included the fostering of local and exotic plants, landscaping and plant watering techniques using recycled water, soil stabilization as well as the control of greenhouse effect. Similarly, there is a research program of developing sea water irrigated Salicornia plant which the RCJY hopes may soon contribute "to the Saudi GNP by exporting another kind of oil replenishable, non-hydrocarbon and edible to customers in other parts of the world" [15].

The Gulf War oil fires and the earlier catastrophic oil spills have helped to focus world attention to the Kingdom and to Jubail Industrial City in particular. Therefore, the Royal Commission, along with some environmental and wildlife groups, has set up a facility near the city for use as Wildlife Rescue Center. Its main aim is to establish biological monitoring relating to oil spill and clean-up, and to study the long term effects of such disasters on the environment. The installation of hazardous wastes disposal system is yet another program resulting from patient research. With the active encouragement of the Royal Commission, a private firm has since 1989 provided comprehensive industrial waste disposal services to industries in Jubail and other areas nationwide [19]. All these preventive and developmental efforts are contributing towards maximizing the benefits of industrialization in Jubail while minimizing its environmental side-effects.

Turning to Jubail's achievements concerning community development, it seems that the quality of residential, educational, health, recreational, commercial and public security facilities have greatly enhanced the quality of life of the residents. Not only are the facilities designed to respond to the Islamic-Saudi culture and values, but they are also well equipped with ultramodern fittings. Employment opportunities are many and diverse. For example, besides participating in industrial production, a significant proportion of Jubail's population works in the commercial sector consisting of a total of over 300 groceries, restaurants, retail, financial and other services firm are functioning, while many more are being developed, as shown in Table 3. The spatial distribution of these facilities is such that local residents travel shorter distances to satisfy their shopping and business needs. The continued growth on the Industrial City is likely to attract commercial interests to meet the ever-increasing demand for products and services needed by the rapidly growing community. All these are bound to have positive impacts on the diversification of the economy.

The general community social and economic profile shows that a very solid foundation of virile community has been laid. As indicated above, the total population generated by the city in 1992 was about 91,000, out of which 58.2% lived in the city itself, about 27.8% lived in Al-Jubail and the remaining 14% commute from elsewhere in the region [14]. Within the industrial city about 50% lived , of whom 33% lived in Haii Al-Fanateer and 16% lived in Haii Al-Deffi. 92% of the Saudi Population was concentrated in these

Table 3. Commercial Development in Jubail Industrial City, December 1992

Status	Groceries	Restau- rants	Retail	Finan- cial	Office	Service	Total
Firms operational	27	26	104	13	35	102	307
Under construction	2	4	16	0	1	9	32
Lease in process	0	3	10	0	12	18	43

Source: [19]

two neighborhoods. In terms of ethnic composition, out of the 91,000 population, 51.25% were Saudis, 4.6% were other Arabs, 3.3% were Westerners and people from other countries constituted 40.9%. About half of the Saudis living in the city were in their teens (less than 20 years of age); this situation reflects the heavy investment in social infrastructure (schools, mosques and recreational facilities) by the RCJY to support the high percentage of dependent population.

The profiles of family status and household income show characteristics somewhat similar to those of other industrial new towns at the same stage of development. Out of the total workforce in the city, over 80% had single status in 1992, this can be attributed mainly to the large number of construction workers. Naturally the Saudis dominate the profile of the employees with families (about 77%). The average household size was 4.73 persons, but among the Saudis the household size was about 5.1. This seems to compare well with the regional average among the Saudis, but higher than average among non-Saudi. The average monthly income in the city was SR 3,126, and this was higher than national average of SR 2,884 [14]. The average income of operators (SR 3,809) was considerably higher than the average income of construction worker (SR 1,982). When the average income of the various ethnic groups are compared it was found that the Saudis with SR 5,651 had much higher than the average. It is also noteworthy that the average monthly income (SR 7,464) among Saudi construction workers was much higher than the overall average and higher than the Saudi operators' average, but the reverse was the case among non-Saudi workers [14].

