Original Research Article

The Stylistic Similarity of Mughal Architecture with Malaysian Mosques: An Alternative Approach

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Abstract

Problem statement: Several typological qualitative studies are reflecting stylistic similarity between Mughal architecture and Malaysian mosques based on the occurrence of Mughal features. However, these features were distorted in their forms and materials during their adaptation in Malaysian mosques being a different region, climate, and period though the features were within recognizable limits.

Research objective: The purpose of this research is to explore an alternative approach based on components of feature to evaluate the stylistic similarity between Mughal architecture and Malaysian mosques during the British period.

Research method: This research is based on the similarity model and feature matching and it will investigate the aim through observation and case study methods by considering components of the feature as connotation with indicators to quantify the qualitative data. The methodology includes comparison and evaluation of dome, minaret, and chhatri as features from three Mughal case studies with three Malaysian mosques of the British period for their stylistic similarity.

Conclusion: The findings show that this alternative approach gives a more precise way to evaluate the stylistic similarity between Mughal architecture and Malaysian mosques based on the numeric value of responses for indicators.

Keywords: *Mughal Architecture, mosque, Malaysian mosques, style.*

Introduction

Religion has been a major stimulus of art and architecture throughout the ages. Religious architecture in a region is a reflection of the identity and culture of people (Ali, 2013). A mosque is a religious place where Muslims gather five times a day to perform their rituals. On one hand, the mosque is a symbol of the existence of Islam in any region and a socio-cultural space on the other hand. Despite being a place of worship, the mosque had been a multifunctional space throughout history in the Muslim world. However, the liturgical requirements in Islam are very few. The essentials of the prayer space may be reduced

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to an area constituted by rows facing the Qibla direction, indicating the direction of the prayer towards the Ka'ba. The typical liturgical elements are the mihrab, a Qibla-facing niche where the imam stands to lead prayer; the mimbar, a pulpit serving for the delivery of Friday oration; and the minaret, which enables the voice of the muezzin to be heard from a distance during the call for the prayer. The function of these elements has remained fundamentally constant throughout history, and no obligatory forms are associated with any of them. The holy book of Islam, the Qur'an, does not prescribe a visual form for these elements, nor does it set out what a mosque should look like; instead, it describes an open system of signs that should be materialized within the context, the individual and collective experiences of the community. The formal expressions of mosques and their liturgical components are therefore mainly contextual, cultural, traditional, and political rather than Islamic per se. Any association to these forms is likewise tied to the cultural or social meanings attributed to them throughout history by different countries, different historical periods, and throughout various Muslim communities.

The first mosque built by Prophet Mohammad (SAW) at Medina, just after migration from Mecca, had various functions. It was a place of governance, court, military camp, community center, meeting place with different delegates from other religions, and a learning seat. The primary mosque was austere in construction, built with the palm tree trunk and covered with palm leaves and mud (Creswell, 1958). The spread of Islam from the Arab world to various countries raised the demand for the place of worship in different regions of the world. Due to different climatic conditions, availability of material, and vernacular architecture of different places numerous styles of mosque architecture could be observed worldwide. Various typological studies at the global and regional level on mosque architecture have been published by renowned scholars in the field. Frishman and Khan (1994)

classified historical mosques into Arab, Persian, Turkish, Indian, Chinese, and Southeast Asian. In Malaysia, typological studies show that North Indian Mughal architecture has greatly influenced the Malaysian mosques, and many considered it one of its types (Ahmad, 1999; Asif, Utaberta & Sarram, 2019; Khazaeem, Yaacob, Awad, Alcheikh & Ali, 2015; Rasdi, 2007; Saaid & Hassan, 2019). This research aims to study the stylistic similarity of Mughal architecture and Malaysian mosques to find the influence of one style over the other.

Architectural historians classify styles such as Greek, Roman, and Gothic based on the repetition of similar features. The styles have been established by historians based on syntax between the recognizable forms. A style can be identified with the help of recognizable features and the same can be categorized as an individual, group of persons, due to geographic regions or through a period respectively (Chan, 2000). It is also defined as a pattern of doing things in similar ways. Chan explored the similarity by using the theory of feature matching (Chan, 1994; Smith, 1989; Tversky, 1977). The term feature includes patterns i.e. ornamentation, forms, material, and treatment or physical characteristics i.e. colors and textures. A designer may create features originally and add them by repeating them in his products. Such features are defined as signatures of designers' styles. A feature can be considered stylistic if it bears/holds a form or composition of a particular configuration it is originally generated, it is imitated or adapted from other products, or is a component of salient forms repetitively employed by a designer.

