YAMASAKI'S DHAHRAN CIVIL AIR TERMINAL AND THE SHAPING OF SAUDI MODERNITY

Abstract

It is very common to see modern architecture in a petroleum-economy examined as a logical consequence of surplus in a state income. Taking Yamasaki's Dhahran Civil Air Terminal as a case study, this essay aims to show the limitation of examining architecture from this perspective. This essay argues that we are only able to understand modern architecture in a petroleum-led context like that of Saudi Arabia, by considering the multifaceted cultural influences of petroleum. The essay also explains the adverse effects of this economy on modern architecture.

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Introduction

Even though only seven years passed between Saudi Arabia's first and second banknotes issuance (1961, 1968), the subtle changes in the banknotes' iconography disclose an intense rate of development that came after the discovery of petroleum.[1] Because Saudi Arabian riyal banknotes depicted icons of what the country identified with, it was not surprising to see included sites and buildings of historic, economic, and cultural value. Those markers of national identity included: Al-Nur mountain in Mecca, Minarets of Medina Holy Mosque, Jeddah seaport, and Al-Masmak Palace and the building of the Cabinet Office, both located in the capital Riyadh.[2] Together with these icons, the fifty riyals banknote (figure 1), displayed a derrick structure in a desert before a small rock formation in the Dhahran area.[3] On these banknotes, petroleum discovery and its ensuing economy were as important to Saudi Arabia's history as historical monuments because they secured the country a position on the worldwide economic map.

The intensity of modernization that touched upon every aspect of life in the Kingdom was reflected in the second issuance of banknotes in 1968. The image of refineries in a busy petro-chemical industrial complex replaced that of a single derrick on a flat arid landscape (figure 2). Representation of the holy mosques in Mecca and Medina showed them with a much-desired recent renovation and expansion. With the help of modern drilling technology, it was possible to access fossil water in deep aquifers. Thus, agricultural projects were also featured on banknotes highlighting the abundance of water, a substance that signified wealth in an arid region. A five riyal banknote attested to Saudi Arabian advancement in commerce by displaying Dammam seaport with modern ships docking at a busy pier (figure 3). The other side of this banknote, the Arabic side, featured an image of the newest airport in the country, Dhahran Civil Air Terminal.

Figure 1: Fifty Saudi riyal banknote picturing a derrick, from the first issuance in 1961. (Source: www.worldbanknotescoins.com.)

Figure 2: One hundred Saudi riyal banknote picturing the Aramco refinery complex as it appears in the second issuance 1968. (Source: SAMA.)

Notes

1. The banknotes themselves, in addition to the economy, show the development and modernization of paper money in Saudi Arabia. The early issues were receipts for pilgrims to Mecca and Medina; today's Saudi paper currency is considered among the most technically advanced banknotes. For an overview of Saudi Arabian early banknotes, see the article by Peter Symes, "The Bank Notes of Saudi Arabia: The Early Issues." For an overview of the Saudi Arabian currency in relation to its history, see Thomas W. Shea, "The Riyal: A Miracle in Money," *Aramco World* (January/February 1969).

2. Pictures and information on Saudi Arabian currency are available on the Saudi Arabian Monetary Agency (SAMA) website at www.sama.gov.sa.

3. The image strikes a very close resemblance to Oil Well No. 7 (Dammam Well #7); I was not able to confirm from the description provided by SAMA. No. 7 was discovered in 1938, the first well to yield commercial quantities. The location of the well was on Jabal Dhahran (Dhahran mountain).

Figure 3: Five Saudi riyal banknote with the Gulf's two ports: Dhahran Civil Air Terminal and Dammam seaport; 1968. (Source: Collection of the author.)

The addition of the newest airport in Saudi Arabia was a significant development because it was the airport terminal that introduced the country to jet airplanes. Like other projects of development in Saudi Arabia at the time, Dhahran Civil Air Terminal showed the adoption of advanced technology. However, this project stands out from the type and scale of other projects at the time. By the end of the 1950s, other than projects that served the petroleum industry, the Saudi Arabian government was focusing its development efforts on large-scale projects of infrastructure to serve the largest segment of the population. The most important of these projects was for transportation.

