The Contextual Design Criteria of Infill Building Façade in Malaysian Urban Historic Districts: A Systematic Review

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ABSTRACT

The urban historic district is one of the man-made places with strong genius loci through its cultural heritage character and values. Architectural heritages are the core element constituting its urban fabric character. However, the emergence of infill buildings that intervene in the urban historic fabric with their conspicuous contrast façade architectural design threatens the genius loci of the urban historic districts. Therefore, this paper aims to systematically review the contextual architectural design criteria of infill building façade in urban historic districts. Using the content analysis method, this paper extracts the previous scholars' studies on heritage conservation guidelines, contextual infill building façade design approaches and the design criteria for the contextual infill building façade design in urban historic districts to answer the highlighted issues. In an urban historic district, the contemporary architectural intervention, especially the infill building façade design, must critically consider and respond to the existing urban fabric that has long been characterized by the place's genius loci to sustain its cultural heritage character and values. The infill building façade design must appropriately be articulated by balancing "compatibility" and "differentiation" elements in its architectural design as well as consider creating a "bond" and having family resemblance with the existing urban fabric of the historic district.

1. INTRODUCTION

Urban identity can be defined as a set of characteristics of a place in the urban area that shows the quality of continuity and distinctiveness [1, 2]. It is described as "genius loci" by Norberg-Schulz [3], where the place has its spirits or characteristics that vibrance the man-made place. Shamsuddin [4] argues the character continuity of place depends on the degree of familiarity or sameness in essential characteristics that lead to people-place attachment and a sense of place that evoke the memory and meanings toward the place. Moreover, Cohen [5] states a well-defined urban character will constitute a district in the urban area. Following this, the distinctive quality of a place is a unique character constituted from the continuous essential characteristics that make the place distinct from others. The community socio-culture of the place is synthesized and expressed through tangible and intangible elements [4, 6]. The tangible elements are the place's physical elements that include a group of buildings, streets, and urban spaces such as squares, spaces between buildings and landscapes, while the intangible elements comprise people's activities and place meanings that are shaped by peoples' beliefs or perception to the place components [4].

Many scholars such as Baper [7], Azmi et al. [8], Sabah and Abdul Samad [9], Ujang [2], Shamsuddin [4], Askari and Dola [10], Semes [11], Ismail and Shamsuddin [12] describe one of the places that have strong urban identity is the urban historic districts due to its cultural heritages such as the architectural heritages, old streets pattern, heritage squares and landscape, and street furniture. In Malaysia, there are many urban historic districts including Melaka, George Town, Kuala Lumpur, Ipoh, Taiping, and Muar. As shown in Figure 1, Among the elements, architectural heritage through its architectural design is seen as the main element constituting the urban historic district identity [4, 13]. Architectural heritage is considered as an architectural work either a historic monument or a group of historic heritage buildings that helps us to understand the relevance of the past to contemporary life [14]. Soosani [15] and Semes [11] argue that architectural heritages characterize urban historic districts through spatial and visual attributes. Spatial attributes comprise the building's formal shape, the mass, the sitting, or building placement setting in the place, and its interrelation with the urban and street pattern and the urban spaces while visual attributes are set by façade and roof design that contribute to shaping the urban scape. The building façade is a crucial part of the urban identity constitution, and it can be perceived by the public from the street or urban spaces [10, 16-19].

Figure 1. George Town urban historic district [13]

In line with the continuous civilization development, many buildings are added in the urban area including within its historic districts [15, 20]. Malaysian urban historic districts also are not an exception in experiencing the new development pressure [21]. However, the conflict occurs when the new architectural intervention like the infill buildings in the urban historic districts with different design convergence and strikingly contrasts with their historical context in terms of style, scale, materials, and composition [11]. It is a result of the continuous changes in urban lifestyles and building technologies [16, 22, 23]. Moreover, the contemporary architectural design of infill buildings only focuses on its individual architectural expression and becomes characteristically isolated from the surrounding context. Thus, it is seen as insensitive, incompatible, and unresponsive to the place character which radically changes and deteriorates the historic genius loci of the place [4]. Therefore, it is pivotal for the infill building façade to contextually respond to the urban historic districts' place character to sustain their historical genius loci. What are the criteria for the contextual infill building façade design in Malaysian urban historic districts? Thereby, this paper aims to make a systematically review on the studies of infill building facade design in Malaysian urban historic districts to answer the issues.