Perceptual style can be expressed as stylistic similarity or difference, which is in turn dependent on visual similarity (Stacey, 2006). Style perception is also subjected to the viewpoint of the observer if an object is viewed from a certain position of the observer, the appreciation of stylistic features and their visual syntax may be quite obvious. The viewer becomes more sensitive to minute variations on category-diagnostic dimensions at the

blur boundaries of style (Goldstone, 1994). Chan observed that a feature is recognizable with a repeat to a particular style even if it is geometrically distorted up to a maximum of 40%. Another observation indicates that it is difficult to recognize a style if the similar features repeating in the object are less than three. In other words, the style can be perceived by an observer and said to be similar to other styles, if it is constituted of any three features similar to the root style. Chan (2000) developed a descriptive model to analyze the style scientifically. However, his model is limited to geometrical changes of features and gives equal weightage to every occurrence of the feature even some of the features were changed in their form, color, texture, and materials. We hypothesized that an alternative approach based on the similarity of components of features can work well to gauge the stylistic similarity of one regional style with the other where the features were adapted within their recognizable limit. In the case of Mughal stylistic similarity with Malaysian mosques during the British period, due to imitation of Mughal features in a different region and climate, they were distorted in their shape, color, materials, and textures though within the recognizable limit. The authors suggested an alternative approach to study each Mughal feature at its component level and to compare them with the same components of features of the Malaysian mosque. The number of similar and dissimilar components of features governs its stylistic similarity between objects as it is dependent on commonality and differences among them. The more commonality signifies more stylistic similarity and the more differences mean less stylistic similarity. When the objects are identical, they possess a maximum similarity.

Litrature Review

A style is expressed by the number of a set of common features in an object, which in turn enhances the perception of the observer. Repetitious forms, features, and syntax may be examined to identify a style (Chan, 2000). In art and architecture,

stylistic similarity describes the resemblance of the forms, features, and syntax among the objects. This research aims to identify the components of Mughal features and to trace their similarity to evaluate their stylistic similarity with Malaysian mosques during the British colonial period. Chan (2000) claims that the perceptibility of the feature depends on its stylistic similarity. More stylistic similarity features will manifest more perceptibility and as a result stronger influence of style. Hence the style with the same number of weak features could not be recognized frequently in comparison to strong features. The degree of similarity among objects depends on the common features they possess (Sloman & Rips, 1998). This research is based on a similarity model to evaluates the stylistic similarity between Mughal architecture and Malaysian mosques.

The earlier responses to mosque architecture in Malaysia were vernacular, characterized by stilt floor, timber construction, and multitiered roof (Hassan, 2010). With the advent of British colonization, the architectural style of the region changed drastically. Several typological studies explicated different architectural styles of the mosque in Malaysia (Ahmad, 1999; Nasir, 2004; Rasdi, 2007). Scholarly work proclaims that there was also a stylistic influence of Mughal architecture along with several other styles on the Malaysian mosque during the British period (Nasir, 2004; Rasdi, 2007; Yi & Ahmad, 2017). These studies were based on the occurrence of Mughal features in Malaysian mosques such as (Rasdi, 2007) explores that North Indian Mughal style in Malaysian mosque was characterized by small and large onion domes, the multitude of spires and small domed canopies, more than one minaret and multilobed arches over-decorated columns. However, these Mughal features were replicated in a different region at a different point in time, hence seems to be blurred the boundaries of architectural styles while adopted in Malaysian mosques (Khazaee et al., 2015; Ali & Hassan, 2018) compared several Mughal features

in different mosques of the British period and found dome, minaret, and chhatri were the most identical among them. These three features due to their salience, similarity, and feature matching were recognized by various other scholars as Mughal or North Indian (Ahmad, 1999; Rasdi, 2007). Hence for this study, these three features were selected for comparing at component level between Mughal and Malaysian case studies.