The first major transportation project was a railway that connected Riyadh to the Eastern Province that was completed in 1951 at the cost of $70 million. A network of paved roads to connect the kingdom's cities was also being built, reaching noticeable growth by the beginning of the 1960s.[4] These government-funded projects served the needs of the middle class that was growing rapidly as a result of the petroleum economy. Train and automotive transportation allowed this important segment of the society to travel inexpensively around the kingdom to fill the increasing employment demands. However, if a "Jet-Age" air terminal, as it was celebrated in a local magazine,

was going to open the door for advanced jet-airplane travel in the region, it was not going to serve the interest of the middle-class segment due to its relative high cost.

This airport terminal also stands out in terms of its location. Instead of being located in the capital Riyadh, where most of the newly constructed government buildings were located, this air terminal was located in Dhahran, a small city that was built for the petroleum company, Aramco, and its employees. These differences make Dhahran Civil Air Terminal a unique building.

Unlike a refinery complex or the Dammam seaport, the airport exhibits unmistakable distinguishing architecture—not only for Saudi Arabia but for the Gulf region overall. Designed by the renowned Detroit-based architect Minoru Yamasaki, the two-story, precast concrete building reintroduced Islamic architectural vocabulary in modern materials and technologies (figure 4). The architecture of the terminal stood out from other petroleum-led projects in Saudi Arabia as well as from modernist glass-and-steel boxes around the world. The building was celebrated locally not so much for its technology but rather for how it weaved together Islamic architectural heritage, such as pointed arches and the evocation of latticework ornamentation on the elevations' panels, with modern architecture. This blend of tradition and modernity was read as a statement of reconciliation. The building was proof that for Saudis to embrace modernity, they did not have to let go of their tradition.

Like many projects of Saudi Arabia's development, this airport terminal came after the discovery of petroleum and the establishment of its industry and economy. However, this project took place at a peculiar period in the economy of Saudi Arabia. During the late 1950s, Saudi Arabia faced a financial crisis caused by the buckling of its financial system, government overspending, and reduction in oil price by Aramco.[5] The result was that the riyal lost about half of its value, the income from petroleum was lessened by $50 million, and the country was about half a billion dollars in debt.[6] Although the Saudi Arabian economy quickly recovered, examining the architecture of this period opens a window into what petroleum architecture would be like without the funds of petroleum.

Modern architecture in Saudi Arabia has been looked at typically from a point of view that sees the country as flushed with petrodollars and thus unburdened with notions of investment, regulations, or cash flow. Consequently, architecture is viewed with little more than amusement; a wonder of what capital could achieve. It certainly would be unreasonable to contest the role petroleum played in fueling Saudi Arabia's intense modernization.

Figure 4: Exterior of Dhahran Civil Air Terminal at night. (Source: Minoru Yamasaki Collection, Archives of Michigan at Michigan History Center, Lansing, MI.)

Figure 5: The interior of Dhahran Civil Air Terminal during construction circa 1960. (Source: U.S. Army Photo, courtesy of the Office of History, HQ, U.S. Army Corps of Engineers. OCLC #992716736, Contentdm #509.)

However, it would be equally unreasonable to consider capital generated from petroleum revenues as the only element shaping modern architecture in Saudi Arabia. A closer look should be made to examine the social, economic, political, and environmental impacts in shaping architecture. These multifaceted influences are effectively concealed by equating petroleum with capital, a notion invoked by the term petrodollars. A closer look at the history of Dhahran Civil Air Terminal reveals the petroleum influence on architecture—with its commission in 1958, inauguration in 1962, becoming a national icon appearing on banknotes and postage stamps from the late 1960s to mid-1970s, and finally ending with its decommission into a military base in 1999.

4. Michel G. Nehme, "Saudi Arabia 1950–80: Between Nationalism and Religion," *Middle Eastern Studies* 30, no. 4 (Oct. 1994).

