

Culture Sustainability in Contemporary Vernacular Architecture: Case Study of Muscat International Airport

S. Hegazy

Abstract—Culture sustainability, which reflects a deep respect for people and history, is a cause of concern in contemporary architecture. Adopting ultramodern architecture styles was initiated in the 20th century by a plurality of states worldwide. Only a few countries, including Oman, realized that fashionable architectural designs ignore cultural values, identity, the context of its environment, economic perspective, and social performance. Stirring the Sultanate of Oman from being a listless and closed community to a modern country started in the year 1970. Despite unprecedented development in all aspects of Omani people's life, the leadership and the public had the capability to adjust to the changing global challenges without compromising social values and identity. This research provides a close analysis of one of the recent examples of contemporary vernacular architecture in the Sultanate of Oman, as a case study, Oman International Airport. The airport gained an international appreciation for its Omani-themed architecture, distinguished traveler experience, and advanced technology. Accordingly, it was selected by the World Travel Awards as the Best Tourism Development Project in the Middle East only four weeks afterward after starting its operation. This paper aims to transfer this successful design approach of integrating the latest trends in technology, systems, eco-friendly aspects, and materials with the traditional Omani architectural features, which reflects symbiotic harmony of the community, individuals, and environment to other countries, designers, researchers, and students. In addition, the paper aims to encourage architects and teachers to take responsibility for valorizing-built heritage as a source of inspiration for modern architecture, which could be considered as an added value. The work depends on reviewing the relevant literature, a case study, interviews with two architects who were involved in the project's site work, and one current high-ranking employee in the airport besides data analysis and conclusion.

Keywords—Contemporary vernacular architecture, culture sustainability, Oman international airport, current Omani architecture type.

I. INTRODUCTION

AIRPORT terminals are expanding at the fastest rate in history. The last two decades have seen a significant expansion of the global air transport network [1]. Modern airports provide a lot more than just runways and boarding gates; they also host retailers, lounges, parking lots, office centers, conference halls, cafés, railway terminals, and hotels [2]. Accordingly, airports would start to be seen as not simply ordinary buildings [3], but rather as icons and representatives of cities and countries [4]. Consequently, to add a prestigious semblance, contemporary design was heavily incorporated in

airport designs over the last twenty years [1]. In addition, the recent push to manage climate change brought airport design and operational sustainability under heavy scrutiny [3]. On the other hand, research has indicated that travelers, on average, utilized 80% of their total transit time engaging in the available amenities, while 20% was dedicated to check-in, security, and other travel procedures [5]. Consequently, traveler satisfaction with the terminal ambience was in favor of delightful experiences that offered a “sense of place”. Airlines started to fly to airports based on travelers’ preferences [4].

It is believed by some scholars that vernacular architecture still has something to provide for the contemporary architecture to add uniqueness, identity, sense of place, and culture sustainability [6]. This paper provides a successful example; Muscat International Airport (MIA) which gained global appreciation for its Omani themed design, favorable passenger experience, and latest state of the art technologies [7]. MIA provides an outstanding model of culture sustainability via a contemporary vernacular design approach.

The research starts with the definitions and characterizations of the discussed topics. Then, a quick overview of airport’s development is presented. Thereafter, a brief on the Omani Vernacular Architecture is provided. Finally, the case study of MIA is evaluated from the vernacular and contemporary perspectives. The paper concluded that the utilization of Omani vernacular architecture starting from the project concept played a critical role of adding a unique experience for the travelers and successfully achieved cultural sustainability.

A quick overview of the relevant publications has revealed that cultural sustainability was appreciated via a variety of publications. For example; Winterberg discussed in 2014 [8] how to build a culture for sustainability, while Hristove et al. discussed in 2015 [9] culture and sustainability in some European cities, while theories, policies, and histories of cultural sustainability were demonstrated by Spinozzi and Mazzanti in 2017 [10]. On the other hand, Pearman in 2004 [3] and Van Uffelen in 2012 [2] went through airport history. Emberson in 2007 went more in depth to discuss the airport interiors [4]. In addition, Branigon and Lynch in 2011 [11] discussed in detail one iconic airport; Chicago’s O’Hare. This was also done in 2020 [12] by Gallop who discussed another iconic airport, London Heathrow. This paper falls in the same area of research as the aforementioned one. Contemporary

S. Hegazy is with the Scientific College of Design, Sultanate of Oman (phone: +96892206733; fax: +968 24513213; e-mail: sohair@sced.edu.om).