Method

This study is based on similarity and feature matching and aims to trace the stylistic similarity of Mughal architecture in North India on Malaysian mosques during the British colonial period. Six case studies from both regions were selected to study stylistic similarity. Three Mughal case studies Jami Masjid Fatehpur Sikri, Jami Masjid Delhi, and Ghaziuddin Khan mosque were selected from North Indian Mughal architecture as representative mosques of early, high and late Mughal period respectively. Jami Masjid Fatehpur Sikri was built in 1571AD, Jami Masjid Delhi constructed in 1650 by Shahjahan and eighteenth-century Ghaziuddin Khan mosque in Delhi representing early, high and late Mughal period respectively were selected from North Indian Mughal architecture. The three case studies from the Malaysian region were Masjid Jamak (1909) in Kuala Lumpur, Kapitan Keling mosque (1801) at Georgetown, and Zahir mosque (1912) at Alor Setar. Three Malaysian case studies were selected from Peninsular Malaysia based on appearances of Mughal features. As the British colonial period showed the maximum influence of Mughal architecture, Malaysian case studies were selected only from this period as a literature study indicates no traces of Mughal architecture on Malaysian mosques before British colonization. From the previous research of Ahmad (1999), the list of twenty-four colonial mosques was adopted and ten mosques were found with a minimum of three Mughal features based on primary observation. Further, three case studies having a maximum number of Mughal features were shortlisted for this research. The objects under study can be compared and

categorized based on similarity (Bruner & Austin, 1986; Smith, 1989). The following hierarchy was used for the observation and analysis in this study: (1) to identify a set of features from Mughal architecture, (2) observe the features concerning their components, (3) compare the similarities between the components among the identified case studies. For this study, Mughal features such as dome, minaret, and chhatri were selected due to their salience in Malaysian mosques during the colonial period. However, these three Mughal features lost their geometry, forms, and material while adopted in Malaysian mosques though found within the recognizable limit. The reason being that these features were routed through British architects and the immigrated Indian Muslim community settled in Malaysia during the colonial period (Izumida, 2003). Hence for this research, these three Mughal features were further studied at their components level to quantify stylistic similarity (Table 1). Each feature from the Mughal style was further subdivided into its components and the similarity was observed for the same components in Malaysian mosques. The occurrences of a number of these components of Mughal features in Malaysian mosques quantify the stylistic similarity of each feature which as a whole can be further used to quantify the degree of Mughal stylistic similarity on British colonial Malaysian mosques.

Similarities between components of features were calculated based on the similarity model and feature matching. Chan (2000) treated all the features as equally important and derived an expression to calculate the similarity between features appearing in the building based on the Tversky (1977) theory of feature matching. Different sets of components are identified as A, B, etc. for all the objects under observation. Some of these sets may be common in more than one object.

$$S(A, B) = f(a \cap b) - f(a - b) - f(b - a)$$

$S(A, B)$ = Similarity between components in A and B

$F(a \cap b)$ = Number of common components in A and B

f (a - b) = Number of distinctive components present in A but not in B

f (b -a) = Number of distinctive components present in B but not in A

S (A, B), is subjected to the number of common components and distinctive components in A and B. The positive value signifies similarity, whereas the negative value represents dissimilarity. The key for examining stylistic similarity is the set of common components. The higher the positive value, the higher is the perceptibility of a particular style by the observer. The same formula is used to analyze the similarity between the components of Mughal and Malaysian features.

Table 1. Classified components of Mughal features. Source: authors.

S. No.	Features	Components	Sub-components
1	Dome	Shape of finial	Amalaka and Kalasha
			Urns and Spire
			Pointed tip rod type
		Base of finial	Inverted Lotus
		Finishing Material of finial	Red sandstone
			Gilded Metal
			Painted Metal
		Shape of dome	Onion shaped
			Three centered
		Finishing Material of dome	White marble
			Stucco
			Metal
2	Minaret	Base	Square
			Octagon
		Position	Front corners of the prayer hall
			At one corner of the prayer hall
			Freestanding
			Outside prayer hall
		Number of stories	One
			Two
			Three
		Numbers	One
			Two
		Material	Red sandstone
			Red sandstone with white marble
			Exposed brick
			Painted plaster
3	Chhatri	Base	Square
			Octagon
		Eaves	Slanted projection
		Arch	Three centered
			Four centered
			Multilobed
		Dome	Three centered
			Bulbous
			Onion shaped
		Material	Red sandstone
			Masonry

For the study, the features can be considered in connotation with indicators. An indicator is defined as an operational representation of an attribute i.e. quality, characteristic, or property of a system (Gallopin, 1997). In the present study, the features are synonymous with indicators and the system reflects the style under observation. Indicators are considered as quantification tools but human experiences cannot be measured in a quantitative manner (Bell & Morse, 2012; Meadows, 1998; Peterson & Bomberg, 1999). The qualitative data is non-numeric and hence needs to be converted into numeric data i.e. quantitative for analysis (Gallopin, 1997).

