THE MINERALS SECTOR AND SUSTAINABLE DEVELOPMENT IN SAUDI ARABIA

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ABSTRACT

There is no doubt that the mining sector is considered to be the backbone of many countries. Furthermore, it has played an important role in the prosperity of nations, whether developed or developing. Saudi Arabia is one of these countries that has a large variety of metallic and non-metallic mineral resources that range in size and value occurrences of limited potential to deposits large enough to sustain profitable exploitation. Therefore, the Saudi government needs to reinforce the capacity of the sectoral institutions to better regulate and promote the sustainable development of the sector. The ability to overcome the administrative and legal complications that constrain private sector participation in the minerals sector through new mining code which will streamline the procedures for obtaining licenses and will add more predictability and transparency to the application process are proposed for increasing the sustainable development. This paper will outline how the Saudi government is tackling the major challenges that face the minerals industry. This paper provides the background to the Saudi Arabian mineral sector and its industrial base. Finally, the paper identifies the problems and constraints that face the minerals sector in Saudi Arabia and provides an assessment of the effects of government policies and planning efforts in the minerals sector, particularly during the period of the development plans which started in 1970.

Keywords: Minerals sector, Sustainable development, and Saudi Arabia.

INTRODUCTION

There is no doubt that the mining sector is considered to be the backbone of many countries. Furthermore, it has played an important role in the prosperity of nations, whether developed or developing. Saudi Arabia is one of these countries which has a large variety of metallic and non-metallic mineral resources that range in size and value occurrences of limited potential to deposits large enough to sustain profitable exploitation. The traditional view is that countries that are considered natural resource abundant economies are fortunate: these resources are assets - part of a country's natural capital. Mining is the key that converts mineral wealth into public infrastructures and other forms of capital that directly contribute to economic development (Davis and Tilton, 2005). According to Davis and Tilton (2002, p: 6), "mining plays an important role in the development process by converting mineral resources into a form of capital that contributes to a nation's output". Further, according to the traditional view, mining, like other economic activities, plays an important role in the development process and can convert 'a mineral resource in the ground into sustainable improvements in people's lives' (Togolo, 1999, p: 597).

However, an opposing view, which has emerged over the past three decades, is more negative regarding the relationship between mineral extraction and economic development. Mehlum et al. (2006a), conclude that this view is considered one of the important empirical findings in development economics in the 20th century and proposes that natural resource abundant economies have tended to grow more slowly than economies without substantial resources. Humphreys et al. (2007, p: 1) state that "The term of "Resource curse" is used to describe the failure of resource-rich countries to benefit from their natural wealth. Perversely, many countries rich in natural resources are poorer and more miserable than countries that are less well endowed".

Papyrakis and Gerlagh (2004) conclude that resource riches such as oil reserves have not proved to be the panacea to underdevelopment. On the contrary, they have become associated with a slowdown in economic growth across the world during the last three decades. For example, growth losers, such as Nigeria, Zambia, Sierra Leone, Angola, Saudi Arabia and Venezuela, are all resource-rich, while the Asian tigers

such as Korea, Taiwan, Hong Kong and Singapore, are all resource-poor. One of the most striking manifestations of the resource curse hypothesis is the disappointing performance of the oil cartel countries. Some of the OPEC countries have actually experienced a negative rate of GDP per capita growth over the last four decades (Gylfason, 2001). There are many modern analysts who consider that the advent of oil has led to economic deterioration, if not ruin, for "petrostates" (Wright and Czelusta, 2003).

Mehlum et al. (2006b) stated that we should not jump to the conclusion that all resource rich countries are cursed, and many growth winners such as Botswana, Canada, Australia, and Norway are rich in resources. Moreover, of the 82 countries included in a World Bank study, five countries belong both to the top eight according to their natural capital wealth and to the top 15 according to per capita income (World Bank, 1994). So, while a poor economic performance has undoubtedly been the experience in some situations, recent empirical case studies have shown that while this might be true in some countries it is not the case in others (Roe, et al. 2004; DiJohn 2002).

Regarding to sustainability in the mineral sector, there is a famous and well cited saying by Ahmed Zaki Yamani who was Saudi Arabia's Oil Minister from 1962 to 1986, and was a very prominent figure in OPEC that "The Stone Age came to an end not for the lack of stones and the oil age will end, but not for the lack of oil" (Leggett, 2005). This could be meant to imply that even though some resources are perceived as 'finite' and extracting them is therefore 'unsustainable', there are always opportunities for future societies to meet their needs such as alternative resources or technology (Mudd and Ward, 2008). In addition to the extent of mineral resources over time, critical factors in understanding the sustainability of mining include environmental costs, namely solid waste burden, declining ore grades as well as energy, chemicals and water inputs and pollution outputs, especially greenhouse emissions (Mudd, 2007). Therefore, the Saudi government needs to reinforce the capacity of the sectoral institutions to better regulate and promote the sustainable development of the sector. Moreover, the ability to overcome the administrative and legal complications that constrain private sector participation in the minerals sector through new mining code

which will streamline the procedures for obtaining licenses and will add more predictability and transparency.