2. METHODOLOGY

Literature searches are conducted from the published online databases and books to gather the secondary data for this research, focusing on the infill building architectural design within urban historic districts. As shown in Table 1, the relevant materials are identified using the keywords of infill architecture, infill building design, new architecture design and new architectural intervention in the urban historic districts [24-58]. Using the content analysis method, the study process is conducted in two stages First, the study identified and reviewed the 58 relevant publications to get an overview of the research topic and organise it according to their study focus and research questions: infill building comprehension, the heritage conservation guidelines on infill building design in an urban historic district context, and the design approaches of infill building facade in urban historic districts. Following this, each study focus category was thoroughly scrutinised and analysed by extracting points to answer the research question and fit the research objective. The study aims to expand the understanding and illustrate the breadth of knowledge available on the architectural design criteria of infill building façade in Malaysian urban historic districts in contextually response to its context.

Table 1. The content analysis summary

| Authors	Study focus
Shamsuddin [4], Semes [11], Soosani [15], Demiri [17], Alfirević & Simonović [24], MBPP [25], MBI [26], Historic Scotland [27], Al Ani [28], Razavian & Samadi [29], JWN [30], Riza & Doratli [31], Brolin [32], Zamri & Abdullah [40]	Infill building comprehension
Semes [11], ICOMOS [14], ICOMOS [24], MBPP [25], MBI [26], JWN [30], The Preservation Alliance [38], UNESCO [39], Abdul Azis et al. [42], Semes [43], ICOMOS	Heritage conservation guidelines for infill design
[54], ICOMOS [55], ICOMOS [56], UNESCO [58]	
Demiri [17], Brolin [32], Davies [44], Byard [45]	The history of infill development in urban historic districts
Semes [11], Demiri [17], Al Ani [28], Alfirević & Simonović [24], Historic Scotland [27], Riza & Doratli [31], Brolin [32], Gaber & Akcay [34], The Preservation Alliance [38], Davies [44], Nagavi & Mazaherian [46]	Infill building façade design approaches in urban historic districts
Ujang [2], Shamsuddin [4], Semes [11], Soosani [15], Demiri [17], Alfirević & Simonović [24], Brolin [32], Semes [33], Gaber & Akcay [34], Sotoudeh & Abdullah [37], The Preservation Alliance [38], Zamri & Abdullah [40], Byard [45], Lambe & Dongre [47], Ujang & Zakariya [48], Abdel-Kader [49], Al-hasany [50], Sotoudeh & Abdullah [51], Ismail [52], Bentley et al. [53]	The contextual infill building façade design criteria in urban historic districts

3. FINDINGS AND DISCUSSION

This section covers the findings and discussion on the infill building as a new architecture in the urban historic district, the related international and local level of heritage conservation guidelines that advocate the contextual infill building design and the practised infill architectural design approaches in urban historic districts.

3.1 Infill building as a new architecture in urban historic districts
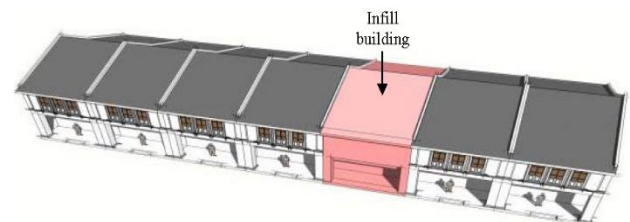
Figure 2. An infill building within the heritage buildings row [26]