Vernacular Architecture was not as widely discussed, for example Nash in 2019 [13] argued via 25 examples about the capability of British Housing to consider vernacular traditions using modern materials. While vernacular architecture was analyzed in a variety of editions from many aspects; for example, one of the recent publications released by Randhawa in 2022 about vernacular architecture of India [14], Murray in 2013 [15] discussed a building's translucent skin as one of the contemporary architecture details. While sustainability as one of the contemporary architecture aspects was displayed by Plan in 2022 [16].

II. DEFINITIONS AND CHARACTERIZATION

A. Culture

While culture has many definitions, the two that are relevant to this paper are as follows: The first one was stated in 1952 by Andretti and Ferraro. "Culture" refers to everything that people hold in their heads such as values, ideas, attitudes, and everything considered as a reference to behavior patterns [17]. The second one was stated in 1989 by UNESCO which mentions: "Cultural Heritage" is specified as the entire frame of material codes, either symbolical- conveyed by the past to every culture, or as the entire human beings [17].

B. Sustainability

The United Nations defined Sustainability in 1987 as living within reasonable environmental boundaries and showing responsibility to preserving the earth's natural resources for coming generations [6]. Around the same time, the global community became more concerned about the adverse effects of airport operations on the environment. These include local air quality, aircraft emissions, noise, energy consumption, contaminated run-off water, and airport waste [3]. One of the newly emerging terminologies is called "Sustainable Airport". Some scholars specified three main aspects of sustainable airports; an economic criterion, an environmental criterion, and a social criterion [18].

It is worth mentioning that sustainability is no longer only assessed by using sustainable resources, renewable energy, and recyclable materials, but has now expanded to include local history, location characteristics, and local traditions or "Culture Sustainability" [16].

C. Contemporary Architecture

Broto defined contemporary architecture as the one that responds to the creativity dimension and latest technology besides profound conceptual perspective as analogies to the relevant function, place, material, and shapes [19] while Murray emphasized the concept of "Light Construction" with transparent glass facades as reflections replaced light and shadows, to be the main feature of contemporary architecture. In addition, "Sustainability" is considered as a main player in contemporary architecture [15].

In spite of recognizing "Contemporary Architecture" as free-for-all, some researchers try to set some key factors to distinguish such architecture as follows: Asymmetry, curved lines, free-form shapes, rounded forms, large-considerable

windows, living walls, green roofs, incorporated smart technology, open floor plans, and integrated LED lighting [20].

D. Vernacular Architecture

It is a style that aims to form a communion with nature as well as environment. However, the current discourse of integrating contemporary architecture with nature leads everyone to mostly ignore this aspect of the vernacular architecture. Two substantial elements of this type inspired contemporary architecture; the exemplary understanding and relation of users' needs and the ideal communion with the surrounding environment [21].

One of the pioneers of discussing the benefits of vernacular architecture; the Egyptian architect Hassan Fathy concluded that: "Thousands of years of accumulated experience has led to the development of building methods using locally available materials, climatization using energy derived from the local natural environment and an arrangement of living and working spaces in consonance with social requirements" [6].

E. Airports

While Chris Van Uffelen, as stated in [5], defines "Airports" as the city gate which links air-traffic to traffic on the ground; team from Queensland University of technology, Australia stated that airports are an example of extreme congregation and one of the largest spaces that gather people, government agencies, processes, private companies, technologies, artifacts, and information [3]. In addition, Ferrulli emphasized the important socio-economic status that airports have and their critical role in backing the socio- economic evolution of city zones. Ferrulli emphasized the significant role that the airport- as the main node in the aviation transport system- plays in current socio-economic reality, supplying accessibility, connectivity and encouraging commerce. Along with current development of terminal infrastructure, airport-connected commercial, business, spatial and residential growth happen in its surroundings [22]. The same aspect was emphasized by another group of scholars that the aviation industry considers airports the backbone of air transport, which provides the fastest universal transport network that is essential for international business and tourism. The crucial economic aspect indicates that an expected potential increase in global carrier revenue/passenger/kilometers (RFKs) till 2030. This reflects the decisive role played by air transport in supporting trade, commerce, and tourism [3].