This paper will outline how the Saudi government is tackling the major challenges that face the minerals industry. This paper provides the background to the Saudi Arabian mineral sector and its industrial base. Finally, the paper identifies the problems and constraints that face the minerals sector in Saudi Arabia and provides an assessment of the effects of government policies and planning efforts in the minerals sector, particularly during the period of the development plans which started in 1970.

METHODOLOGY

In order to assess the relationship between sustainable development and minerals sector in Saudi Arabia and the role of government policies and planning efforts in development of the minerals sector, and thus the problems and constraints that face the minerals sector in Saudi Arabia, various methodologies have been used in this study. These were influenced by several variables related to the nature of this research. It is often very difficult to gather everything related to the subject under investigation, but sometimes it is impossible when the study lies in a developing country such as Saudi Arabia. Generally, research studies are conducted for the purpose of obtaining data that are not available from other sources regarding a specific area of knowledge.

Obtaining empirical data for this research has been achieved by using three different techniques: interviews, documentation and observation. The reason for using three methods is to gather as much information as possible about the evaluated project. Interviews provide in-depth investigation, field observation provides information about the tasks and activities performed inside the project environment, and both documentation and archival records provide related documents detail the project activities over the past years. Based on Yin (1994), the various methods of collection data are highly complementary to each other. Benbasat et al. (1987) argue that these multiple sources of evidence aim to obtain a rich set of data surrounding the specific issue of research and capture the contextual complexity. However, the method selected depends on the goals and objectives of the research, the sample of

respondents involved, the time set for the completion of the study, and financial considerations.

A variety of materials and data that pertain to aspects of minerals sector that relate to the topic of the research have been covered from the municipalities and some ministries , and are as follows:

- Ministry of Petroleum and Minerals Resources (MPMR);
- Directorate General of Mineral Resources (DGMR);
- Deputy Ministry for Mineral Resources (DMMR);
- Ministry of Planning (MOP);
- Ministry of Information (MOI);
- Ministry of Finance and National Economy;
- King Abdulaziz City for Science and Technology (KACST);
- Saudi Geological Survey (SGS); and
- Saudi Arabian Mining Company (Ma'aden).

The data used in this research includes numerous official documents and records that were obtained from various government and private sector departments. Needless to say, the Saudi Arabian Mining Company (Ma'aden), the Saudi Geological Survey (SGS) and the Ministry of Finance and National Economy come first, but other departments supplied a great deal of information concerning many aspects of the study. The most important of these data sources were the five National Development Plans (Ministry of Planning), the Statistical Yearbook series, the Private Establishments Census and the International Trade Statistics (Ministry of Finance and National Economy).

THE ECONOMIC IMPORTANCE OF MINERALS

The mining sector has played an important role in the prosperity of nations, whether developed or developing. This importance of minerals increased in the second half of the nineteenth century as the demand for high-grade industrial raw materials rose. There are about fifty countries in the world in which the mining sector plays an

important role in the economy. Australia, Chile, Peru, USA, South Africa, and Canada are the leading regions in today's global mining investment. The importance of minerals comes from the essential needs of manufacturing, construction, energy requirements and agriculture and thus for the sustainable development of a modern economy.

Mining has played a vital role in the economic development of many southern American countries, including Chile, Peru and Brazil. Relying on Wright and Czelusta, (2003, p: 19) since 1990, Chile has been "Latin America's star economy". Copper production in Chile was resurrected in the first half of the twentieth century and took place in the absence of strong domestic technical capacity. Chile is the most important country in Latin America, for copper or minerals and has gained 46 per cent of export revenues and 8 per cent of GDP on average during the 1990s.

The mining sector is a major contributor to Peru's sustained economic growth. Peru hosts vast quantities of minerals such as gold, copper, silver, lead and zinc. After more than twenty years of isolation from direct foreign investment, the mining scene is changing as political and economic stability have brought renewed interest in Peru as a resource rich investment opportunity for foreign companies. Most of the restrictions have been removed and the government has instigated a variety of incentives for foreign investment. After the privatization programme, which started in 1992, mining exports doubled to $3.01 billion by 1999 (Wright and Czelusta, 2003). In 2005, mining production represented 13.5 per cent of the GDP and comprised nearly 54 per cent of total exports (Jochamowitz, 2005).

Brazil is considered one of the leading industrial nations in Latin America. Mineral production grew at more than 10 per cent per year in the 1980s. Between 1988 and 1994 exploration was interrupted because of restrictions imposed by the Constitution of 1988 on foreign participation in mining. These restrictions were lifted in 1995 and exploration activities expanded significantly in the 1990s, increasing both production and reserves of most minerals. Brazil produces more than 60 mineral commodities and is the world's largest exporter of iron ore (Wright and Czelusta, 2003). Also,

during the present gold rush, Brazil ranks first in South America and second in the world in gold production (Malm, 1998).