Infill building or infill architecture is one of the urban infill developments which is the new architectural interventions built on infill sites within a developed area mostly in the urban area (Figure 2) [17, 24-27]. In addition, it is also considered one of the urban smart growth development strategies to control urban expansion [28, 29]. It can be a completely new architectural development, or a replacement of an abandoned old building which has an unsafe structure to retain and has no historical significance value or an extension structure of the existing building [15, 24, 26, 30]. Furthermore, as highlighted by Alfirević and Simonović [24], there are 8 infill site types which can be simplified into 2 categories of corner sites and intermediate sites (Figure 3). Both categories can be physically attached to its neighbors or detached. This classification category also is applied by many local authorities and government bodies in Malaysia for their infill building development guidelines in urban historic districts.
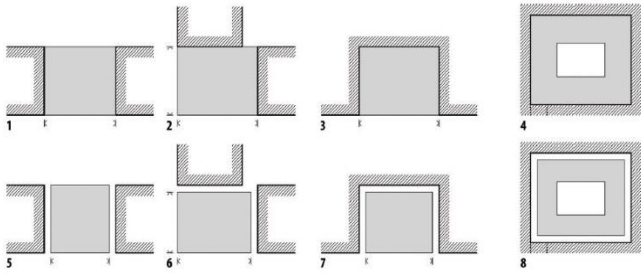
Figure 3. Infill building site types: 1) linear intermediate site, 2) corner site, 3) 3 sides intermediate site, 4) courtyard site, 5) linear- detached intermediate site, 6) corner-detached site, 7) detached intermediate site, and 8) multiples sides infill site [24]

Semes [11] highlights being a new element in historic fabric, the compatibility design of infill building toward the historic physical context always become an issue between the architects and the preservationists as well as the layman especially when its architectural expression is conspicuously against the existing urban fabric character. Moreover, the alien design expression is not just against the formal attribute, but also the façade design attribute of the existing architectural heritages in the place especially the adjacent neighbors which is seen change negatively the urban character and deteriorate its values [4, 11]. Historically, this is not a modern architecture and urban development issue but an old endless issue since before World War II took place in the west [11, 31]. There are a few historical instances recorded by Brolin [32] and Semes [33] on this issue. In 1521s, Michelangelo proposed the New Sacristy a century after Filippo Brunelleschi completed his Old Sacristy in the Florentine Church of San Lorenzo with different architectural decorative features. In the 1585s, Vicenzo Scamozzi won a competition for Procuratie Nuovo by separating his building from the Library of St Marks built in 1553s. In the 1545s, Andrea Palladio proposed to wrap the Gothic style Medieval Town Hall of Vicenza with a classical architecture style and white marble arcades. In 1835, the Gothic style of the Houses of Parliament was built next to Westminster Hall in London with a bigger and higher building mass and façade (Figure 4).

Figure 4. House of Parliament (right) and Westminster Hall, London (left) [32]

Next, Semes [11] mentions after World War II; the issues became more complicated when Richard Meir proposed a modern-style museum of Ara Pacis in Rome (Figure 5). Even though the design is celebrated by architecture people, it is disliked by ordinary Roman citizens due to its conspicuous

contrast features against its historic neighbor's character. Then, the trend of aggressive modern infill building design movement continues to rapidly be developed and followed by modernist architects in many urban historic districts, especially among Starchitects including Frank Gehry, Rem Koolhaas, Zaha Hadid and Peter Eisenman. This movement advocates for "no fake architecture" and "true to its time" [32, 34]. Following that, modernist architects emphasize 3 main principles in their design including function, technology and rejecting ornamentations [35]. Similarly in Malaysia, infill building developments also rapidly occurred in urban historic districts in major cities after the independence of the country with contrasting form and façade design attitudes (Figure 6). It is due to the changes in the technologies and building types, the prosperity of the economy as well as the new design thought brought by young architects who have finished their studies abroad [4, 21, 36].