III. A QUICK LOOK ON AIRPORT DEVELOPMENT

A. Evolution and Expansion: Reasons Behind

Since 1909, when the first international flight from France to England was managed by Louis Bleriot, the concept of accommodating the plane emerged [3]. The initiation of airports was in the military domain; control tower, a grass landing, and a wooden cabin [4].

A dramatic growth in aviation traffic started after World War I in 1920s. The first civil airport was constructed in 1928 in Amsterdam, right as the city was hosting the Olympic Games [3]. Since then, airports have gone through successive stages of

development, starting with targeting the best inflow of moving passengers through spaces to the plane. In the 1960s, one of the most influential decisions has been the taken, airliners shifted focus from the few wealthy elites to large group tourism. In addition, in 1978 another important step was taken with the deregulation of the United States carriers, which enabled competition among American airlines. This resulted in a tremendous rise of US air travel, reducing the percentage of Americans who never flew before from 70% to 20% in twenty years. The hub-and-spoke model of aviation, which allows switching between planes with lower cost tickets and extended flight time started to take a role in aviation industry, thus extending the amount of time passengers spend in airports. However, in the 1980s another type started to emerge, the point-to-point, low cost airline model [3].

Another critical influence was the 9/11 shocking incident, which required a massive reemphasis of security measures. Accordingly, even more time must be spent at airports, and now passenger must typically budget two hours for the check-in process. Consequently, airport operators started to offer commercial activities to get more revenue from dining and retail [4].

Airport utilization extended from constant tourist and business use to everyday commuting and periodic leisure travel. Recently, the issue concerning the adverse effects of airports to the environment started to take a considerable weight, especially in the western countries. It is expected that the design of future airports will use creative solutions to comply with sustainable development goals such as greenspaces and natural features around the airfield, green and affordable energy, waste reduction, saving and conserving natural resources, natural storm water running, sustainable transit system, etc. [18].

B. Development from a Design Perspective

Initially, airports were considered as a little more than a bus terminal. The first international airports were considered as municipal structures. The government, which ran and owned the airport, hired a civilian architect who viewed the airport as a series of rectangular boxes from the building, with long bridges extended outwards. None of the designers were assigned the responsibility of interior designs; very little seating and lighting were present, with a few available cafés and commercial activities. The change started when distinguished architects were appointed to design airports with a modernist flavor and a lot of creativity in the 1960s with the iconic airport; Paris Charles De Gaulle. Signage was used for the first time with modern seating and lighting. However, keeping the airport run by the government means those “municipal” factors were still there, with a mindset of disbursing money rather than making it.

The privatization of the British airports in the 1980s was a major breakthrough which resulted in a full-bloom design accompanied by prosperous commerce. In 1980, the Gatwick Airport North Terminal was master planned by qualified architects and designers and provided successful model for other airports. Every aspect was enhanced; premium terminal fit-outs, office areas turned into passenger spaces, and catering

offers for all budgets and tastes. Later, other airports adopted the same path like Washington National Airport which has initiated its “Architecture Enhancement Program” for specified artistic repletion. The concept of the “interior sense of place” has emerged [4].

Those examples show how airports underwent an unprecedented rate of development of all building types in history. Within one hundred years, airports turned from only runways and terminals to also accommodate a variety of other facilities like lounges, hotels, office centers, parking lots, conference halls, malls, and railway stations [2].

IV. BRIEF ON OMAN VERNACULAR ARCHITECTURE AND CULTURAL SUSTAINABILITY ASPECTS

The Sultanate of Oman occupies a strategic location in the Arabian Peninsula and is the third largest country in the region with a surface area of 309,500 km². Oman is an ancient country with a history that extends back to the fourth century BC [23]. Al-Zubair stated that the vernacular architecture of the Sultanate of Oman evolved from the dictates of culture and the natural environment that affected identity, lifestyle, faith, and mood [24]. In addition, Fathy, a pioneer of sustainable architecture, believed that vernacular architecture has matured over time and accumulated experience. Fathy stated that the growth of vernacular architecture has incorporated local materials, climate and socio-cultural values [17].

In the following two points, the major two factors that formulate the vernacular Omani Architecture- Environment and Culture- will be examined.