Minerals are a principle source of income for many developing countries in Africa as well. For example, the minerals sector has played a vital role in the economic development of Namibia. The mining industry was developed relatively early, based mostly on diamonds discovered at the turn of the century (Hartmann, 1986). Based on Coakley (2003), the diamond remained the most important sector of the mining industry in Namibia, followed by uranium, for which Namibia ranked as the world's sixth leading producer. In 2003 the government spent more than $35 million on exploration for minerals, with more than 80 per cent of this amount devoted to offshore marine diamond exploration.

Mining is a vital sector in the economic development of many industrialized countries such as Australia, United States of America, United Kingdom, Canada and Sweden, which have largely depended on their natural resources for the development of their country (Alfi and Zagan, 2004). Based on Highley et al. (2004), the complex geological history of the UK and its adjacent Continental Shelf has contributed much to its national wealth, in that coal and iron ore resources supported the development of the Industrial Revolution. Now the UK produces a wide range of construction minerals, notably aggregates, and industrial minerals such as salt, potash and kaolin. This domestic mineral production will be of continuing economic importance.

Australia is considered the most striking success story. At the beginning of the 1960s, Australia witnessed a simultaneous resurgence of successful minerals search and economic growth. From 1989 to 1999, Australian mineral reserves expanded alongside production. The Australian minerals sector has created much more wealth than it has depleted, in that the real value of the mining sector's capital stock increased by 40 per cent during 1990-1998, almost twice the rate for all other industries. Australia has emerged as one of the world's leaders in mineral exploration and development technology: "Australia leads the world in mining software and now supplies 60 to 70 per cent of mining software worldwide" (Stoeckel 1999, p: 25).

The Kingdom of Saudi Arabia has natural resources that are highly diverse, both in terms of their variety and their location throughout the country. According to Dabbagh, the President and CEO of Ma'aden Company, is quoted in an interview as saying "The Arabian Shield rock formation in the west of the Kingdom is a little smaller than the Canadian Shield, and we are optimistic that it contains a similar amount of riches" (2004, p: 11). So, Saudi Arabia has a large variety of metallic and non-metallic mineral resources that range in size and value occurrences of limited potential to deposits large enough to sustain profitable exploitation.

THE CONCEPT OF SUSTAINABLE DEVELOPMENT AND MINERALS SECTOR

In spite of the term sustainable development now being widely used within government, business and the wider community, there is no generally accepted definition of sustainable development and there is much debate about the scope and practical application of the concept. The classic definition of sustainable development, as stated by the Brundtland Commission statement that, is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987, p: 43). However, there are some who argue that mining is fundamentally incompatible with sustainable development, and can contribute negatively to sustainable development because it involves the extraction of non-renewable resources. From this perspective, the best that the industry can hope to do is to minimize its 'footprint' and improve resource efficiency. The alternative view is that mining can actually contribute positively to sustainable development by converting physical resources into new forms of economic and human capital, and by leaving a positive legacy in the areas where mining has taken place (Brereton, 2003).

Relying on the report of Mining, Minerals and Sustainable Development Project (MMSD) (2002) applying the concept of sustainable development to the minerals sector does not mean making one mine after another sustainable-whatever that means. The challenge of the sustainable development framework is to see that the minerals sector as a whole contributes to human welfare and well-being today without reducing the potential for future generations to do the same. Thus the approach has to be both

comprehensive taking into account the whole minerals system and forward looking setting out long term as well as short term objectives. If the minerals sector is to contribute positively to sustainable development it needs to demonstrate continuous improvement of its social, economic, and environmental contribution, with new and evolving governance systems. The sector needs a framework within which it should judge and pursue any development. Using minerals to build a sustainable development requires some principles that help to implement the concept. These are:

- adoption of a 'beyond compliance' philosophy by companies and individual sites.
- a strong focus on resource use efficiency and waste minimization (that is, 'eco efficiency').
- responsible stewardship of the natural environment.
- mine closure policies that aim to leave a positive long-term legacy - both environmentally and socially.
- responsible and safe workforce management practices.
- sensitivity to local community concerns, combined with a commitment to advancing the long-term social and economic well-being of communities affected by mining.
- integration of economic, social and environmental considerations into corporate decision-making processes (Brereton, 2003).
- an understanding of the key challenges and constraints facing the sector at different levels and in different regions and the actions needed to meet or overcome them along with the respective roles and responsibilities of actors in the sector.
- a process for responding to these challenges that respects the rights and interests of all those involved is able to set priorities and ensures that action is taken at the appropriate level.
- an integrated set of institutions and policy instruments to ensure minimum standards of compliance as well as responsible voluntary.
- verifiable measures to evaluate progress and foster consistent improvement (MMSD, 2002).
- policies that maximize resource rent generated by mining.
- recovery of resource rent by an agency able and willing to reinvest rent.

- reinvestment of rent in other assets that are capable of generating income and employment once resources are exhausted, such as human capital, public infrastructure and manufactured capital (Lange, 2003).