5. At the time, oil prices were set by Aramco, an American company. The Saudi, who in 1950 negotiated a fifty-fifty revenue agreement with Aramco, learned that it was beneficial for Aramco rather than Saudi Arabia to offer discounts on the posted price. This was one of the issues that led to the formation of OPEC. On the history of revenue sharing between governments and petroleum companies during this period, see Daniel Yergin, chapter 22, "Fifty-Fifty: The New Deal in Oil" in *The Prize: The Epic Quest for Oil, Money, and Power*.

6. Shea, "The Riyal: A Miracle in Money." This period also saw the beginning of the Arab Cold War; see Malcolm Kerr, *The Arab Cold War: Gamal Abd al-Nasir and His Rivals, 1958–1970* (London: Oxford University Press, 1967). For more on Saudi Arabian context, see Nehme, "Saudi Arabia 1950–80: Between Nationalism and Religion."

An Agreement for Architecture

Although Yamasaki would later be commissioned to design another airport in the 1970s, as well as other buildings for the Saudi Arabian government, this airport terminal was not funded by Saudi Arabia, but rather by the United States. The funding for this airport terminal was part of an agreement prepared by the United States to Saudi Arabia in exchange for an airbase lease renewal in Dhahran that was expanded from its simple establishment during World War II. During the war, Japan cut the Pacific supply air routes from Hawaii to the China-Burma-India Theater.[7] Saudi Arabia allowed the Allies to operate in their airspace to help the allied air forces resupply from nearby airfields. The need for an airfield in the Gulf was soon realized by the United States, so in 1944 a formal request was made to Saudi Arabia.

The choice was made to use an existing airfield in Dhahran that was used for Aramco. Dhahran Airfield facilitated the reach to the Pacific through a shorter route. After World War II, the airfield was used as a hub for Trans World Airlines (TWA) between Europe and the South and East Asia markets. The airfield became even more important during the Cold War as Dhahran was located within a thousand miles of the Soviet Union. However, with the rise of Arab nationalism beginning with the Egyptian revolution in 1952, local public criticism grew in reaction to seeing their country hosting an American airbase. At first, the Saudi government was not interested in renewing the lease for the airbase, citing the rising nationalist rhetoric. At the Department of State, the United States considered the airbase "absolutely essential" with no "alternate base in the general area of Dhahran which is currently capable of satisfying all of the U.S. military requirement."[8] This prompted the United States to prepare better terms in an attempt to gain renewal for its lease. The agreement proposed building a civil air terminal and military academy, in addition to contracts for military training and arms sales. When King Saud visited the United States in January 1957, President Eisenhower offered the terms of this agreement. Because of this personal commitment, the airport terminal was an integral, if not the most important, part of that package.[9]

Funding for the airport terminal came from the International Cooperation Administration (ICA), a United States government agency that was formed to administer foreign assistance and non-military security programs.[10] The ICA had a limited budget of $5 million that it could use. United States Corps of Engineers became involved in the project because it had experience in building for military bases around the world (figure 5). The corps contracted Ralph M. Parsons International Group, a company that had been active in construction for the petroleum industry in the Middle East. For the design of the terminal, Parsons decided to hire Minoru Yamasaki.

As can be seen from above, the geographic location of petroleum played an integral role in the selection of the Dhahran site for constructing an air terminal. The infrastructure that was first built to support the industry and bureaucracy of petroleum extraction laid the ground for future expansion and addition. Although infrastructure such as roads and utilities made it easier for other service companies to establish a base, the concentration of this integral industry meant that it was a location that needed protection. The location of Dhahran was specifically selected for the airbase because of its proximity to the Soviet Union. In the context of the Cold War, this also meant the location was selected to defend the United States and its allies' access to energy against any possible attacks. Because the project was funded, supervised, and executed by a United States government agency, the scale of the building, technology employed and, as it will be discussed below, the selection of the architect, all were decisions based on the interest in petroleum.

