DEVELOPMENT OF INTERCITY TRANSPORTATION SYSTEM IN SAUDI ARABIA

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ABSTRACT. Kingdom of Saudi Arabia has undergone many changes in the transportation sector during the past decades. Documentation of these changes, particularly those in the administration and the infrastructure are scattered and not concise. This paper, objectively, presents and analyzes the development in the intercity transportation system for the common modes (road, air, bus and train) connecting the major hubs of the Kingdom.

1. INTRODUCTION
Kingdom of Saudi Arabia has undergone drastic changes during the past decades. These changes touched all aspects of life including the transport sector. Documentation of these changes in this sector is lacking and furthermore the information is scattered and not concise. This paper presents and analyzes the development of the intercity transportation system for the common modes, namely, the road, the air, the bus and the train connecting major hubs of the Kingdom. These major hubs are the eastern province, Riyadh, Jeddah, Qasim, Madina and Abha which are shown in Fig. 1.

![Figure 1: Major hubs of Saudi Arabia.](image)

2. TRANSPORTATION ADMINISTRATION
In Saudi Arabia, transportation and its networks have been purely a governmental affair. The government has been financing the establishment of the network and the infrastructure as well as regulating, maintaining and operating the network. These functions are carried on either by a governmental organization such as the Ministry of Communications or by a quasi-governmental one such as the Saudi Railway Organization. Each travel mode is administered by a separate organization which will be presented below.
2.1 Ministry of Communications
The earliest effort to institutionalize the development of road system was in 1353 H (1935) when Works and Mineral Authority was established which reported to the Ministry of Finance [1]. This governmental entity supervised all public work projects particularly roads. As the importance of communication, particularly roads evolved and realized, the Ministry of Communications (MOC) was established in 1372 H (1953). Its main task was to develop the nation’s "communications" sector which included the responsibility of developing all land, marine transportation and telecommunication affairs.

The responsibilities of the MOC continued to increase and its services became so diversified that a reorganization was necessary in 1395 (1975) [1]. The telecommunication affairs became the responsibility of a new ministry, thus MOC retained the responsibility and control of the land and marine transport in the Kingdom. Further, reorganization within the MOC has established several deputies. One of these is the Deputy of Transport Affairs which was tasked to ascertain the intermodal coordination and regulation (excluding the air).

MOC has continued to be influential in all aspects of intercity travel modes. This influence is presented and discussed in the following sections.

2.2 Saudi Railway Organization (SRO)
The history of the railroad industry goes back to 1367 (1947) when there was a need to establish the Dammam sea port with the industrial city of Dhahran in order to facilitate the movement of goods needed for oil exploration [2]. This was in the form of a project managed by the then Arabian American Oil Company (ARAMCO). The Saudi government had the keen interest to link the central region (Riyadh) with the eastern part and ARAMCO was directed to include in its project a line to Riyadh which was completed in 1371 (1951).

Due to the expansion of the service, the Ministry of Finance took over the administration of the railroad project in early 1372 (1953). Later in the year, management transferred to the Ministry of Communications. Thus far, this project remained a full governmental organization coordinated by MOC, until 1385 (1966) when a royal decree announced the establishment of the SRO. This decree implied the separation of railroad industry from the Dammam sea port, however, it has continued to be regulated and coordinated by the MOC.

2.3 Saudi Public Transport Company (SAPTCO)
SAPTCO evolved in 1399 (1979) as a joint stock company with a government ownership of 30 percent of the shares and the rest is owned by the public [3].

SAPTCO has the concession contract with the Ministry of Communications to provide both intra- and inter-city public transit service Kingdom-wide.

Although SAPTCO is run by a board of directors, it is essentially following the MOC policies since MOC is representing the government in this concession contract. This, in fact, qualifies SAPTCO to receive governmental subsidies for many years.

2.4 Ministry of Defense and Civil Aviation (MODCA)
Administratively, the civil air transport is under the jurisdiction of MODCA. This task is delegated to the Presidency of Civil Aviation (PCA) which is responsible for establishing, operating and maintaining air navigation and control facilities and the domestic airports except the three major airports (Dhahran, Riyadh and Jeddah) which are under the jurisdiction of the International Airport Projects.
3. GOVERNMENTAL SPENDING ON THE TRANSPORTATION SECTORS

Transportation is vital to a nation's economy. Fig. 2 shows the percentage of governmental budget appropriated to the transport sector [5]. As the figure shows, the highest appropriation was in 1981 which is characterized as the "boom year". During the early eighties, Saudi Arabia was investing in many aspects of its infrastructure in a series of five-year plans. Investment in the transport sector was no exception. The high percentage of the governmental spending in this sector during those early years of the eighties was warranted to support the development in other areas, mainly the industrial and agricultural. As the main transport infrastructure was completed, the appropriation for the transport sector has leveled over the recent years, probably being mandated mainly for maintenance and operation.