Figure 5. Richard Meir's Museum of Ara Pacis, Rome [11]

Figure 6. Modern buildings in heritage shophouses district in George Town [23]

3.2 The heritage conservation guidelines on the infill building design in urban historic districts

Although the concern toward the contextual fitness of the new or infill building architectural design in the historic environment has been highlighted by Pugin in the 1836s, it significantly came to the forefront of the public's attention through the emergence of the conservation movement around the 1960s [18]. To control the aggressiveness of architects' ideas in proposing their modernism architecture in historic environments, many heritage conservation guidelines such as recommendations, declarations, and charters were established by international advisory bodies of cultural heritage like UNESCO and ICOMOS (Figure 7) [35, 37, 38]. The ICOMOS Venice Charter 1964 is considered as the founding document of modern heritage conservation advocacy and was set as a milestone for the guidelines of new architectures in historic environments [11]. This charter advocates the sustainability of

the remaining architectural heritage in both urban and rural settings that have historical significance and value. Any new architectural works in the historical fabric must be integrated harmoniously into the whole historic fabric but simultaneously could be differentiated from the existing historic architectural composition as well as represent their contemporary stamp. In the same way, the Australia ICOMOS Burra Charter 2013 also gives a similar sound of recommendations where the new works must consider the physical character of the historic place, not deteriorate the surrounding cultural significance of the place, and at the same time avoid the imitation as well as being readily identifiable. In addition, there is the ICOMOS Washington Charter 1987 that complements "The Venice Charter" by narrowing down the scope into the conservation of historic towns and the revised ICOMOS New Zealand Charter that has put a similar sound of advocacy but focuses on the cultural heritage value of the conservation place. These 2 charters celebrate the continuous development of social and economic as well as its urban setting in the historic district, but they must consider and be integrated with the conservation strategies of the historic district. The new architectural intervention must preserve and be in harmony with the historic character of the place, maintaining the relationship between buildings and urban spaces, as well as harmonizing the new activities or functions with the place's historic attributes.

Furthermore, there are also other international heritage conservation guidelines identified that advocate the contextual new buildings' design in urban historic districts which is also important to be referred to. There is the ICOMOS declaration of Amsterdam 1975, the ICOMOS Nairobi Recommendation 1976, and the UNESCO Vienna Memorandum 2005. All these documents highlight the importance of the new architectural interventions in urban historic districts to consider the urban character while striving to fulfil contemporary needs. ICOMOS [14] and UNESCO [39] urge the new architecture interventions either infill buildings or extension structures of the existing buildings to harmoniously fit the urban historic fabric character in terms of urban spatial organization as well as the existing architectural heritage formal attributes and façade design. In addition, ICOMOS [14] urges for the contemporary architecture proposed must be in high-quality design. It is to ensure the architectural design quality and historic value sustainability in urban historic districts [40]. Following this, the consideration of the character of the historic fabric not only identifies the general character but must also analyse the dominant physical features or the shared characteristic among the urban elements and the intangible aspect of the place. Besides that, it is also important to balance the "compatibility" with the "differentiation" in the new architectural design which reflects the contemporary stamp but does not extremely contrast with the site context [11, 41].

Following that, the international heritage conservation guidelines are then justified and adopted in many countries heritage conservation policies according to their needs as well as the condition of culture and setting [34]. In the Malaysian context, the international level guidelines are adopted in the National Heritage Act 2005 and Historic Building Conservation Guidelines of Malaysia and local authorities' guidelines [25, 26, 42]. Continuing the international heritage conservation agenda, it is highlighted that the infill building design within the historic urban historic districts either a new building or an extension structure of the existing heritage building to be ascertained not disrupting or deteriorating the originality identity features and the cultural heritage of the

places. The new architectural design must consider the existing urban fabric elements and place physical character. Additionally, there is no vertical structure that can be built that blocks the majestic view toward the historic monuments and domineering the architectural heritage formal attributes of the place. On top of that, the guidelines also highlight the creativity of the architects to balance the "compatibility" and the "differentiation" in their infill building design in the urban historic district.