MINERALS AND SUSTAINABLE DEVELOPMENT IN SAUDI ARABIA

The kingdom of Saudi Arabia is largely considered to be a single-commodity economy, in that the oil sector is the most important pillar of the national economy, while the non-oil sectors have relatively weak roles. The government, having realized the risks of this dependency, has taken delineated action to make the best use of the huge oil-revenues to develop all sectors of the economy through the planning process. Considerable attention has been paid to the minerals sector and various policies and programmes have been undertaken to increase its productivity. Furthermore, it has been regarded as a strategic factor for the inducement of future economic and industrial development in the country due to the Kingdom's enormous and relatively untapped mineral resource base. Thus, the minerals sector has the potential to play a key role in the national economy. The mining Activities require appropriate environmental management in all fields particular to mineral exploration, processing, extraction and production. Therefore, economic and environmental issues must be considered when taking a decision related to any mining project, taking into account that mineral deposits are non-renewable. The community's social and economic needs must also be considered taking into account that such minerals, particularly non-metallic minerals, constitute huge reserves for the use of future generations through integrated and advanced programs and plans.

The real minerals development in Saudi Arabia was after the establishing of the national development plans that started in 1970. This section presents the seven national development plans, in order to investigate briefly the major characteristics and achievements of each plan, and to highlight the role of government in applying the sustainable development in the minerals sector, based on the official information released by Ministry of Petroleum and Mineral Resources.

The first development plan started in September 1970 as part of the overall national Five Years Plan. During the period of the ***First and Second Development Plans***

(1970-1980), the Directorate General of Mineral Resources continued its dual programme of basic geological and geophysical work and of specific mineral investigation. The greater part of this programme was carried out by the two geological missions: the United States Geological Survey Field Party and the Bureau de Recherches Geologiques et Minieres through contracts financed from the budget of the Ministry of Petroleum and Mineral Resources. A small team of geologists and other technical personnel from the Geological Survey of Japan was also engaged on a mineral exploration project (DGMR, 1971).

Furthermore, the opportunity was taken to introduce within the framework of these plans a general reorganization of the functions and performance of the technical departments of the Directorate General. About the same time the Centre of Applied Geology was established in Jeddah as a joint project financed by the United Nations Special Fund and the Saudi Government. The majority of Saudi geologists working in the Directorate General who had not already received postgraduate training were enrolled in a two and a half year course at the Centre to equip them to take a productive part in the programme of the Directorate General. Research programmes were continued by the Mining Geology Department of Imperial College of Science and Technology, London, and the Department of Earth Sciences, University of Leeds, under the direction of Professor G. R. Davis and Professor I. G. Gass respectively, with small teams of postgraduate students. Most of the core drilling required under the Directorate General's programme was undertaken by the Arabian Drilling Company under contract, although the USGS also maintains a small drilling unit (DMMR, 1981).

Progress in the mineral resources sector during the ***Third Development Plan*** (1980-1985) was more practical than the first and second development plans. Under this plan, the Deputy Ministry for Mineral Resources was entrusted with the responsibility for extensive programmes of mineral exploration and development, basic geology, geophysics, geochemistry and for the provision of technical services supporting these activities. Sound progress was made during this plan, with particular emphasis being given to the exploration for gold, zinc and the granitophile minerals, such as tin, tungsten, niobium, tantalum and the rare-earth elements. Underground exploration at the Jabal Sayid copper deposit was started, and substantial drilling programmes were

carried out in the Sirhan-Turayf phosphate and the Az Zabirah bauxite deposit (DMMR, 1984). The Ministry of Petroleum and Mineral Resources has taken precautionary measures by locating all mining activity sites away from populated areas. It also takes all actions and measures as required to avoid the adverse effects of pollution. The Ministry constantly issues strict instructions and rules when giving licenses for the sake of protecting the environment.

Geological mapping of the Arabian Shield at 1:100,000 scale was well advanced, with more than 80 percent of the fieldwork now finished. An unusually large amount of airborne geophysical work was undertaken; radiometric surveys were flown over 11 areas on the shield, and a combined magnetic and radiometric project was started over the Phanerozoic rocks east of the shield. Work towards the establishment of mines at the Mahd Adh Dhahab gold deposit, at Al Masane zinc-copper-gold-silver deposit and at Nuqrah silver-zinc-copper-gold deposit was continued by mining companies working under exploration licences (DMMR, 1982). In addition, the Deputy Ministry itself examined the Wadi Sawawin iron ore deposit as a possible domestic source of ore for the new iron and steel industry and contracted with British Steel Corporation (Overseas Services) to carry out all work necessary for a full feasibility study (DMMR, 1981). By the end of the Third Plan, mapping at 1:100,000 and 1:250,000 scales had been completed over the whole Arabian Shield, comprising an area of 650,000 km2. Responding to the need for geological maps to assist mineral exploration in the Phanerozoic Cover Rocks, a 1:250,000 scale mapping programme was started by the Deputy Ministry for Mineral Resources. At the end of the Third Plan seven maps had been published and another four were being prepared (DMMR, 1985).