Analysts and discussion

The research analyzed three selected Mughal features for the study which have a stylistic similarity with features of the Malaysian mosques of the British colonial period. To refine the results, the similarity was observed between the components of similar features of Mughal and Malaysian case studies. All the features are classified into components based on their forms and materials. Following is the analysis of each feature based on collected data.

Dome

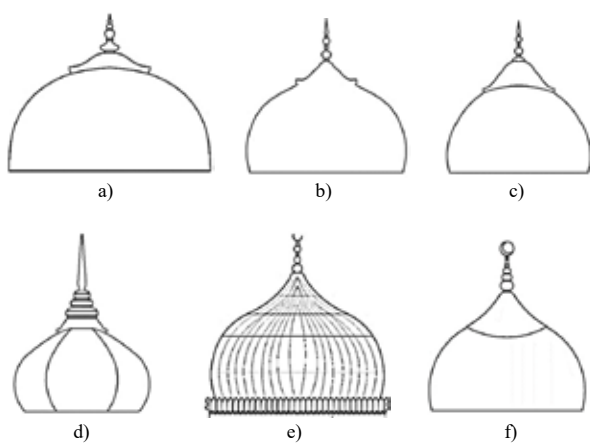The domes of all the case studies were classified

Fig. 1. Domes a) Jami Masjid Fatehpur Sikri b) Jami Masjid Delhi c) Ghaziuddin Khan mosque, Delhi d) Masjid Jamek Kuala Lumpur e) Kapitan Keling mosque, Penang f) Zahir mosque Alor Setar. Source: authors.

into the base of finial, and shape and material of finial and dome, finial base and their materials. Mughal finials in all the case studies are resting on an inverted lotus and the same can be observed in all Malaysian case studies except Masjid Jamek where its occurrence is not up to its recognizable limit. Early examples of Mughal finials were constructed in red sandstone for instance in the case of Jami Masjid Fatehpur Sikri while the finial built during the late Mughal period were gilded metal and in Malaysian case studies, metal finials were painted in black. However, pointed tip rod type finial exists only in the Malaysian mosque and could be observed in Masjid Jamek, Kuala Lumpur while the other two case studies adopted urns and spire type of finial similar to Mughal architecture (Fig. 1).

The shape of the dome observed in all case studies was either onion-shaped or three centered. Domes in all the Malaysian case studies are constructed in metal in comparison to masonry Mughal domes either finished with stucco or stone. The components of the dome, existing in Mughal buildings only, are identified and marked as 1,2,3,4, etc., and matched for their existence in Malaysian examples (Table 2). The following sets have been identified, based on occurrences of components of domes of Mughal mosques in Malaysian case studies. D-JMF=(1,4,5,6,9); D-JMD=(2,3,5,7,8); D-GKM=(2,3,5,7,8); D-KKM=(2,3,5); D-JMK=(3); D-ZMA=(2,3,5). Fig 2 shows the Venn diagram of these representing subsets of components of domes of all case studies which shows that components 2, 3 and 5 being at the center are more similar while 1,4, 6 and 9 at the periphery indicate dissimilarity.

The positive value of S (D-JMD, D-KKM), S (D-JMD, D-ZMA), S (D-GKM, D-KKM), S (D-GKM, D-ZMA) shows that the dome at high and late Mughal mosques i.e. Jami Masjid Delhi and Ghaziuddin Khan mosque are similar to the Malaysian case studies Kapitan Keling mosque and Zahir mosque. While the negative values (-[5] and -6)

Table 2. Components of the dome of Mughal case studies and their occurrences in Malaysian mosques. Source: authors.