![Graph showing percent of government budget over years](image)

Figure 2: Government budget appropriation to the transport sector.

Fig. 3 shows how the government monetary appropriation was distributed among the various transportation agencies [5,6]. Clearly, the expenditure were mainly in the highway (MOC) sector and the air (Civil Aviation, etc.) sector. This reflects, the importance of these two modes in the Saudi Arabia. In fact, the predominance of these two modes is reflected by this appropriation of the budget. The table further shows that appropriation for MOC continued to grow over the years while that for air is generally dropping. This may be explained by the fact that highway mode would continue to need major appropriation due to the maintenance of the large scale network and the fact that it is not a revenue generating mode as the air.

Appropriations for the railway sector has been relatively modest with obvious two peaks; one in 1985 and another one in 1990. This is in reflection of investment in three major projects. The first was realigning the tracks, the second was establishment of a large terminal in Riyadh (the Dry Port), and the third was renovation of the main terminals at Riyadh, Hofuf and Dammam.

Fig. 3 further shows that the budget appropriation for the sea port sector continued to decline over the years until it ceased in 1985 when the port started to be self-financed from its revenues which normally come from land lease and registration fees.
4. THE INTERCITY NETWORK

InterCity transport activity is mainly performed in three modes, i.e. road, air and railroad. Below is description and analysis of the development in the intercity network for each of these modes.

4.1 Roads

The dominant role of the road transport in Saudi Arabia's transport system is demonstrated by the share of passenger traffic carried by road, estimated at 75 percent of all the intercity passenger trips in 1400 (1980) [7], and it was about 64 percent in 1992 [8].

Expansion over the last two decades (1390 to 1410 H) in the length of paved roads is shown in Fig. 4 [6]. Intercity road network has steadily increased over the years, mounting to more than four times in 1410 (1990) from that in 1390 (1970). The major hubs of Saudi Arabia are sparse, and due to the geography of the country, direct linking between these hubs is almost impossible due to the rough terrain. Today, there are two main axes that carry the bulk of the intercity travel. The first one runs for the east coast to the west coast and the other one connects the north (Medina) with the south (Abha) along the west coast.

Figure 4: Development in the intercity road network.
In fact, these two roads go through the mostly populated areas of the Kingdom, and basically they serve as collectors to traffic from the remote and the sparse population and activity concentration.

A historical review [1] of the road development reveals that the earliest road system was mainly trails connecting the Holy cities Makkah, Madina of the western part with all other parts of the peninsula for Hajj (pilgrimage) purposes. When oil exploration began in 1351 (1931), service trails were established in the eastern region for the purpose of moving the equipment for the oil discovery. As there were no other roads, the public began to use these roads, and for many years these roads carried more public traffic than the oil exploration vehicles. As plans were initiated to move the Kingdom’s capital from Makkah in the western region to Riyadh in the central region, it was imperative to connect Riyadh to various parts of the Kingdom and thus the inter-regional road concept evolved. By 1374 (1954) there were, however, only a couple of hundred kilometers of asphalted roads in the Kingdom.

In the early years, the policy of the road building was basically to build as need arose due to the limited fund and lack of a major comprehensive plan. This trend continued until 1384 (1964) when MOC studied the needs for roads and initiated the "Primary Construction Program" with a purpose of establishing high standard intercity road system. The program continued until 1390 (1970) when the "Secondary Construction Program" was laid as part of three national five-year development plans. The first five-year national development plan was initiated and the road building was recognized as a prime contribution to the overall Kingdom’s development. Connection of the principal regions of the Kingdom was a primary goal of this plan. A second five-year development plan was later initiated in 1395 (1975) with a goal that the existing main roads be upgraded to multilane so to improve mobility and safety level. By the end of this plan all main roads were completed, but by 1400 (1980) when the third five-year development plan was initiated more roads and freeways were built. Efforts were then directed to maintaining, landscaping, and upgrading the safety level through the Road Safety Management System. By 1985 expenditures on roads were a massive SR70 billion and above 20,000 km of primary intercity roads were completed.