Yamasaki's Desert Concrete Box

A number of reasons could be cited for Parsons' decision to select Yamasaki to be the architect of this building. Yamasaki had just completed the much-praised St. Louis Lambert International Airport in 1956. The St. Louis terminal may have attracted Parsons for two reasons. First, it was a hub for TWA, an airline that also made stops in Dhahran.[11] Most importantly, the architect of the St. Louis Lambert airport was selected for the scale and the cost of the terminal, which came in at about $7.2 million. Yamasaki was aware of the budget restrictions but given the fact that Dhahran Civil Air Terminal exceeded the $5 million budget set by the ICA and that aspects of the project were not completed, the two air terminals shared a relatively similar cost.[12]

Other reasons for selecting Yamasaki may have been due to the project being a government building in a foreign country. The urgency of the project may have necessitated working with a vetted person who understood the complexity of government projects. Yamasaki already had experience with government projects because before Yamasaki established his own practice, he was a partner at Hellmuth, Yamasaki & Leinweber, the architectural firm that designed the United States Consulate in Kobe, Japan, in 1954. The selection of a Japanese-American architect to design Kobe's consulate sheds light on another element that might have led to his Dhahran commission.[13] The United States was aware of how issues of nationalism were rising in the Middle East, so they were trying to avoid being perceived as another colonial

7. For more on the early presence in Dhahran, see Robert P. Grathwol and Donita M. Moorhus, *Bricks, Sand, and Marble: U.S. Army Corps of Engineers Construction in the Mediterranean and Middle East, 1947–1991* (Washington, D.C.: Center of Military History, Corps of Engineers, U.S. Army, 2009). On the context of the Air Field Agreement, see Rachel Bronson, *Thicker Than Oil: America's Uneasy Partnership with Saudi Arabia* (Oxford; New York: Oxford University Press, 2006).

8. Memorandum of conversation #237, July 2, 1956, Foreign Relations of the United States, 1955–1957, Volume XIII, Near East: Jordan-Yemen, eds. Klingman, Miller, and Noring (Washington: Government Printing Office, 1988), Document 237.

9. Grathwol and Moorhus, *Bricks, Sand, and Marble*, 160–163.

10. After the split of the U.S. Foreign Operations Administration into the Department of State and Department of Defense in 1955, ICA was formed to assume the remaining responsibilities. ICA is known today as the United States Agency for International Development.

11. In fact, the airport is remembered as a place where the "Jet Transportation Era" began, with the inauguration of Trans World Airlines'

power dictating its architecture abroad. In a meeting between King Saud and President Eisenhower at the White House in January 1957, Secretary of State John Dulles stated that "The United States were once a colony, and Americans have not forgotten their efforts to gain freedom and independence.... Britain and France were once colonial powers, but their former rule over other peoples has diminished and has now been largely eliminated."[14] Therefore, the selection of Yamasaki, descendant of a non-Western ancestry, was in-line with this policy of not appearing as yet another Western colonial power aiming to rule over Saudi Arabia.

Yamasaki delivered a project that, inadvertently, achieved this message. Yamasaki stated that he "deliberately chose to use a system which suggests an Arabian character. Surprisingly enough, in Saudi Arabia there are very few buildings which show the Moslem influence. They are poor imitations of western buildings for the most part."[15] This is not to suggest that Yamasaki was acting at the direction of the government or the ICA by any means. In fact, Yamasaki's quest for new architecture began before he received the commission for Dhahran's terminal. It began right after he completed his world travels in the mid-1950s. Despite Yamasaki's admiration to modernist architecture, he believed that there was still more to explore to reach a "mature modern architecture." He expressed his displeasure with the repetition of the likes of "Lever Brothers buildings, some horizontal, some vertical and all indifferent parts of the country." He even reflected on his earlier work that it was a "shallow imitation of those of Mies van der Rohe."[16] After experiencing some of the world's historic architecture on his travels, Yamasaki became interested in exploring what he referred to as "visual delight" to combat cities becoming "endless streets of flush glass, steel, and porcelain enamel modules." To Yamasaki, visual delight constituted elements such as "[s]unlight and shadow, form, ornament, the element of surprise, are little explored fields, barely understood by today's architects."[17] These elements, he maintained, are experienced in the building of the past and could be learned from them.