Dome ID	The shape of the final			The shape of the dome		Finial base	Finishing Material of Finial			Finishing material of Dome		
	Amalaka and Kalasha	Urns and Spire	Pointed tip rod type	Onion shaped	Three cantered	Inverted Lotus	Red sandstone	Gilded Metal	Painted Metal	White marble	Stucco	Painted Metal
	1	2		3	4	5	6	7		8	9	
D-JMF	●				●	●	●				●	
D-JMD		●		●		●		●		●		
D-GKM		●		●		●		●		●		
D-KKM		●		●		●			●			●
D-JMK			●	●					●			●
D-ZMA		●		●		●			●			●

D-JMF-Dome at Jami Masjid Fatehpur Sikri, D-JMD-Dome at Jama Masjid Delhi, D-GKM-Dome at Ghaziuddin Khan Mosque, D-JMK-Dome at Masjid Jamek Kuala Lumpur, D-KKM-Dome at Kapitan Keling Mosque, D-ZMA-Dome at Zahir Mosque

Table 3. Calculation of similarity of domes between different sets of components. Source: authors.

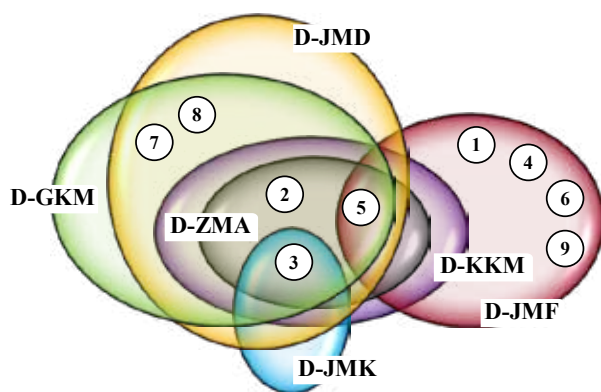| S.No.	Similarity between components	Calculation $S(A,B) = f(a \cap b) - f(a - b) - f(b - a)$	Response
1	S (D-JMF, D-KKM)	1-4-2	-5
2	S (D-JMF, D-JMK)	0-5-1	-6
3	S (D-JMF, D-ZMA)	1-4-2	-5
4	S (D-JMD, D-KKM)	3-2-0	1
5	S (D-JMD, D-JMK)	1-4-0	-3
6	S (D-JMD, D-ZMA)	3-2-0	1
7	S (D-GKM, D-KKM)	3-2-0	1
8	S (D-GKM, D-JMK)	1-4-0	-3
9	S (D-GKM, D-ZMA)	3-2-0	1

Fig. 2. Venn diagram representing subsets of components of domes. Source: authors.
These sets are further evaluated for their similarity and the responses are shown in Table 3.

indicate that there is a high dissimilarity between the dome of Jami masjid Fatehpur Sikri (D-JMF) and all Malaysian case studies. The negative values (- 3 and -6) indicate dissimilarity of the dome of Masjid Jamek with all Mughal case studies.

Minaret

The minarets of all the case studies were classified based on their position concerning prayer hall, number of minarets, the shape of its base, number of stories, and finishing materials. Similar to the contemporary mosques of the early Mughal period there was no minaret at Jami Masjid Fatehpur Sikri. Malaysian traditional mosques were mostly characterized by freestanding minaret outside the prayer hall while in Mughal mosques, two minarets were attached to the front corners of the prayer hall. Minarets in Mughal mosques were generally three-storied surmounted by a chhatri and each story was divided by a balcony (Fig. 3). Red sandstone was a chief material for the construction of minaret in Mughal case studies while painted plastered masonry minarets were in Malaysian mosques. The components of the minaret, existing in Mughal

buildings only, are identified and marked as 1,2,3,4, etc., and can be used to synchronize for their existence in Malaysian examples (Table 4).

The following sets of components of minarets have been identified, based on occurrences of components of minarets of Mughal mosques in Malaysian case studies. M-JMD = (2,3,5,6,8); M-GKM = (1,3,4,6,7); M-KKM = (2,5); M-JMK = (2,3,5,6); M-ZMA=(2). Fig. 4 shows the Venn diagram of these representing subsets of components of minarets of all case studies which shows that components 2,3,[5] and 6 b the

center are similar while 1,4,[7] and 8 at the periphery of the diagram indicate more dissimilarity.