Jubail's spatial structure seems to reflect the ideas of Ebenezer Howard more than those of Caliph Omar Ibn Al-Khattab whose instructions to leaders to Muslim armies on new towns stipulated that the main mosque should be the heart of the town with hierarchical system to routes radiating from it. But its buildings style and urban grain reflect Shari'ah values as well as modern technology and life style.⁴

Problems

During the planning and development of the Industrial city a number of problems have appeared and they need adequate attention. These include the problems of

4 There is a muted discussion among planners and designers on how best to develop urban environments appropriate for Muslims (see for example [28-31]). Such discussions need to be continued and large-scale developments such as Jubail offer opportunities for experiments. The planners and designers of Jubail have made detailed analysis and appear to have suggested strategies on how to encourage Shari'ah-value pertaining to privacy, segregation of sexes [24]. The Shari'ah-values relating to the revival, betterment and enhancement of the earth are to some extent reflected in the landscape development efforts of Jubail. At the urban level, the texture of neighborhood (Hii) development, especially the introduction of cul-de-sac and the division of space between private, semi-private and public functions tend to conform to local custom (*urf*) which some researchers suggest is sanctioned by the Qur'anic Verse 7:199 [30].

under-performance in the planned growth, sub-regional growth management, institutionalization, cultural image and environment issues.

The master plan technique has been used not only to define pace and direction of urban growth, but also to locate roads and utility networks, and to prescribe the nature and intensity of permitted uses. The initial master plan, for example, projected a resident population of 219,000 by 1989. However, as indicated above, the 1992 census showed that the number of the city's residents was 53,000 and a further 38,000 work there but live outside it [14]. There has been similar failure to meet planned targets in the Secondary and Light manufacturing sectors.

The problem could be due to both the rigid planning techniques and its use of over-ambitious assumptions and to the management's inability to attract adequate private investors. The plan was drawn up in 1978, a time of optimism when all OPEC member governments were experiencing unexpected inflow of revenues. On the other hand the failure to initially attract adequate Saudi private investors in the secondary and light manufacturing sectors, which the plan targeted for them, could be due to lack of investor confidence resulting from the two Gulf wars. The general worldwide slow-down in economic activities in the 1980s, could also be contributory factor. At the same time the expanding industrial townships of Dammam and Hofuf Ñ also based of secondary and light manufacturing, but nearer the large regional markets Ñ offered stiff competition to Jubail. The initial poor performance in the residential construction by Saudi private developers in Jubail could also be attributed to similar reasons and also to the slow down in the lending activities of the Real Estate Development Fund.

The Royal Commission did not have resettlement problem to handle because the city is situated in a sparsely populated region. There are a number of communities in the Jubail sub-region, which include the old Jubail town, the navy base, the Aramco camp and the Desalination Plant neighborhood. None of these communities is within the jurisdiction of the RCJY, but as they continue to expand, the problem of growth management of the sub-region would need to be addressed, especially the issues of land-uses, efficient natural resource utilization and environmental externalities.

The problems of ineffective coordination and frequent changes in policies, common in the development of some new towns, do not seem to apply in Jubail management of the Industrial City. There is, however, the issue of institutionalization common in company new towns" development which is often raised. This issue should not be totally ignored because it has been warned that "institutionalization or fear of living in a total institution" should be addressed as a real threat as it applies to Jubail and Yanbu" [5].

It normally takes about a generation for a new town of medium size to develop such an identity and to be culturally self-sufficient. Thus the residents of new towns have to wait for a long time to get the type and variety of cultural activities of their tastes. In many cases this situation results into regular weekend exodus by people dissatisfied with

cultural life available to them. There is no study to determine whether this is now a serious problem in Jubail Industrial City. However, a strategy should be developed so that when the construction workers are replaced by permanent residents, and the RCJY is replaced by a fully constituted civic authority, the city can create its own sense of urban and cultural identity.