Yamasaki's Dhahran Civil Air Terminal was not the first time he explored visual delight in design. He attempted to break the modernist glass box in his design for St. Louis Lambert International Airport, which was completed in 1956. The form was one large space under a vaulted concrete structure. Yamasaki used a glass-framed pointed arch on the elevation, a feature that has always been indicative of Yamazaki's attitude toward history. However, in the case of St. Louis Lambert airport terminal, the pointed arch is only one aspect of the form. The massive groin vaults that terminate on the ground directly echo Renaissance and Gothic spatial qualities.[18] Articulating the structural system as seen in the ribs and pendentives that touch the ground, the structure and ornament became one, both an integral part of the architecture, not merely applied on the surface. This is a treatment that will be re-explored in Dharan's terminal.

The opportunity that a commission like Dhahran's terminal presented to Yamasaki was that it was in a non-Western context. Although Yamasaki's Kobe consulate building was in a non-Western context, it was also before his investigation into the role of history in architecture matured. In an unpublished short essay that he wrote in 1957, he explained why Islamic architecture is of importance to modern architecture. Enriched architectural sensitivity, he wrote, would be achieved by understanding the history of Asian and Islamic architecture to "round out the European interests of our architectural fathers."[19] An Islamic and nationalistic context presented him the opportunity to explore this aspect.

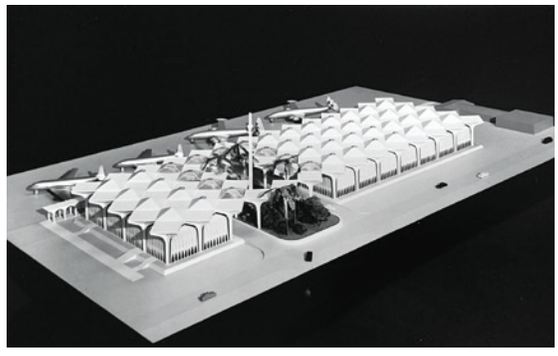

Figure 6: A model of the air terminal showing the two halls separated by a green oasis. (Source: Minoru Yamasaki Collection, Archives of Michigan at Michigan History Center, Lansing, MI.)

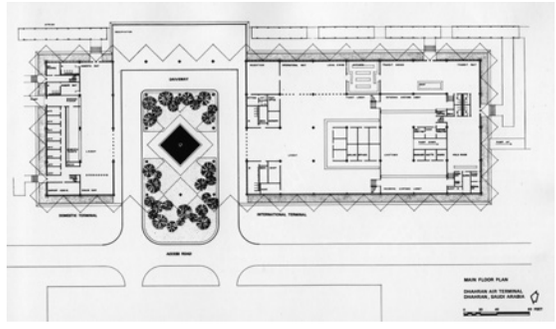

Figure 7: Plan of Dhahran Civil Air Terminal showing the domestic terminal on the left and the international terminal on the right, separated by an oasis of palm trees. (Source: Minoru Yamasaki, *A Life in Architecture*.)

Boeing 707 in 1959. A similar message, "entering the Jet-Age," was frequently used to describe Dhahran Civil Air Terminal.

12. "Civil Air Terminal, Dhahran, Saudi Arabia," *Architectural Record* 125 (May 1959).

13. The Architectural Advisory Committee paired Yamasaki with the U.S. Consulate project in Kobe based on his Japanese ancestry, with the assumption he would bring special architectural sensibilities to the project. For more on the consideration of ethnic background in the selection of architects, see Jane C. Loeffler, chapter seven, in *Architecture of Diplomacy: Building America's Embassies*.

14. Memorandum of conversation #259, White House, Washington, January 20, 1957, Foreign Relations of the United States, 1955–1957, Volume XIII, Near East: Jordan-Yemen, eds. Klingman, Miller, and Noring (Washington: Government Printing Office, 1988), Document 259.