These sets are further evaluated for their similarity and the responses shown in Table 5.

The data shows that the set of components of minarets S(M-JMD, M-JMK) has a value of 3 which implies that there is a high similarity between the minarets of Jami Masjid Delhi (M-JMD) and Masjid Jamek Kuala Lumpur (M-JMK). The negative values (- 3 and -6) of S (M-JMD, M-ZMA) and S (M-GKM, M-ZMA) indicate that minaret at Zahir mosque
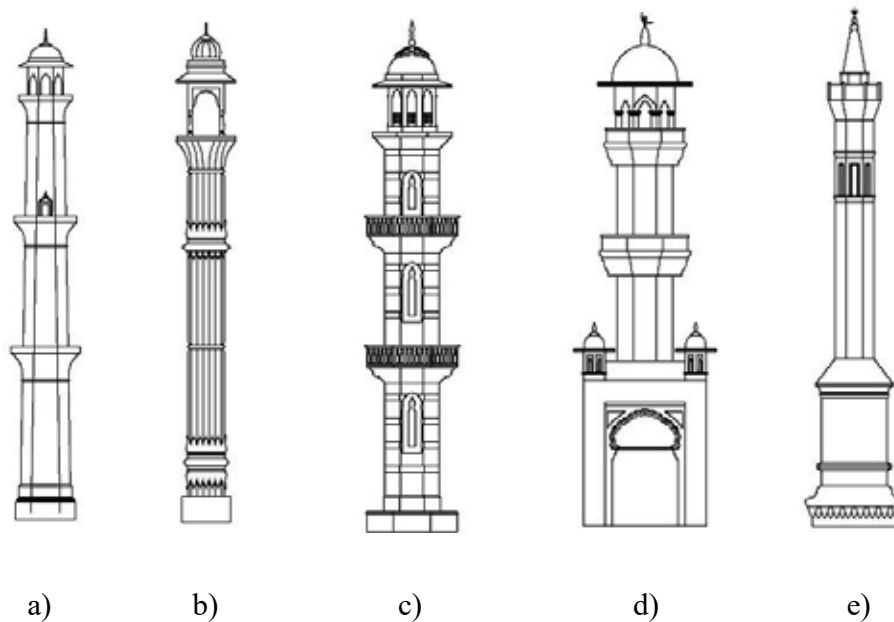

a)   b)   c)   d)   e)

Fig. 3. Minarets a) Jami Masjid Delhi b) Ghaziuddin Khan mosque, Delhi c) Masjid Jamek Kuala Lumpur d) Kapitan Keling mosque, Penang e) Zahir mosque Alor Setar. Source: authors.

Table 4. Components of minarets of Mughal case studies and their occurrences in Malaysian mosques. Source: authors.

Minaret ID	Base of minaret		Position of minaret/s			No. of stories			No. of minarets		Finishing material of minaret			
	Square	Octagon	Front corners of the prayer hall	At one corner of the prayer hall	The freestanding outside prayer hall	One	Two	Three	One	Two	Red sandstone	Red sandstone with white marble	Exposed brick	Painted plaster
	1	2	3			4	5			6	7	8		
M-JMD		●	●				●			●		●		
M-GKM	●		●			●				●	●			
M-KKM		●			●		●		●					●
M-JMK		●	●			●	●			●			●	
M-ZMA		●		●			●							●

M-JMF-Minaret at Jami Masjid Fatehpur Sikri, M-JMD-Minaret at Jama Masjid Delhi, M-GKM-Minaret at Ghaziuddin Khan Mosque, M-KKM-Minaret at Kapitan Keling Mosque, M-JMK-Minaret at Masjid Jamek Kuala Lumpur, M-ZMA-Minaret at Zahir Mosque