4.2 Railroad
As was mentioned earlier, the oil industry was the drive to establish the railroad transport mode. It started with only 13 kilometers that linked Dammam sea port and Dhahran, the oil base. Railroad industry was considered then as an emerging and attractive technology, so the government desired to connect Riyadh with the eastern region. The project, when finished in 1951, included 565 km line between Riyadh and Dammam, and 631 km branch lines together with supporting facilities and terminals at the main stations Dammam, Riyadh, Dhahran, Buqaiq, Hufuf, Haradh, and Khurj [2]. The main line was the only on-land means of transportation between Riyadh and Dammam until the late 1950s when the highway was opened.

Fig. 5 shows ridership peaking in 1402 (1982) then continued to decline [5]. This was basically related to the low level of service due to the long travel time (taking seven hours between Dammam and Riyadh) and the uncomfortable rolling stock. Situation continued to worsen, with 1405 being the worst when the 383-km road was inaugurated. SRO was concerned for this trend and undertook major renovation as was planned in the third national five-year development plan beginning 1400 (1980) [2], which included the following:

1) Improving the Riyadh-Dammam line to be double and shorter (450 versus 565 km).
2) Introduction of a new and fast rolling stock making trip shorter, from 7 hours to only 4 hours.

3) Improving the main terminals at Riyadh, Dammam and Hofuf.

![Graph showing overall railway ridership.

Figure 5: Overall railway ridership.](image)

These measures improved the ridership and as Fig. 5 shows ridership continued to increase. However, due to the other competing modes (roads and air) railroad service turned to be a freight mover and, accordingly, investment turned to be in this sector. As an example of this, is the construction of the "dry dock" at Riyadh.

Saudi Railway Organization has the dream of expanding its network to cover not only the main hubs of Saudi Arabia, but also the neighboring countries.

4.3 Intercity Bus Transit

As mentioned SAPTCO has the concession of providing the intercity transit service. During the early years after the establishment of SAPTCO ridership grew and along with this, fleet size and lines also grew. Fig. 6 shows the trend in the ridership [9]. This trend then reversed after 1982 reaching a bottom level in 1988. Among the factors influencing this trend is the competition faced from the air industry, when realizing the sparsity of the Kingdom and the low fares offered by air for a better level of service.

![Graph showing trend in SAPTCO intercity ridership since established.](image)

Figure 6: Trend in SAPTCO intercity ridership since established.

4.4 Air Transport Network

The Presidency of Civil Aviation (PCA) has constructed 26 airports [4]. These airports comprise the nodes of the domestic air network. They cover a vast area of the Kingdom with routes ranging from 138 km (between Jeddah and Taif) and 1472 km (between Jeddah
with routes ranging from 138 km (between Jeddah and Taif) and 1472 km (between Jeddah and Tabuk).

The air industry dates back to 1934 (1353) when the then ARAMCO used land strips to transport its personnel and equipment [10]. As an influence of the advancing international air industry, the Saudi government acquired three DC-3 (Dakotas) in 1945, which was the real start of the commercial passenger service when these were put to transport the government officials and the public.

Suadia has developed its fleet with the purchase of several modern aircrafts. Lease of aircraft was necessary at sometimes and intensive in the 1980's so to meet the booming demand in the early years of that decade as Fig. 7 shows.

Sources indicate that two thirds of the total traffic handled by Saudia is domestic, the other third is being international [6]. This fact emphasized the role of Suadia as being predominantly a domestic carrier.

![Figure 7: Trend in the domestic air travel.](image)

A study [7] found, based on demand, that there are five major hubs for domestic passengers, namely Dhahran, Riyadh, Jeddah, Madina, Abha and Qasim. In fact, airports of Saudi Arabia can be classified as follows:

- International airports: as in Dhahran, Riyadh and Jeddah
- Main Domestics airports: as in Madina and Abha
- Domestic airports: as in Hail, Hofuf, and Jof
- Local Airports and Landing Strips: these are at oil fields, along pipelines or private.
  These, however, do not contribute significantly to intercity travel.

Considering the performance of Saudia, it is published (see for example Ref. 11) that Saudia operates at a load factor of less than 60 percent and at deficit which is subsidized by the government. Revenue passenger-km has always been less than the available seat-kms as Fig. 8 shows [6]. This is of no surprise since Saudia operates at extraordinary low fares.

Domestic fare structure had not been revised for years. In fact, fares were increased during early 1991 but this decision was reversed. However, fares have been increased in early 1995 to lower the government subsidy to Saudia.
Figure 8: Available and revenue seat kilometers of SAUDIA.

5. CONCLUSIONS
Intercity transportation has undergone dramatic development in its infrastructure and administratively in all modes. Development was unplanned until the early eighties when development plans were initiated and intermodal coordination was necessary.

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REFERENCES
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