A. Environmental Factors which Affected the Omani Architecture

Oman is located in the arid zone where summer temperature reaches 50 °C and extends for eight months. Consequently, the inhabitants are exposed to extra heat and blazing sun. Climate has a significant influence on architectural choices. An observed feature of the vernacular architecture is employing thick walls accompanied with small openings-solidity- to avoid sun glare and hot air. In addition, large openings were covered with wooden lattices to enable the breeze to flow in, while mitigating the sun glare. Moreover, local materials with high thermal features, such as mud brick, were employed. Furthermore, buildings were closely grouped together to shade each other and provide a comparatively cool microclimate [17]. Fig. 1 illustrates those characteristics.

A. Culture of the Omani People

The Omani people were of the ones who responded positively to the call of Islam in the seventh century [26]. Islam features through and comprehensive regulation of all aspects of Muslim life. Inspired from the divine legislation, the Sharia set a series of guidelines and limits that dictate Muslim everyday life. Accordingly, all attitudes, values, and ideas which form the Muslim culture are influenced by Islamic teachings. The civilization of Islam holds a special status for art and architecture. A wide range of crafts feature the signature Islamic art called “arabesque”- ceramic tiles, gypsum work, stained

glass, metal and wooden work, carpentry and masonry. This arabesque art consists of biomorphic shapes reflects the surrounding environment features created by God, the main source of beauty in the universe. The Muslim artists abstract all the pristine nature forms, rhythms and patterns to their original essence as shown in Fig. 2.



Fig. 1 Some features of the vernacular Omani architecture; solidity, simplicity, small screened windows, grouped and joint units [25]



Fig. 2 Some arabesque patterns of Oman [27]

From the architecture perspective, the Muslim architect believes that God is the Superior Architect. Accordingly, the relationship between the Muslim architect and the surrounding ambience is built on respect not arrogance [17]. Consequently, the Omani vernacular architecture features a humane scale. During the construction procedure, the builders and prime craftsmen used sections of their body as units of measurements [15].

B. Vernacular Omani Architecture Main Features

The vernacular architecture in Oman is a chain of complementary factors that have merged over the ages to provide a harmonious and coherent built fabric [24]. Careful selection of the colors and materials from the physical environment sets it apart. In addition, it shares with Arabian

Islamic countries a height restriction of three floors and utilization of local materials, lime mud plasters, wood, and stone [17]. Simplicity and purity characterize the Omani traditional architecture. The architecture is recognized by the contraindication of arabesque decoration and details against the massive solid walls. The mentioned arabesque details are featured in a wide variety of carved wooden doors and wooden window screens.

C. Sustainability of the Omani Vernacular Architecture

Over its history which started back from the fourth century BC, the Sultanate of Oman went through periods of boom, interrupted by periods of decline. In 1970, after a century of being isolated as a listless country, Oman started its path to modernization, backed by the recent increase in oil revenue [26]. Throughout the last fifty years, significant progress has been realized which affected all Omani people's lives. Oman is considered one of the most impressive models of socio-economic retrieval in the world. In 1997, the Sultanate of Oman ranked first in the United Nations Development Program [23]. In addition to the comprehensive regeneration of the state's economy and society, the government showed a clear concern for culture, art, and architecture. Oman decided to esteem its deep-rooted civilization as a source of national pride, and not to compromise social and culture values.

In 1970, two Iraqi and British consultants were authorized to prepare planning proposals for Muscat the capital and its neighbor Mutrah. The Omani government decided -based on the identical outcomes of the two reports- to consider the vernacular architecture heritage as an inspiration for new architecture moving forward, besides laying out a national plan for maintenance and conservation of traditional buildings as a live reference for Oman vernacular architecture [16]. A law for renovation the national heritage was enacted in 1980. In addition, a national committee for protecting and documenting the historic buildings was commissioned for that task, supported by respective ministries and chaired by the undersecretary of the Heritage Affairs.

Moreover, the Diwan of the Royal Court issued in the 1980s "Elevation Guideline" to control all the new constructions such that it abides by the unique Omani/Arabian and Islamic architecture [17]. The document was restrictive and successfully managed the messy development process. In 1992, a new version of "Building Regulations for Muscat" was released followed by other versions; with the latest one in 2020. It is worth mentioning that in all the editions the content of the following article is abided by; "The architectural works should be according to the Local, Arabic, or Islamic Style" (Building regulations for Muscat, chapter II, point 2, article No. 33). Unprecedented in the gulf region, extra regulations in the building code restrict the residential buildings height to a maximum of three floors, and ten floors for the commercial ones. Furthermore, specific light colors are also mandated (Fig. 1 shows the sustainability of the current Omani architecture - at the back - with the vernacular one, at the front).