(M1ZMA) is drastically different from all Mughal case studies. The value of S (M-JMD, M-KKM) i.e. -1shows that there is a subtle dissimilarity between the minaret of Jami Masjid Delhi (M-JMD) and Kapitan Keling mosque (M-KKM). However, the highest degree of dissimilarity of minarets is between Ghaziuddin Khan mosque and Zahir mosque as the value is -7.
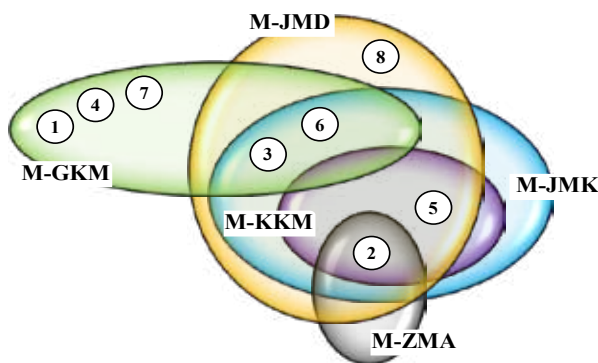

Fig. 4. Venn diagram representing subsets of components of minarets. Source: authors.

Chhatri

Chhatris of all Mughal and Malaysian case studies were classified based on its base, arch, eaves, dome, and materials (Table 6).

The base of chhatri in all case studies was either square or octagonal. Eaves are the common component of all chhatris except Masjid Jamek Kuala Lumpur. Four centered, multifoil, or multilobed arches were raised over the columns. The whole arrangement was surmounted by an onion-shaped or three centered domes with finial and inverted lotus (Fig. 5).

The following sets of components have been identified, based on occurrences of components of chhatri of Mughal mosques in Malaysian case studies. C-JMF = (1,3,6,9); C-JMD = (2,3,4,7,9); C-GKM = (1,3,5,8,9); C-KKM = (2,3,4,7,9); C-JMK = (2); C-ZMA = (1,3,8,9); Fig. 6. shows Venn diagram of these representing subsets of

Table 5. Calculation of similarity between different sets of components of minarets. Source: authors.

S.No.	Similarity between components	Calculation	Response
1	S (M-JMD, M-KKM)	2-3-0	-1
2	S (M-JMD, M-JMK)	4-1-0	3
3	S (M-JMD, M-ZMA)	1-4-0	-3
4	S (M-GKM, M-KKM)	0-5-2	-7
5	S (M-GKM, M-JMK)	2-3-2	-3
6	S (M-GKM, M-ZMA)	0-5-1	-6

Table 6. Components of chhatris of Mughal case studies and their occurrences in Malaysian mosques. Source: authors.

Chhatri ID	Base of chhatri		Eaves	Arch				Dome of chhatri			Finishing Material of chhatri	
	Square	Octagon		Four centered	Multifoil	Multilobed	Three centered	Bulbous	Onion shaped	Finial	Red sandstone	Painted plaster
	1	2	3	4	5		6	7	8	9		
C-JMF	●		●				●			●		
C-JMD		●	●	●				●		●	●	
C-GKM	●		●		●				●	●	●	
C-KKM		●	●	●				●		●		●
C-JMK		●										●
C-ZMA	●		●			●			●	●		●

C-JMF-Chhatri at Jami Masjid Fatehpur Sikri, C-JMD-Chhatri at Jama Masjid Delhi, C-GKM-Chhatri at Ghaziuddin Khan Mosque, C-KKM-Chhatri at Kapitan Keling Mosque, C-JMK-Chhatri at Masjid Jamek Kuala Lumpur, C-ZMA-Chhatri at Zahir Mosque
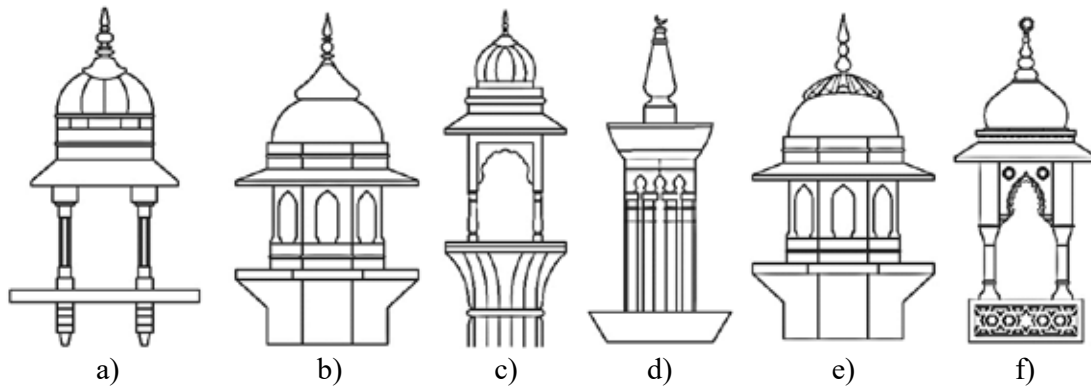
Fig. 5. Chhatris a) Jami Masjid Fatehpur Sikri b) Jami Masjid Delhi c) Ghaziuddin Khan mosque, Delhi d) Masjid Jamek Kuala Lumpur e) Kapitan Keling mosque, Penang f) Zahir mosque Alor Setar. Source: authors.
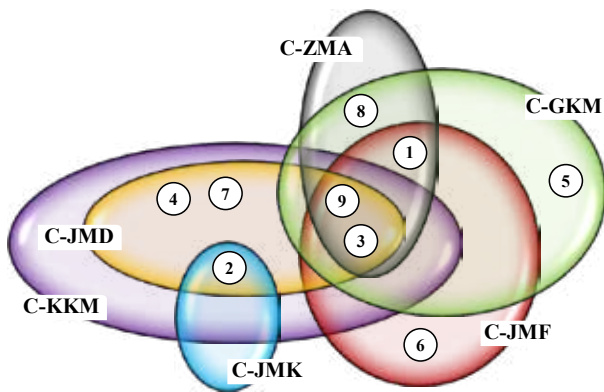