As part of the Government's overall diversification policies, major emphasis was to be given to developing the mineral sector during the ***Fourth Development Plan*** (1985-1990) period and beyond. Although non-oil mineral resources were far less significant than oil mineral resources, their development had the potential to contribute to the economic diversification of the Saudi economy. Exploration and development of non-hydrocarbon mineral resources has, therefore, been a consistent objective of the government throughout successive Development Plans. The fifth basic strategic principle states in this respect: "Developing economically promising natural

resources, such as the exploration of mineral and sea resources, the mapping of their location, their further development and utilization, and the processing of available natural gas to the maximum extent possible" (MOP, 1990, p: 183).

Therefore, one of the major objectives of the fourth development plan was to encourage the discovery, development and utilization of mineral resources. This was transformed into a set of detailed policies for the mineral resources and mining sector as follows:

- surveying and recording the geology of Saudi Arabia as a basis for mineral exploration and other applications in agriculture, industry and construction;
- prospecting for all types of mineral resources;
- exploring mineral occurrences for exploitable ore, applying modern technological and theoretical concepts;
- investigating and assessing infrastructure and economic cost conditions which affect mining development;
- encouraging the development of mining support services and downstream processing industries;
- evaluating mineral deposits and conducting prefeasibility studies;
- providing information services to the private sector;
- promoting the formation of joint-venture companies to invest in mineral projects;
- advising the community on the practical significance of geohazards and application of construction materials;
- training Saudi nationals in the practical application of geosciences and mining engineering (MOP, 1985).

Moreover, in line with the plan strategy, the main impetus for development was expected from the private sector, in joint ventures with either foreign companies or Petromin. With the revision of the mining code, the Government intended to create an environment conducive to investment and there was a positive response from the private sector. In this plan the shift from basic geological research towards mineral exploration and mining development was increased. Emphasis was on direct support

to the national industry and economy rather than scientific work. Some activities were organized in this plan to implement the policies of this plan. The Mineral Exploration Programme was the core of DMMR's activities. The range of target commodities included both those with export potential and those which could promote national industrial and agricultural development. A programme for Exploration Geochemistry, Geophysics and Drilling provided the specialized facilities that were required in mineral exploration. Support programmes were concerned with the provision of services such as laboratories, specialist equipment, publications, storage and transportation facilities. In addition, DMMR's Management and Administration Programme was concerned with the overall planning and management of DMMR's activities and of the other operating units (such as foreign missions). An intensified training scheme for Saudi geoscientists, technicians and administrative staff at all levels was included in this programme (MOP, 1985).

The highlight of the ***Fifth Development Plan*** (1990-1995) was the directive of the Custodian of the two holy mosques (King Fahad), which with the strategic principles, constituted an attempt in the fifth development plan period to overcome the administrative and legal complications that constrained private sector participation in the minerals sector and included issuance of the regulations governing mining activity, as well as mining concessions. The Saudi mining industry was in its infancy and lacked the necessary expertise, so every possible effort had to be made to promote the participation of specialized international foreign companies in investment in the Kingdom to facilitate the transfer of technical knowledge. Also, the mining and tax laws were modified and a business-like approach adopted with a view to keeping abreast of on-going progress in this field (MOP, 1985).

In the early stages of this plan, the Council of Ministers provided guidelines for the DMMR to promote the development of the mining sector. The DMMR was instructed to publicize those deposits likely to prove exploitable and to invite experienced mining companies to submit applications for exploration licences and for mining leases as appropriate, to be issued under the provisions of the Mining Code. The Zarghat magnesite was the first deposit to be publicized and was later licensed to Petromin. The growth of the minerals sector during this plan expanded because of the

recovery in domestic construction, as well as continuing substitution of imports of foreign construction materials with locally produced materials.

The DMMR continued to implement its wide-ranging mineral exploration programme with increased emphasis on exploration for near-surface gold mineralization. There was testwork on the Wadi Sawawin iron ore deposit which was undertaken following the signing of a contract in late 1990 between the DMMR and British Steel Consultants Ltd to provide a report on the technical feasibility of the project. Late in 1991, the DMMR discovered huge resources of silica sand at Al Butayn near Riyadh, some of which would be utilized in two new glass plants under construction in the area. Furthermore, this plan was marked by the completion of the economic assessments of the Az Zabirah bauxite, Wadi Sawawin iron ore, Al Jalamid phosphate and Khnaiguiyah zinc deposits, and by the issue of the Mining Regulations. A Mining Lease was granted for the development of the Al Masane polymetallic sulfide deposit in the southwest of the Kingdom. An airborne thematic imaging survey was made of 74,000 km2 of part of the Red Sea coastal plain and parts of the Arabian Shield.

At the end of this plan, the opportunities for world-scale mining projects in the Kingdom were made available to foreign investors with the publicizing of the Az Zabirah bauxite, Wadi Sawawin iron ore and Al Jalamid phosphate deposits, following the completion of technical and economic assessment studies. Companies specializing in the mining and processing of such ores were invited to submit proposals for the exploitation of the deposits. As a means of encouraging interest in the Kingdom's mineral potential, the DMMR published the Mineral Resources of Saudi Arabia. Also, an important publication issued by the DMMR was the Atlas of Industrial Minerals. Mining investment seminars were held in the Kingdom, the United States of America and Canada (DMMR, 1995).