As indicated above, the RCJY has issued guidelines pertaining to air and water quality, hazardous wastes, occupational health and noise. Effective monitoring of compliance of these guidelines is made to ensure prevention of environmental problems. However for more sustainable development approach, greater efforts need to be made to reduce demand on resource such as water and energy. There is an indication that demand for water is steadily increasing not only in Jubail but in all Gulf countries and ground water levels are falling steadily. Fresh water is produced mainly in desalination plants through a process which releases salt residues into the Arabian Gulf, which is now getting saltier with the potential for inestimable ecological consequences. As the world's largest desalination plant is in the Jubail sub-region, positive preventive measures need to be taken.

Prospects

Jubail Industrial City is clearly a powerful statement by Saudi Arabia of its desire to diversify its economy and to acquire modern technological skills with which its citizens can ensure continuity and change in national development with greater confidence. The city will continue to be the focus of rapid and dynamic urban growth of the Jubail sub-region. The increasing confidence shown by local and foreign investors in the development of the industrial city, its dynamic municipal administration system, the quality of its industrial and residential development, its use of research and development to ensure that industrialization and environment viability reinforce each other, are but few indicators that Jubail Industrial City will continue to do Saudi Arabia proud. It is also a worthy lesson for many countries on how to use new towns to achieve multiple national development goals.

This is the real contribution of Jubail experience as a new town to the general worldwide issue of the use of new settlements as instruments to achieve specific types of national, regional, and local spatial patterns of development. Beyond this, however, there are other lessons to be learnt from Jubail. An important lesson of Jubail is the use of new towns to achieve economic diversification, besides its use as a spatial development tool. Most recent internationally known new towns (Brasilia, Chandigarh, Abuja and Jubail) have been based on the technique of master planning, which is under increased criticism in favor of the more flexible process planning approach. The efforts of the RCJY to balance environmental sustainability with a high level of industrial output by means of largely preventive measures is a lesson which is becoming increasingly important not

only to new towns managers but also to all those concerned with the future of human settlements.

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المدن الجديدة وأثرها في التنمية الوطنية والإقليمية- دروس من مدينة الجبيل الصناعية في المملكة العربية السعودية

عمر بنا

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ملخص البحث. المدن الجديدة كانت ومازالت تستخدم كأدوات لتحقيق الأهداف والسياسات الوطنية والإقليمية، فالدراسات الحديثة التي تناولت المدن الجديدة تعطي الاهتمام إلى كل الأهداف التخطيطية الخاصة بالمدن الجديدة.

ومن أجل إظهار هذا الجانب المغفل، فإن تجربة ومساهمة مدينة الجبيل الصناعية في التنمية الوطنية في مستوياتها المختلفة، هي محل نقاش هذه الورقة بالتركيز على عدد من المتغيرات، مثل درجة الإنجاز لأهداف وأغراض التنمية الوطنية والإقليمية والمحلية، وأساليب الإدارة التخطيطية، وكذلك المشكلات والمعوقات التي تواجهها.

إن تجربة مدينة الجبيل الصناعية يمكن أن تقوم من خلال مساهمتها في التنمية بجميع مستوياتها. فعلى المستوى الوطني ساهمت المدينة في تنوع مصادر الدخل الوطني، وفي معالجة التخلخل الإقليمي، ونقل التقنية. أما على المستوى الإقليمي فيمكن أن تعتبر المدينة كمختبر لتوائم الصناعة مع البيئة، وكتجربة حية لمجتمع يقوم على القيود الإسلامية.

وخلال تخطيط وتنمية مدينة الجبيل الصناعية، برز عدد من المشكلات التي استرعت الاهتمام الخاص، مثل ببطء التنمية، إدارة منطقة النفوذ، النواحي الإدارية، النظرة الاجتماعية للمشروع، والمشكلات البيئية. ولكن بالرغم من كل هذه المشكلات والمعوقات، إلا أن المشروع حاز ثقة المستثمرين الأجانب والمحليين للمساهمة في تطوير الجبيل الصناعية، بجانب الإدارة البلدية الناجحة، ونوعية التنمية الصناعية والاجتماعية، والاستخدام الأمثل للموارد، التي أكدت أن الصناعة والمحافظة على البيئة كانت من المؤشرات لنجاح المشروع وجعل تجربة مدينة الجبيل الصناعية جديرة بالدراسة والاستفادة منها عالمياً.