The said regulations wonderfully kept the sustainability of the Vernacular Omani architecture to be merged with the

contemporary one. Oman is a living example of what Sir Geoffrey Jellicos's commented: "Architecture is to make us know and remember who we are" [17].

V. MUSCAT INTERNATIONAL AIRPORT: CASE STUDY

A. Brief History

Before 1970, there was a small old airport known as Bayt Al Falaj. In 1973, Al Seeb International Airport replaced the former. In 2008, it was renamed to Muscat International Airport (MIA) to acquire a global standing. The airfield- with an area of 21 km²- had 23 departure gates, 58 check-in counters, a limited number of cafés and retails [28].

Oman has to respond to the global attitude started in year 2000, as the airport terminal had acquired an important status as a symbol of national pride and aspiration with respect to trade, tourism, and as a national gateway [3]. In addition, Oman started to plan for economic diversification where tourism is expected to be a key player. Through an interview with Eng. Shayma Al Belushi, site engineer in MIA, in June 22, 2022, she stated that it was decided to conduct a comprehensive renovation process of the MIA in order to accommodate 12 million passengers per annum in the first phase, 24 million in the second phase, and up to 48 million in 2050. The design phase lasted from 2004 to 2009, and then the construction started in 2010. Finally, the 20th of March 2018 saw the beginning of the airport operations. Extra facilities were added, as the area was extended to be 580,000 m² in the first phase, with an additional 118 check-in counters and 40 departure gates [28].

B. Design Concept and Main Objectives

Eng. Zain Al Harthi, Head of Interior Design Department at MIA provided a copy of the presentation displayed in 2012 by the project consultant with information and details. From the mentioned document, it was concluded that the main objective of the project was to create "A State of the Art" unique

contemporary building inspired from the traditional Omani architecture elements, such that it would be globally identified as a distinguished gateway to Oman.

Accordingly, the major concept was solidity represented in a heavy weight base-ground floor- to indicate the vernacular Omani Architecture, and lightweight top floor to indicate the spirit of the future and flight. In addition, a courtyard which is one of the Omani and Islamic architecture themes is included. Moreover, the Mashrabiya (window screen) design element was executed using CNC aluminum technology, and it was used to filter light through a wide area of glass to unite exterior and interior elements, as seen in Figs. 3 and 4.



Fig. 3 Omani vernacular architecture solidity reflected on the first floor of MIA [29]

Furthermore, glass, marble, wood, and metal works with arabesque themes occupy each corner. Over and above, one of the most important features of the Omani environment is the "Wadi", a valley of seasonal running water between the mountains with palm trees and stones, a common tourist attractions. The "Wadi concept" was simulated to be extended along the 40 departure gates, it was done with the blue LED lights to represent water, Fig. 5 [30].



Fig. 4 The Mashrabiya (arabesque window screen) using CNC aluminum technology [7]