15. Dhahran Civil Air Terminal project details, Minoru Yamasaki Papers, Syracuse University.

16. Yamasaki, *A Life in Architecture*, 24.

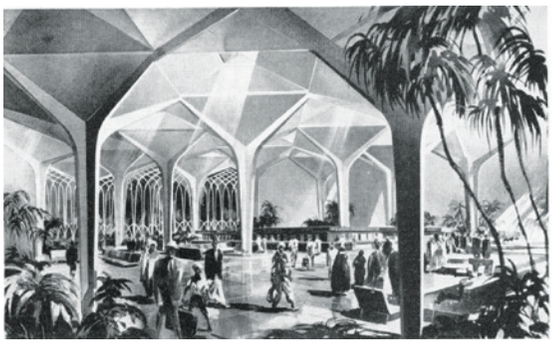

Figure 8: A rendering of the interior of one of the halls. (Source: "Civil Air Terminal, Dhahran, Saudi Arabia," *Architectural Record* 125, no. 5, May 1959.)

Dhahran Civil Air Terminal consisted of two halls, for domestic and international flights. The two halls were separated by a green oasis with planters of palm trees (figures 6 and 7). The structure of the building featured an array of stacked tree-like canopies. These canopies were composed of four identical p-shaped precast concrete sides. Yamasaki had these structural units connected at the corner, an arrangement that created a pointed arch (figure 8). The building envelope was made by adding a panel between the columns of the canopies. Those panels had minimum opening to control the temperature within the terminal, an entirely air-conditioned space. The exterior panels had a reinforcement pattern of ribs made by superimposing the shape of the pointed arch (figure 9). To achieve the best curing of concrete, it was vital to avoid the extreme heat during the day. The curing was completed at night and hydrated throughout the next days. The modular design of these "concrete trees" helped speed up the construction and reduce the cost of the building (figures 10a and 10b).

The vocabulary of the local architecture of the Eastern Province includes pointed arches. Those might have been the sources of Yamasaki's inspiration. Although not realized, Yamasaki intended to reflect a pattern on the ground of the two halls and have the wall panels painted. Of these, only the rims of the entrances were painted blue in what appears to be an abstraction of the Persian architectural element pishtaq.

The architecture of the terminal is of the most significant influences of petroleum on architecture. The political and economic interests in this region helped bring architects to design in an uncharted context. Dhahran Civil Air Terminal showed that modern architecture had to respond to climatic, cultural, and technological challenges. In doing so, this architecture helped expand the vocabulary of modern architecture beyond the glass-and-steel boxes.

Figure 9: Exterior panel before adding glass during construction. (Source: Minoru Yamasaki Collection, Archives of Michigan at Michigan History Center, Lansing, MI.)

Figure 10a: The interior of Dhahran Civil Air Terminal during construction circa 1960. (Source: U.S. Army Photo, courtesy of the Office of History, HQ, U.S. Army Corps of Engineers. OCLC #992716736, Contentdm #509.)

17. Minoru Yamasaki, "Visual Delight in Architecture," *Architectural Record* (November 1955): 48.6.

18. Yamasaki stated that his inspiration was Grand Central Station in New York. Yamasaki, *A Life in Architecture*, 39.

19. A short essay sent to Albert Bush-Brown at Massachusetts Institute of Technology, January 1957 (Wayne State, Box 4–30).

Figure 10b: Interior after completion. (Source: Minoru Yamasaki Collection, Archives of Michigan at Michigan History Center, Lansing, MI.)

National Icon of Petroleum Modernism

A building's history continues well after it is completed and handed to the client. Petroleum influenced the culture of Saudi Arabia by introducing modern technology. Although, at first, the technology was used solely for the exploration and extraction of petroleum. Modernization took many forms, from the airplanes surveying the desert and advanced photographic equipment used to record geographic features, to the many appliances and devices that operated on electricity. It is this aspect of petroleum, bringing the experience of modernity, that helped turn Dhahran Civil Air Terminal into a national icon.