However, although the messages in those charters and other international conservation guidelines for the infill building design in urban historic districts is to achieve the balance between "compatibility" for the spirit of place and "differentiation" for the spirit of times, there are some parties that interpret the guidelines in different angle of views. Semes [11] and Semes [43] highlight that some conservation authorities focus more on the "differentiation" that not only does not prevent the extremely contrasting architectural design but encourages them for it which results in visually dissonant interventions. The justification is based on the statements in the international guidelines for the new building design to be differentiated from the existing historic fabric. From this situation, the question arises of what will be left if everything in urban historic districts is altered radically by the new architecture. Moreover, Semes [11] suggests the degree of differentiation is enough when the new architecture is identifiable. On the opposite side, there is a conservation authority that is too conservative to the point where it can be seen as discouraging the continuous development of architectural design in historic districts [44]. In addition, Semes [43], Byard [45] and Brolin [32] suggest replicating the existing historical architectural features also harms the identity of the place and its value which will lead to false interpretations of historical evidence. However, regardless of their stance, the main point of all the heritage conservation guidelines is the contextual compatibility of the new architectural intervention design in urban historic districts. Each design intervention in a historical context must be based on the interpretation and consideration of the place because the 'new' should not be designed in isolation but must be assimilated with the existing architecture [4, 17]. Hence, to make the infill building design tend to either more in "differentiation" or "compatibility", it must look at the locality context as well as the conservation and contemporary needs of the place.
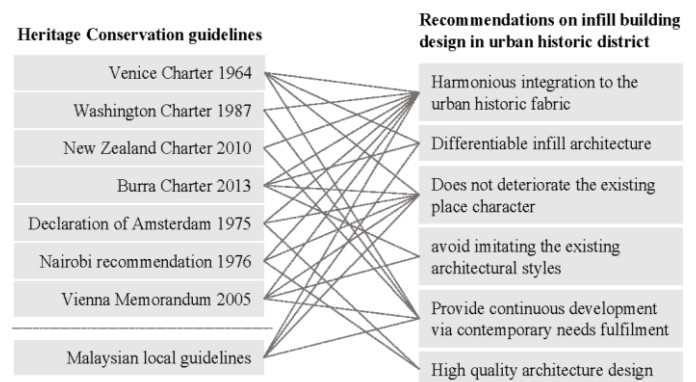
Figure 7. The heritage conservation guidelines on infill building design in urban historic districts summary

3.3 The contextual infill building façade design approaches in urban historic districts

To respond to the international heritage conservation guidelines, there are many infill building design approaches maneuvered with various compatibility levels to the context of urban historic districts due to the different convergences and considerations in the design. In the overall view, the design approaches can be divided into 3 categories of infill building of high compatibility, contextuality balance and low compatibility:

1. High compatibility infill building design.
   The Preservation Alliance [38] explains this design approach is concerned with the place's historical character sustainability, prioritizes the compatibility relationship to the place and minimizes the percentage of differentiation features. It is also known as contextual uniformity [31, 34] and mimetic design approach [24, 28]. It emphasizes character continuity by extending the existing architectural characteristics but toning down the scale of replication [17, 38] Under this category, "pastiche" or "literal replication" is the extreme design version and "traditional method" is the modest design version. Riza and Doratli [31], Davies [44] and Brolin [32] criticize this design approach for the issues of the false sense of historical development, unwelcoming the innovative architectural design and might result the historic character inelegant or poor imitation impact. This approach is permitted only to recover the corrupted place's historical character [11].

2. Medium compatibility infill building design.
   It is described as the contextual continuity design approach [31, 34, 46], united diversity [28], and associative design approach [24]. Semes [11] highlights the design objective is to balance between "differentiation" and "compatibility" by emphasizing a continuum of urban scape composition and simultaneously allowing the historic environment to speak loudest. It avoids replicating the existing context character at the same time interpreting the historical cues of the place through a contemporary lens to achieve the character continuity of the place or the sense of continuity. The existing architectural character is explored upon the design principles and elements as basic references and then articulated for the new design version without subverting the existing identity. On top of that, The Preservation Alliance [38] and Semes [11] sub-categorize it into 2 sub-design approaches of the invention within the style and abstract references while Naghavi and Mazaherian [46] suggests three sub-design approaches of contextual simplification, contextual abstraction, and contextual nullification. Despite being the most universally accepted design approach, it requires artistry and skill from the architect to achieve the standard [38, 44].