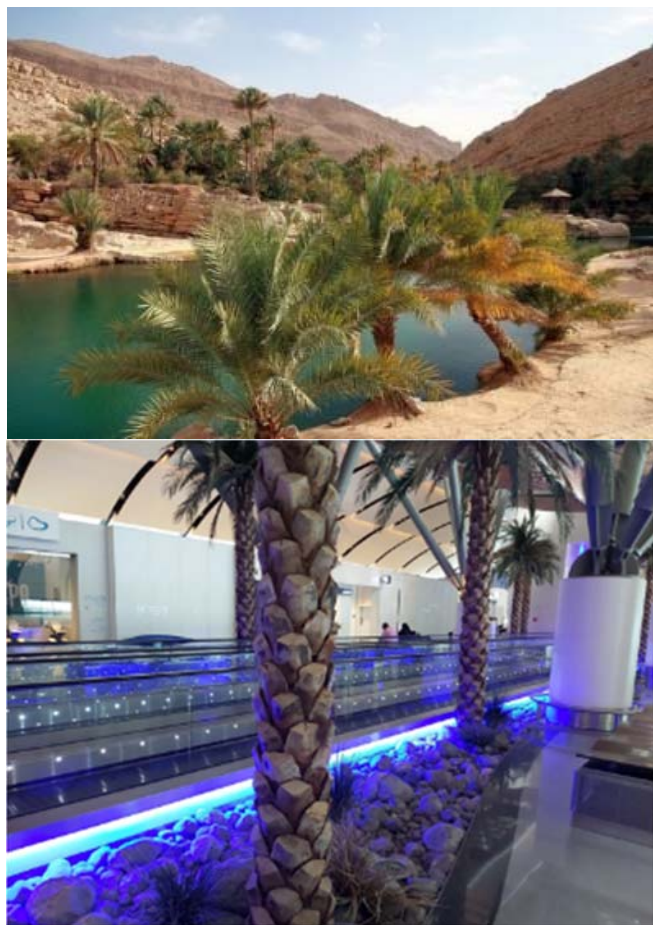


Fig. 5 Sense of place – the Omani Wadi was simulated in MIA with the LED Technology [30]

The project objectives have been fulfilled on the same operational year of 2018. MIA was given the title of the “World’s Leading New Airport” by the World Travel Awards [7] It has also won global appreciation for its advanced technology, Omani themed architecture and anticipation of travelers’ experience. Many other global and regional awards were earned [22].

C. Evaluation of the Vernacular and Contemporary Aspects in the MIA

From the definitions and characterizations mentioned in the second point of this paper, the sum of the main features of the Vernacular and Contemporary architecture was derived. In addition, information about the MIA was collected from interviews with two architects who were involved in the construction process; Arch. Ahlam Al Kiumi, and Arch. Zina Al Harthi, the HoD of interior design, Muscat Airport. Furthermore, some information and images were obtained from the presentation prepared by the consultant in 2012 titled “Development of Muscat International and Salalah Airports”. Accordingly, Fig. 6 includes an examination of the representation of Omani Vernacular Architecture themes (V), and the contemporary ones (C). In addition, the merge between (C&V), in case of executing vernacular architecture features via contemporary and modern techniques was included as Contemporary and Vernacular Aspects (C&V). From Fig. 6, the statistics represented in Figs. 7 & 8 were prepared using the SPSS software.

	FORM						MATERIALS				ECO-FRIENDLY			MOTIFS			WINDOWS		STRUCTURE SYSTEM		SENSE OF PLACE	
	FLAT (A)	CEILING	FURNITURE	VOLUME	MASS	RETRATER HEIGHT	SYMMETRY	FLOORING	WALLS	CEILING	FURNITURE	ENERGY EFFICDODY	WATER SAVING	WINDOW SCREENS	IGLASSI PATTERN	WOODEN COMMENT MOTIVES	SIZE	MATERIAL (WINDOW SCREAM)	SPAN	TECHNIQUE	NATURE SURROUNDING FEATURES	
OMAN ARCHITECTURE ASPECT (V)	0	0	1	1	1	1	1	0	1	0	0	1	0	1	0	0	0	0	0	0	1	
CONTEMPORARY ASPECTS (C)	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
CONTEMPORARY AND VURNACULARE ASPECTS (C&V)	0	0	1	1	1	1	1	0	1	0	0	1	0	1	1	0	0	0	0	0	1	1
V	0	0	1	1	1	1	1	0	1	0	0	1	0	1	1	1	0	0	0	0	1	1
C	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
V&C	0	0	1	1	1	1	1	0	1	0	0	1	0	1	1	0	0	0	0	0	1	1

Fig. 6 Evaluation of the representation of vernacular and contemporary features in MIA

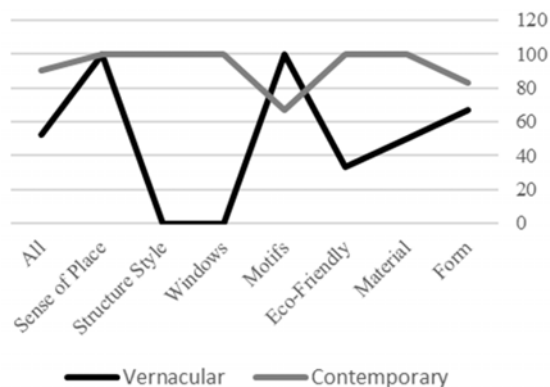


Fig. 7 Evaluation of the representation of vernacular and contemporary features in MIA