Dhahran Civil Air Terminal received royal attention from its inception. In addition to having its design approved by King Saud personally, the King himself inaugurated the opening. The inauguration was a televised ceremony of the highest caliber. Among the attendees were representatives of the United States, local princes, and visiting dignitaries. Inauguration activities included an air show and handing diplomas to the first Saud Arabia Air Force academy graduates. One of the earliest public circulations of the terminal image on a national level was on postage stamps (figure 11). Right after the terminal received the honor of winning the first award in May 1963 from the American Institute of Architects, Saudi Arabia issued a set of six "jet over Dhahran airport" stamps in July of the same year. The postage stamps were issued to commemorate the opening of the terminal and the inauguration of international jet transportation services. The terminal was also featured on an airport exit tax stamp (figure 12), as well as Saudi Arabian banknotes in 1968, then again on the third issue of banknotes that came out in 1976 and remained in circulation until 1984 (figure 13).

Figure 11: Five of the six stamps that were issued for the inauguration of Dhahran Civil Air Terminal. (Source: Collection of the author.)

Figure 12: Airport exit tax stamp. (Source: Collection of the author.)

Figure 13: Dhahran Civil Air Terminal as it appeared on one of the third issues of Saudi riyal banknotes in 1976. (Source: Collection of the author.)

The airport terminal was made a national icon not only because it symbolized an uncompromising modernization, but also because it did so at the height of the Arab Cold War. In response to Egypt's Arabism, Saudi Arabia seemed to adopt Islamic identity but aimed to cast it in modern terms. During a visit to Malaysia in 1970, King Faisal expressed this notion when he stated that he felt sorry for those who think Islam "impedes progress or stands as an obstacle in the way of advanced development ... [t]he opposite is the truth. The most important requirements Islam calls for are to maintain progress."[20] With its modern design inspired from Islamic culture, Dhahran Civil Air Terminal became an interpretation of that message and also a model to learn from. It was not surprising then to see the influence of the Dhahran terminal on some of the major architectural projects in Dhahran. The theme of a pointed arch, for example, was employed extensively in the Caudill, Rowlett and Scott's campus design for the University of Petroleum and Minerals (later renamed King Fahd University of Petroleum and Minerals). This is important in particular because despite the fact that the airport terminal building does not represent a political entity (e.g. royal offices or parliament), the terminal building was elevated to the level of national icon. The combined reading of all historic, political, and economic context surrounding this building compels us to understand the building as an icon of Saudi petroleum modernism.

Crude Hub

Discussed above are instances where petroleum influenced the architecture of Dhahran Civil Air Terminal in establishing it and in maintaining its status. Now let's turn attention toward the economic aspect of petroleum. Operation of Dhahran Civil Air Terminal ceased in 1999 to be transferred to King Fahd International Airport in Dammam, another Yamasaki-designed airport.[21] Examining the conditions surrounding Dhahran Civil Air Terminal, it would seem that it had all the basic supportive elements to be the regional commercial air travel node in the Gulf, but it was not a regional hub. Although there is no single formula to guarantee an airport becomes a regional node, one would suggest that petroleum was a major reason why commercial aviation was not monetized.

There are many conditions that should have supported the growth of this airport. To begin with, in terms of economics and operation costs, Saudi Arabia would have the lowest cost for airplane fuel and energy. In addition, unlike private investors, Saudi Arabia had the funds to build, operate, and maintain the airport without the need to borrow from financial institutions. Because the country's rapid and continuing growth and development did raise the demand for workers and experts, to travel in and out of the country, commercial air travel was also growing. Commercial air travel would also have been supported by the growing number of pilgrims arriving in the Kingdom to visit Mecca. In addition, Dhahran's expansive, flat topography would have made it relatively easy to expand the runways and perhaps add other terminals. Geographically, as can be attested by the American interest in renewing the lease for their airbase, Dhahran is located strategically, providing connection between the Americas and Europe from one side, to central and east Asia on the other. These elements will prove to be very important for the success of Dubai as a regional air transportation hub.