The mineral activity in Saudi Arabia in the ***Sixth Development Plan*** (1995-2000) was expected to grow at a target rate of 9.1 per cent annually, thereby targeting it as the fastest-growing sector of the economy. The Saudi government has increasingly viewed the private sector as an engine of growth for the mining sector. The government's focus in this plan had been on building the legal and institutional infrastructure to encourage the private sector to invest in this promising sector.

According to Babhair (2002), in August 1997 the Council established the basic rules for the transfer of public assets to the private sector, including:

- increasing the share of the private sector in GDP;
- expanding the scope of public participation in projects;
- encouraging local and foreign investment;
- increasing job opportunities and employment for the national workforce;
- providing services to citizens and investors at the appropriate time and cost;
- raising the competitiveness of the economy;
- rationalizing public spending and easing the burden on the state budget by giving the private sector a chance to provide some services; and
- increasing state revenues from partnership projects.

The DMMR continued to provide geophysical support services and conduct environmental geohazard and seismic monitoring programmes, as well as maintaining responsibility for technical support services provided by the Mineralogy-Petrology Laboratory, the Chemical Laboratory, the Remote Sensing Centre, and the Technical Reports Unit. During this plan the strengthening of the human resources potential was a particular focus with training and formal classroom exercises. Fieldwork included the joint completion of exploration, drilling and mapping programmes and training of Saudi staff in the laboratory and in the computer centre. From these developments, in April 1997 the Saudi government established the state-owned Saudi Arabian Mining Company (Ma'aden), which consolidated all mining projects in which the government was involved. This company is a 100 per cent Saudi governmental holding company with an initial capital of more than $ 1 billion, reporting directly to Ministry of Petroleum and Mineral Resources, and the Minister himself is the chairman of the board. This well capitalized company is part of the Saudi Government's national planning objective to diversify the income of the Kingdom into the non-hydrocarbon sectors.

Ma'aden is proactive for the entry of private sector companies into resource projects. It does not have monopoly rights, and operates on a commercial basis under the

mining code as applied to all mining companies in the Kingdom, either independently or in joint ventures with Saudi or foreign companies. Shares in the company will be offered for public subscription, either partially or wholly, once the company starts operating profitably. Ma'aden has taken over Petromin's interests at the Mahd Ad Dahab gold mine and in the Saudi Company for Precious Metals gold mine at Sukhaybarat. Ma'aden presently has three operating gold mines and three projects under consideration for gold and magnesite. The company's significant priority is the development of phosphate in the Northern Region with integrated fertilizer operations on the Gulf Coast. These, together with the potential for an integrated bauxite-alumina facility, will permit the KSA to realize its potential as a world-class source of minerals and downstream products. In May 2004, the Saudi Government approved the initial steps to privatize Ma'aden. According to the Supreme Economic Council, the privatization of Ma'aden will take place in phases. Once privatization is complete, Ma'aden will have four strategic units specializing in basic metals, phosphates, bauxite, and aluminum and industrial minerals (U.S.-Saudi Arabian Business Council (USABC), 2005).

In a second development, on 25 October 1999, the Saudi Geological Survey (SGS) was established as an independent entity by Royal Decree and attached to the Ministry of Petroleum and Mineral Resources. The role of SGS is similar to those of most geological surveys worldwide and includes: geological research, geochemical, geophysical and hydro geological surveys. It uses the most advanced methods in research and exploration for mineral resources. Moreover, it presents pre-feasibility studies of promising ore deposits to assist the mining industry and offers consultancy services relating to its activities to government and private agencies.

According to Ma'aden (2005) the Mining business comes with a vital responsibility for the conservation and protection of the environment. It is in this key concept that Ma'aden developed its Proposed Corporate Environmental Policy highlighting its commitment to the sustainable use of natural resources and conservation of the environment. These comprise the conservative exploitation of mineral resources; protection of natural resources during operations; and reclamation and improvement of soil, air and water resources following the development of all operations. The creation of these principles is vis-a-vis with the corporate intent of Ma'aden that the

fragile ecosystems of the Kingdom must be conserved for present and future generations. In order to realize this, continuous application of the latest and modem practices in environmental conservation management are required. Moreover, the company has established a key set of environmental principles which include conducting its operations in compliance with all applicable regulations and within the guidelines and standards of national and international good mining practice; undertaking regular monitoring and auditing of environmental, health, and safety performance of its operations; ensuring that employees and contractors are fully aware of their environmental obligations and requirements; and maintaining an employee training program aimed at continual improvement in safety and environmental protection within the workplace.