Fig. 7 reveals that the highest ratio of representation of the vernacular architecture was via motifs and sense of place which was provided by the vernacular architecture and executed via contemporary technology, that greatly contributed to giving the uniqueness and enjoyable experience to the passengers. With reference to the definitions in the second point, the above-mentioned MIA design characteristics constitute an important aspect of cultural sustainability. On the other hand, the highest ratio of contemporary architecture representation was given to the structure, windows, and materials, thus using today's technology to provide modern-day levels of convenience and utility. In addition, Fig. 8 indicates that the merge between both vernacular and contemporary design criteria had the highest ratio of representation than both styles on their own.

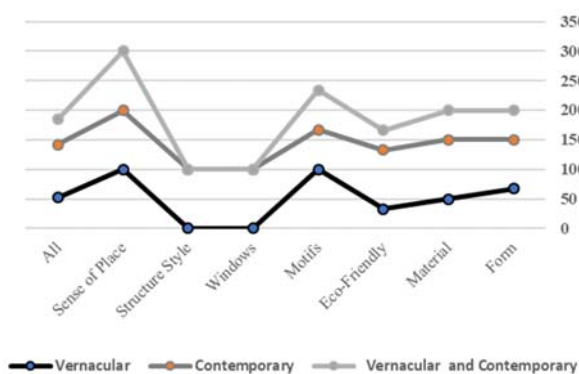


Fig. 8 Evaluation of the representation of vernacular, contemporary and vernacular and contemporary features in MIA

It is worth mentioning that the traditional Omani Architecture emphasizes sustainability and protection of the environment – as mentioned in the second point. However, it was not shown in the table or the statistics as the relevant modern techniques were implemented. One of the highlights of the sustainable design elements is establishing green spaces all around the airport, starting from the external landscape and into the courtyards. Grey water and air conditioner condensate are used for irrigation in all those green spaces. In addition, double glazing curtain walls were used in many passenger areas with louvers and Mushrabiya (window screens) providing shade

while still allowing natural light into the building. As impressive as those design elements are, the main focus of this research is “Culture sustainability”, so they had to be excluded from the data.

VI. CONCLUSION

Airports are not merely complex and utilitarian spaces; they have now evolved into vibrant social spaces that aim to enhance the lives of both travelers and staff.

This research reveals that vernacular architecture and built heritage have the potential to supplement contemporary architecture with uniqueness, identity, a sense of place, and providing positive emotional experiences. It is recommended to do more in depth studies of vernacular architecture to identify more successful examples and to inspire contemporary architecture with more fascinating and magical concepts and ideas.