Fig. 6. Venn diagram representing subsets of components of chhatris. Source: authors.

Conclusion

Architectural style can be recognized with the repeated features and can be classified as individual, group, regional, or a period. These features can further be found in the work of another individual, group, regional, or period. However, during the process of imitation features may lose their components though in the recognizable limit. In the case of mosque architecture during the British colonial period in Malaysia, several Mughal features were routed through British architects and immigrant Indian Muslims settled in various parts of Malaysia. Due to not being concurrent, the features lost their components. Hence authors provided an alternative approach to evaluate the stylistic similarity at the component level. With the help of six case studies from both regions authors compared the components of three Mughal features (dome, minaret and chhatri) and observed their occurrences in features of Malaysian mosques.

The results give the numeric value of stylistic similarity of each feature based on their components present in Malaysian and Mughal case studies. The high positive value indicates more stylistic similarity and the negative value shows dissimilarity. For instance, the responses of data processed indicate the highest similarity of chhatri between Jami Masjid Dehli and Kapitan Keling mosque due to maximum positive value. In the same way, stylistic similarity can be gauged based on responded values of features present in Mughal and Malaysian case

components of chhatris of all case studies which shows that components 9 and 3 being in the centre are most similar while peripheral 5 and 6 are most dissimilar.

These sets are further evaluated for their similarity and the responses are shown in Table 7.

The highest positive value (5) shows that chhatri at Kapitan Keling mosque and Jami Masjid Delhi has the highest level of similarity between them. The set of components for S (C-GKM, C-ZMA) and S (C-JMF, C-ZMA) have positive values (³ and 1) which signify that chhatri at Jami masjid Fatehpur Sikri (C-JMF) and Ghaziuddin Khan mosque have a similarity with Zahir mosque (C-ZMA). The high negative value (-5, -3, and -6) indicates a high dissimilarity of chhatri at Masjid Jamek with all Mughal case studies. Other stylistic similarities and dissimilarities can be interpreted based on their response values.

Table 7. Calculation of similarity between different sets of components of chhatris. Source: authors.

S.No.	Similarity between components	Calculation	Response
1	S (C-JMF, C-KKM)	2-2-3	-3
2	S (C-JMF, C-JMK)	0-4-1	-5
3	S (C-JMF, C-ZMA)	3-1-1	1
4	S (C-JMD, C-KKM)	5-0-0	5
5	S (C-JMD, C-JMK)	1-4-0	-3
6	S (C-JMD, C-ZMA)	2-3-2	-3
7	S (C-GKM, C-KKM)	2-3-3	-4
8	S (C-GKM, C-JMK)	0-5-1	-6
9	S (C-GKM, C-ZMA)	4-1-0	3

studies respectively. The finding shows that this alternative approach of stylistic similarity between the features of Mughal architecture and Malaysian mosques provide the more precise influence of one style on the other. The approach can be used to evaluate the stylistic similarity between the features of one regional style and the other, those who adopted the same features within the recognizable limit.

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