3. Low compatibility infill building design.
   Basically, it is considered a radical intervention of new architecture in the historic environment [24]. It is also known as contextual juxtaposition [31] context pretense [46] and intentional opposition [38]. Riza and Doratli [31] also mentions that freestyle design is the extreme version of infill building design where it completely ignores the context and prefers using inappropriate materials. Alfirević and Simonović [24],

Demiri [17] and The Preservation Alliance [38] argue this is the least acceptable in the urban historic district due to its individuality convergence, totally or partially repudiating the historic context as well as its value and prioritizing differentiation at the expense of compatibility. Normally this infill building type domineering the historic place through its height, type of roof, color, materials, and façade where it repudiates their relationship with the neighbors [17, 31]. Generally, this design approach practitioner against other design approaches especially the literal replication method that tries to reconcile the existing historic character of the place as it has seen unsuccessful infill designs which could not fit the modern contemporary need and are unable to express old and new integration [24, 28]. However, Gaber & Akçay [34] and The Preservation Alliance [38] criticize this design approach for too much contrast or diversity of architectural character in historic fabric might destroy its historic identity and sense of place. Thus, Gaber and Akçay [34] and Riza and Doratli [31] suggest the infill design can be in contrast to the context if does not invade the historical core of the surrounding context, which could lead to weakening its value. Apart from that, The Preservation Alliance [38] adds recommendation for the contrast design approach application is limited to rectifying the place identity of urban historic districts that weaken or broken by other oppositional interventions.

As shown in Table 2, each contextual infill design approach has their own agenda, convergences, and propensities. Urban Historic Scotland [27] and The Preservation Alliance [38] opine the selection of the design approach must consider all related design contexts and balance the contemporary needs and the infill building compatibility fitness to the historic fabric. The selection of extreme design approaches either extremely contrast design or extremely compatible design would disrupt the original urban historic district character.

Table 2. The summary of contextual infill building design approaches in urban heritage districts

	Design features	Implications
High compatibility infill building design	• Historic fabric physical attributes are the main concern. • Less concern about the contemporary attributes. • Prioritizes the compatibility relationship to the place and minimize the percentage of differentiation features. • Follows the existing place character with minimal replication.	• Does not welcome architectural design development. • Might results misunderstanding and confusion between the historic objects and the new intervention.
Medium compatibility infill building design	• Balances the "differentiation" and "compatibility" features. • Emphasizes the continuum urban scape composition and	• Celebrate design and technology innovation and development while conserving the urban historic fabric character.

	historic environment character conservation. • Avoids replication and emphasizes place character interpretation.	
Low compatibility infill building design	• Considered as a radical design approach for new intervention in historic environment as the design is intentionally provoke the place character. • Emphasizes "differentiation" than "compatibility" to the historic fabric by highlighting "the architecture of our time." • Highly disagree with literal replication infill design approach.	• Deteriorates the urban historic fabric character and identity.

3.4 The criteria of contextual infill façade design in urban historic districts

As elaborated in many heritage conservation guidelines in Figure 7, contextuality is one of the critical design criteria for new architecture in historic environments. On top of that, it is considered the main design objective and a gauge in determining the successfulness of infill building design conciliation to its context in urban historic districts [4, 37, 38]. Generally, contextuality in architecture can be understood as the ability of the architectural design to respond, adapt, and sympathetically fit its surrounding context [34, 37, 47]. The consideration mainly focuses on the surrounding vicinity's physical elements within the urban historic district including the architectural heritage, the streets' pattern, and the urban spaces [31, 37, 40]. Furthermore, the design consideration also reviews the spatial and visual attributes of the surrounding site [15, 17, 47]. Moreover, Brolin [32] and Shamsuddin [4] suggest the necessity of learning the previous buildings or architectural heritages' design development approaches in the place in terms of how they respect and interweave their architectural features with the existing urban fabric character. Other than that Ujang and Zakariya [48], Ujang [2], Shamsuddin [4] and Semes [11] suggest also considering the intangible aspects and their relationship to the tangibles as both subjects are the elements that constitute urban identity. In addition, as mentioned in the ICOMOS Washington charter, safeguarding the place's character is more important than a single heritage subject preservation [11]. On the other hand, many scholars like [49, 52], Sotoudeh and Abdullah [51], Semes [11], and Byard [45] argue that architectural design contextualization also must include the time context factors into the design consideration. The design consideration includes the evolution of the building model, building services system, as well as urban social and economic development [50]. This consideration is another factor that is important because technologies and urban lifestyles always evolve over time and the new development should be able to fit the need [49, 50, 52]. However, Semes [33] highlights the objectives of modernism architects proposing contrast architecture design is to repudiate and obliterate the old character as they prefer the new design; just focusing on the scientific principles and they argue the existing architectural heritages are the obstacle to the new design innovation. Then, in response to the critics and international heritage conservation standard recommendations, the new architecture juxtaposes the historic fabric by complementing the formal architectural attributes or called volumetric "compatibility" but continues being in contrast in architectural design styles which is also known as stylistic "differentiation".