REFERENCES

- [1] Rushmer, Rob. (2019). Three Airport Terminal Trends Affecting the Future of Aviation. Retrieved on May, 5.2022 from <https://www.icfcom/insights/transportation/future-airport-design-trends#>.
- [2] C. V. Ufflen, “*Airport Architecture*”, Braun Publishing, 2012, pp. 7-8.
- [3] H. Pearman, *Airports: A Century of Architecture*. London: Laurence King Publishing Ltd, 2004, pp.9-13
- [4] S. Thomas-Emberson, “*Airport Interiors: Design for Business*”. England: John Wiley & Sons Ltd, 2007, pp.12-18.
- [5] A. Livingstone, V. Popovic, B. Kraal, and P. Kirk, “Understanding the Airport Passenger Landside Retail Experience” in Proc. DRS2012 Bangkok, Chulalongkorn University, Thailand, 2012, pp. 1-8, Retrieved from <http://eprints.qut.edu.au/54334/>.
- [6] T. Tylor, L., M. Nicolopoula, L. Mahdjoubi, and N. Culler, “Vernacular Architecture and Contemporary Design in Oman: Challenges in a Changing Climate, in: Detail Design in Architecture, Translating Sustainable Construction, 8-4 September 2009, Cardiff <http://www.casd.uwic.ac.uk/detail-design.htm>
- [7] FACES. (n.d.). Muscat International Airport is World's Leading New Airport. Retrieved on June 4, 2022 from: <https://faces.oman.com/muscat-international-airport/>
- [8] J. Wirttenberg, “*Building a Culture for Sustainability: People, Planet, and Profits in New Green Economy*”, Praeger, 2014, pp.4
- [9] P. Spinozzi, M.D. Sestic, and N. Duxbury, “*Culture and Sustainability in European Cities: Imagining Europolis*”, Routledge, 2015, pp. 8
- [10] P. Spinozzi and M. Mazzanti, “*Cultures of Sustainability and Wellbeing: Theories, Histories and Policies*”, Routledge, 2017, pp.5
- [11] M. Branigan & C. Lynch, “*A History of Chicago's O'Hare Airport*”, Kindle Unlimited, 2011, pp.6
- [12] A. Gallop, “*Heathrow Airport: Yesterday and Tomorrow*”, Kindle Edition, 2020.
- [13] C. Nash, “*Contemporary Vernacular Design: How British Housing Can Rediscover its Soul*”, RIBA Publishing, 2019, pp.6
- [14] T. S. Randhawa, “*Traditional Residential Styles and Spaces*, Independently published, 2022.
- [15] S. Murray, “*Translucent Building Skins, Material Innovations in Modern and Contemporary Architecture*”, 2013 Routledge, pp.1-2.
- [16] T. Plan, “*Sustainable Architecture: Contemporary Architecture in Detail*”, Hoaki, 2022. Pp.4.
- [17] S. Hegazy, “Cultural Sustainability between Traditional and Contemporary Omani Residences- A Comparative Case Study”, *European Journal of Sustainable Development*, vol. 4, 2015, pp. 185-194.
- [18] S.K. Kaya and N. Erginel, “Futuristic Airport: A Sustainable Airport Design by Integrating Hesitant Fuzzy SWARA and a Hesitant Fussy Sustainable Quality Function”, *Journal of Cleaner Production-Elsevier*, Production 275, 2020. <http://doi.org/10.1016/j.iclopro2020.128.800959-6526/@2020 Elsevier Ltd>.
- [19] E. Broto, “*Contemporary Architecture*”, Barcelona, Spain: LINKS, 2009, pp.7, 8.
- [20] K. Hohenardel, “What is Contemporary Architecture?” Retrieved from:

- <https://www.thespruce.com/What-is-contemporay-architecture-4769079>.
2022, accessed May 25, 2022.
- [21] G. Nash and D. Gheoghiu, "Vernacular Architecture as a Model for Contemporary Design", *WIT Transactions on Ecology and the Environment*, Vol. 128, 2010, pp. 157-171.
- [22] P. Ferrulli, "Green Airport Design Evaluation" (Gr ADE)- Methods and Tools Improving Infrastructure Planning", Elsevier B.V. 2016-Doi:10.1016/j. trpro:2016.05.463.
- [23] S. Hegazy, "Continuity and Change of Muscat House- Influencing Factors and responses", *International Journal of Advanced Research*, vol. 3, 2015, pp.95-107.
- [24] M. Al Zubair, "*Oman's Traditional Journey*", Sultanate of Oman: BAZ Publishing, 2013, pp.26-40.
- [25] K. Sunder, "Understanding Oman Through Its Architecture". Retrieved on December 28,2022 from: <https://theculturetrip.com/middle-east/oman/articles/understanding-oman-through-its-architecture/>
- [26] S. Hegazy, "Conservation of Omani Archaeological Sites, Harut Al Bilad-A case Study", *International Journal of Art and Sciences*, Vol. 7, 2014, pp.435-414.
- [27] T. Atrissi, Patterns of Oman, Retrieved on December 28, 2022 from: <https://www.atrissi.com/patterns-of-oman/>
- [28] G. Medhat, "Here's Everything You Need to Know About Muscat International Airport". Retrieved on June 4,2022 from: <https://the culture trip.com/middle-east/oman/articles/heres-everthing-you-need-to-know-about-musca-international-airport/,2017>.
- [29] This photo was included in an unpublished document presented during the construction period by the consultant in 2012 titled "Development of Muscat International and Salalah Airports" provided to the author by Eng. Zain Al Harthi, Head of Interior Design Department at MIA
- [30] G. Medhat, the Most beautiful Wadis in Oman, Retrieved from: <https://the culture trip.com/oman/article/beautiful-wadis-omn/> Accessed on December 23, 2022.