This is also surprising when we are reminded that Saudi Arabia was aware of the essential role ports play. Before the discovery of petroleum, Saudi Arabia's economy relied on pilgrimage, with a large number arriving by sea. This must have been clearly understood because pilgrimage, by definition, suggests a notion of travel. Other than pilgrimage, ports provided trade opportunities on either side of the Arabian Peninsula. Furthermore, in addition to the continuation of building airports in other major cities in the 1970s and early 1980s, Saudi Arabia was growing its own national air carrier, Saudia.

Despite these conditions, Dhahran Civil Air Terminal did not witness growth, nor become a hub. The very reasons that the airport terminal had been built was the cause of its stifled growth. These factors, as promising as they can be, existed in and operated within the economy of petroleum—the nature of which did not help commercial air-travel, or any other industry for that matter, to grow. However, this was not possible because of a phenomena economists refer to as the "Dutch disease." This phenomena takes place when economic growth in one sector, such as the petroleum industry, devalues and lowers economic growth in other sectors, such as commercial aviation. Generally, it leads to increased imports and reduces the competitiveness of other sectors. Put simply, because the petroleum sector was very profitable, it became the first priority of the government, but then as the petroleum sector grew even more, it effectively became the only revenue-making sector. The economic relationship can be applied to many economic sectors in a petroleum-dependent economy.[22] This is one of the reasons it was extremely hard to establish other sources of income and diversify an economy that relied on petroleum.

Petroleum and its economy are generally seen in a positive light because of the funds it provides. Funds are essential for creating new projects (or mega-projects). However, because of petroleum, these projects are rarely competitive or self-sufficient. Thus, they rely on petroleum. This makes petroleum architecture very vulnerable to the sways of the petroleum economy.

20. English text is cited from Fouad Al-Farsy, *Modernity and Tradition: The Saudi Equation* (New York, NY, USA: Kegan Paul International Distributed by Routledge, Chapman & Hall, 1990), xxi. The Arabic text was published in the issue #2325 of *Um Al-Qoura* Newspapers, June 12, 1970 (7 Rabi' al-Thani, 1390 H).

21. Design of the airport began in 1976; construction began in 1983. Yamasaki passed away in 1986; thus, he did not live to see the project completed. The airport did not open until 1999 with petroleum economy as a reason for the delay.

Conclusion

Petroleum played an essential role as a catalyst of Saudi Arabian modernization. This can be witnessed clearly in the petroleum culture that took shape in Saudi Arabia after the discovery of petroleum. An essential part of the Saudi petroleum culture is the formation and reliance on mineral rent economy, but there is more to culture than just economy. Architecture in a petroleum driven economy, like that of Saudi Arabia, has been typically considered as a logical consequence of a country's capital surplus. The limitation of this perspective is that it focuses on petroleum as a generator of capital by also treating petroleum in a manner that surgically removes petroleum capital from the larger political and social context of the culture it operates within. As a result, this perspective cannot accurately explain a building like Dhahran Civil Air Terminal, which clearly could not have existed without the discovery of petroleum, yet was not funded by petroleum capital. Thus, modern architecture in Saudi Arabia can be better understood when we consider how it was shaped by petroleum, not only as an economic phenomena but as a cultural one.

The increased reliance on fossil fuels globally as an energy source during the nineteenth and twentieth centuries meant that securing constant access to petroleum became a matter of national security, in particular to major industrial nations. Geopolitical interests in securing a constant access to petroleum resulted in funding the building of the terminal as well as making the decision on its location, scale, and even the architect. This interest had attracted a number of architects to a new frontier, an uncharted area of architectural, cultural, and climatic contexts. Petroleum-influenced architecture added architectural vocabulary of these regions into modernist architecture, nudging it slightly away from a Eurocentric focus. Finally, in addition to its significant contribution to the nation's wealth, petroleum's technology, infrastructure, global connection, and financial system constituted a unique modernity for Saudi Arabia. These influences must have been at work on all other projects because development took place under Saudi Arabian petroleum culture.

22. Literatures on this topic are sometimes grouped under the general subject of "resource curse." For more on this subject in the context of petroleum, see Terry Lynn Karl, *The Paradox of Plenty: Oil Booms and Petro-States* (Berkeley: University of California Press, 1997).

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