It is also a strategic approach of Ma'aden to consider the environmental management required during the entire cycle of the mining project, from the inception of mining through to mine closure and beyond. Future costs of proper environmental management are identified and provided for, so that there is adequate funding for these purposes at all times during the life of the venture. Therefore, Ma'aden will ensure that all practical steps to minimize adverse environmental impacts are taken on as quickly as possible; improve the company's anti-pollution commitment through the incorporation of the most appropriate technology; conserve resources by establishing economically viable plans to treat or recycle processed waste; prevent deterioration in the environment of the local community in the vicinities of the company's properties; and rehabilitate all sites so that there is an appropriate and sustainable end use for these sites. These core environmental initiatives of Ma'aden are rooted in its mission of to build a diversified, profitable, international mining company that is efficient and effective while maintaining utmost care for human resources, safety, environmental and social issues. Thus, its mining operation is coupled with the social responsibility of protecting and conserving the environment for future use.

Although to date the minerals sector has made a limited contribution to the Saudi Arabian economy, the government believes that it can contribute significantly and, hence, is trying to enhance its role in the economy. Minerals have been highlighted in the ***Seventh Development Plan*** (2000-2005), and there are big ambitions for the part they can play in the future prosperity of the country. In the Seventh Development Plan

the annual growth rate for the non-oil mineral sector was set at 8.34 per cent a year and was expected to grow at a target rate higher than any other sector of the economy. Integral to the attainment of this rate of growth will be two factors; the proposed new Mining Code and the Saudi Arabian Mining Company (Ma'aden). The Deputy Ministry for Mineral Resources (DMMR) is the sole supervisory agency for the application of the Mining Code, which lays down all the premises for mineral operations in the Kingdom.

Al-Attas (2004) stated that, during the past two decades the large-scale expansion of domestic mineral-based industry has resulted in a steep rise in production. For example, eight cement factories finished their planned expansion and increased their capacities by 40 per cent in 2002. The output expansions of iron and steel and fertiliser production have been based on imports of their raw materials such as iron ore, coking steel scrap, phosphoric acid and potassium chloride. In 2002, the total mineral-based industry was more than 351 factories with a total cost over $8 billion. To date, over 30 minerals have already been identified in the Kingdom of Saudi Arabia, with at least 15 industrial minerals that could become commercially viable. The DMMR has identified 1,273 sites of precious metals, and 1,171 sites of non-precious metals.

Relying on Saudi Aramco's website, the Kingdom's economy relies heavily on petroleum and mineral resources production, refining, and industry. In this plan, following the Kingdom's general policy and pursued plans to protect and continuously develop the environment, the Ministry of Petroleum and Mineral Resources - represented by its concerned departments and national companies - is dedicated to providing the Kingdom and the world with a reliable source of petroleum energy and, at the same time, implement effective regulations to protect and preserve the environment. One of the Ministry's most important achievements in the field of energy supply and environmental protection is the initiative to collect and treat associated gas which was launched by the Ministry for economic reasons and also for its tremendous positive effect on the environment. Emissions from gas burning have been avoided and gas was directed to support local industries. Moreover, the Ministry is undertaking a program to provide petroleum products conforming to environmental standards, including the production of unleaded gasoline and low-

sulfur diesel. The production of unleaded gasoline started in 2001 and the removal of sulfur from diesel is going on gradually.

The protection of the clean water as a vital resource is an important responsibility and one of Saudi Aramco's highest priorities. In order to maintain high standards of purity, Saudi Aramco assesses water quality from source through distribution to ensure that it is free from harmful biological and chemical contamination and is safe for use. Saudi Aramco also monitors its industrial and community wastewater for physiochemical, organic, non-organic, and biological pollutants. Data are analyzed and reported to the Kingdom's Presidency of Meteorology and Environment (PME). While ongoing campaigns stress the conservation of drinking water, Saudi Aramco's water conservation efforts include the recycling of wastewater that has undergone tertiary treatment. This treated water is then used for landscape irrigation at most company communities.

Regarding to the waste management, the Ministry of Petroleum and Mineral Resources's Industrial Waste Management Plan ensures that wastes are properly handled to protect the environment. The plan, which has received international recognition, provides for the special industrial waste management needs of each of the operating plants. Saudi Aramco utilizes several environmentally acceptable methods for treating industrial waste. Sanitary landfills are used for the disposal of municipal solid waste, while industrial wastes are segregated and handled according to their hazard risk following approved industry practices. Rotary autoclaves sterilize medical waste before disposal. Saudi Aramco has a Waste Minimization Program that reduces waste generation and lowers associated costs. Measures include installation of flare-gas compressors to recover gases, use of flue-gas oxygen analyzers to optimize fuel consumption and to minimize emissions and off-site regeneration of valuable catalysts.

The Saudi Government is in the last stages of approving a new mining code. The code currently in effect grants local and foreign investors significant incentives. These incentives are included in a draft of a new mineral policy and a new mining and investment code that are in the final stages of governmental approval. Under the new mining code, investors enjoy many incentives such as:

- Duty-free import of mining equipment;
- Exploration licences guaranteeing the exclusive right to explore within the licence area, and the exclusive right to obtain a mining lease;
- Exploration rights for a period of 5 years (renewable for an additional four years) and mining lease for 30 years (renewable for another 20 years) together with 5 years of exemptions from taxation;
- Full management control and repatriation of profits and capital;
- Choice of selecting local partnership or of operating as a wholly Foreign Owned Enterprise.