Therefore, Bentley et al. [53] and Semes [11] recommend using the criteria of "appropriateness" of infill building design over "contextuality". In other words, the infill building façade design should offer identity character continuity by fitting to the historic district rather than provoking the character, contribute to consolidating the historic character rather than subverting it, respond effectively to the locality of the place and become an exemplary to others. Thus, as the newcomer to the place that accommodates the contemporary design needs, the infill building also must respect, contextually respond, and appropriately intervene in the historic fabric through the coordination of "compatibility" and "differentiation". On top of that, contextual design can be achieved when compatibility is given greater weight to sustain the valued historic character and the differentiation is minimized just enough to distinguishable from the historic objects or buildings [38]. It is to reduce the erosion of the historic character of the place and is unacceptable in contemporary preservation practice. De-emphasizing differentiation and prioritizing compatibility would allow historic buildings and districts to grow and change organically following their historic patterns and styles, thereby ensuring the continuity of character through time. Furthermore, to make sure the continuum impact of infill façade on the urban historic fabric, Alfirević and Simonović [24], Bentley et al. [53], and Brolin [32] suggest for the infill building design to have a "bond" as a connector and transition element to connect with the existing architectural heritages of the place. Meanwhile, Bentley et al. [53] and Semes [11] recommend for the infill building be assured of sharing the same underlying principles of space, structure, elements, composition, proportion, ornament, and character regardless of the architectural style. Both old and new designs are harmonious and considered to have a family resemblance when they share the same underlying principles of space, structure, elements, composition, proportion, ornament, and character regardless of the architectural styles.

4. CONCLUSION AND RECOMMENDATION

Infill building is a main type of new building development erected in an urban historic district where the issue of façade design compatibility to the historic context has always been a major issue between architects and conservationists as well as the public. The emergence of new architectural design direction with individuality agenda as well as the different design convergence and propensity seen threatening the identity of the urban historic district. Therefore, many international and local heritage conservation guidelines have been established to balance the new architectural development and the urban historic district conservation. The infill buildings in the built environments are welcome as one of the smart urban development strategies but need to be guided by the outlined recommendations. Regardless of various infill architectural designs, as a new element in urban historic districts, high consideration must be given to its historic fabric

through architectural design that contextually responds to the surrounding area while accommodating contemporary needs. The infill building façade design must appropriately be articulated by balancing "compatibility" and "differentiation" elements in its architectural design. On top of that, to communicate with the elements in historic fabric, the "bond" and having family resemblance with the existing architectural heritages as well as other historic elements should be considered. The contextual considerations and compatible infill building façade design are significantly important to safeguard the remaining cultural heritage as part of the conservation afford and continuous urban development.

Therefore, these research findings demonstrate the need to develop an empirical study on infill building façade design in urban historic districts. The proposed studies must be articulated based on the local phenomenon and issues to achieve the heritage conservation goals. Furthermore, the results of the study also can be useful to improve the existing related guidelines and be one of the references for property owners, architects, local authorities, and policymakers.

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