There are many other attractive features in investing in Saudi mining sector such as:

- The infrastructure of the country is well developed and modern. All big cities and small towns are connected by roads and highways and have necessary utility services;
- Most known deposits are situated in the vicinity of developed areas;
- Many explored mineral deposits are untapped and available for development and exploitation;
- A local manufacturing industry is well established and prosperous, creating domestic demand for high-grade industrial raw materials;
- The manufacturing sector in the neighbouring GCC countries has shown significant growth over the last two decades, and therefore can be considered potential consumers of Saudi raw materials;
- Existing industries in Saudi Arabia often rely on imported raw materials, even though many of these minerals are locally available. Domestic materials could effectively replace such imports if a long-term supply, consistency and quality assurance can be guaranteed (cited in Alfi and Zagan, 2004).

Based on Ma'aden's website, Ma'aden is committed to Corporate Social Responsibility (CSR) which allow to contribute positively to the wellbeing of people, the environment, economy and society. Ma'aden endorses the definition of Corporate

Social Responsibility as proposed by the World Business Council for Sustainable Development:

Corporate Social Responsibility is "the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large."

Ma'aden will demonstrate its commitment in accordance with the four pillars that guide our strategic and operational approach globally, ethics, environment, community Commitment, and employee Commitment. Core to Ma'aden's commitment are the ICMM principles:

1- Implement and maintain ethical business practices and sound systems of corporate governance.
2- Integrate sustainable development considerations within the corporate decision-making process.
3- Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities.
4- Implement risk management strategies based on valid data and sound science.
5- Seek continual improvement of our health and safety performance.
6- Seek continual improvement of our environmental performance.
7- Contribute to conservation of biodiversity and integrated approaches to land use planning.
8- Facilitate and encourage responsible product design, use, re-use, recycling and disposal of our products.
9- Contribute to the social, economic and institutional development of the communities in which we operate.
10- Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

These incentives have contributed to making investment in the Saudi mining sector highly lucrative, and have boosted interest in the sector among local and foreign

investors. For example, the number of valid building material permits and quarrying leases doubled in seven years and reached more than 841 in 2002 (Al-Attas, 2004).

CONCLUSION

Mining is a vital sector in the economic development of countries such as Australia, Canada and Sweden, which have largely depended on their natural resources for the development of their economies. The minerals sector in Saudi Arabia has great potential to play a leading role in diversifying the Saudi economy and has been regarded as a strategic factor for the inducement of future economic and industrial development in the country due to the Kingdom's enormous and relatively untapped mineral resource base, including precious and base minerals as well as industrial minerals.

This research concludes that the minerals discovered in the Kingdom of Saudi Arabia include phosphate, bauxite, gold, magnesium, gypsum, marble, iron ore, bentonite, copper, garnet, granite, graphite, high-grade silica sand, limestone, silver, and others have become the main activities attracting foreign investment, and that during the next decade it is hoped that they will create considerable economic growth in the region and the country. As a result, the minerals sector will become a third pillar of the economy after hydrocarbons and petrochemicals. It will also have several positive effects on the national economy, such as providing a source of additional revenue for the government, increasing exports and contributing to export diversification, creating new opportunities for the creation of industrial activities in the Kingdom, and contributing to harmonious regional development and an improvement in level of regional inequality.

This research concludes that mining has been embraced by the Saudi government not only to diversify the national economy, but also to stimulate the economy, generate employment opportunities, attract foreign capital, and encourage citizens to invest their money. The government created the Ma'aden state mining company in order to achieve these goals. Within the context of these endeavors, a sizeable number of mineral deposits have been explored, and substantial knowledge of the Kingdom's geology and mineral potential has been gained, and as a result, a data base has been

established that has helped to identify a number of mineral projects and deposits that give a sound basis for the development of the Kingdom's mining industry.

This research has revealed that the Saudi government is taking most of the measures necessary to face the challenges that face the minerals sector in applying sustainable development principles during the national development plans in accordance with the reform policies formulated by the Custodian of the Two Holy Mosques and the Crown Prince: for example, promoting manufacturing industries that depend on local mining products, encouraging and motivating banks and domestic financial institutions to extend credit and support to mining companies. In addition to the development of geological, technical and economic knowledge of mineral projects and relevant investment opportunities and completing the privatization of the Saudi Arabian Mining Company, Ma'aden.

This study concludes that the mining sector is expected to experience accelerated growth during the next decade as a result of the new Mining Investment Code that will help attract domestic investors and boost foreign investment. This will, in turn, lead to increased total factor productivity, along with an increase in mineral exports, leading to a projected annual growth rate of some 7.9 percent during the Eighth Development Plan. The mining sector will promote substantial economic growth in the region and the country, as a result of the fundamental features attracting investment in the mineral industry: the diversified geological terrain, strong economy and strategic location of Saudi Arabia in the GCC countries.

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