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RESEARCH ARTICLE

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Adaptive reuse of heritage architecture and its external effects on sustainable built environment—Hedonic pricing model and case studies in Hong Kong

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Abstract

The integration of the sustainable development perspective into the discussion of heritage conservation by UNESCO in 2015 represents an acknowledgement of the values of heritage conservation in the agenda of sustainable development. This paper aims to provide empirical evidence regarding how heritage conservation fits into the overall sustainable development in Hong Kong by examining the external effects generated by architectural heritage conservation onto their adjacent neighborhood. By two adaptive reuse heritage case studies with respective hedonic pricing analysis on their adjacent property prices, this paper presents the results of how residential property prices have been increased as a result of heritage adaptive reuse. The analysis suggests that an established heritage grading mechanism along with a socially inclusive conservation approach with community stakeholders not only maintains the authenticity of the cultural heritage, but also brings substantial social and economic benefits to the neighboring communities. The research findings add new knowledge to the studies on sustainable development and provide practical recommendations to policymakers, urban planners, and heritage conservationists in future heritage policy and implementation.

KEYWORDS

adaptive reuse, built environment, hedonic pricing model, heritage conservation, sustainable development

1 | INTRODUCTION

Conservation of architectural heritage has gained significant momentum since the end of World War II (WWII) after the mass destruction of many historic cities. The damaged conditions of much heritage architecture prompted the establishment of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1945, to protect both movable and immovable properties of great cultural heritage value (O'Keefe, 1999). The definition of immovable heritage, according to the International Council on Monument and Sites (ICOMOS), includes buildings, properties, monuments, archaeological sites, or a collection of built complexes that have unique architectural importance. Through preserving the past of a city's buildings and their architecture, heritage conservation can denote the continuity of urban development for its future generations in a sustainable manner. However, the unequivocal inclusion of heritage conservation into the overall sustainable development agendas has only emerged in recent decades. The Budapest Declaration in 2002 was a milestone of this progressive notion. In particular, there was an explicit clause for "the effective and sustainable conservation of the World Heritage properties" (The Budapest Declaration on World Heritage, UNESCO, 2002, p. 6) which was followed by further calls for an integration of sustainable principles into heritage conservation to maintain cultural authenticity and strategize built heritage as an

important asset to the continual socio-economic development (UNESCO World Heritage Papers 9, 2004). The discussion of sustainable heritage conservation was then further crystallized by the 2012 request from the World Heritage Committee to prepare a draft policy on the integration of sustainable development into the framework of the World Heritage Convention (Labadi, 2017; UNESCO, 2007, 2010, 2011, 2012). Yet, it was not until 2015 at the 20th General Assembly of the States Parties to the World Heritage Convention where a policy on a sustainable development perspective was officially adopted into the processes of the World Heritage Convention (UNESCO, 2015). The overall goal of the policy was to harness the potential of World Heritage properties and heritage in general to contribute to sustainable development. Heritage then began to be associated with sustainable development officially, and a growing amount of research was conducted to identify different perspectives on heritage conservation and sustainability. There has been a wealth of studies which has examined the incentives and approaches to sustainable development through heritage conservation (Labadi, 2017; Nocca, 2017; Rodwell, 2015); sustainable management of heritage sites (Pereira Roders & van Oers, 2011); and the economic benefits, social opportunities, and policy challenges of cultural heritage and sustainable development (Boccardi & Logan, 2007; Labadi & Gould, 2015; Mergos & Patsavos, 2017). Nevertheless, much research on the conservation of architectural heritage has been dominated by the Western world such as Europe and North America, whereas heritage conservation in a high-density urban context, especially in Asia has been acknowledged as an under-researched area (Aygen, 2013). Therefore, by focusing in Hong Kong, an Asian city with an extremely dense population of 17,588 people per square mile, this paper examines how adaptive reuse of architectural heritage can bring significant impact on sustainable development environmentally, socially, and economically. Through two completed projects in Hong Kong where the architecture was revitalized by adaptive reuse, along with a quantitative analysis using hedonic pricing model, this research elucidates how architectural heritage generates external impact onto their adjacent properties. The paper is divided into six sections. First, the Background section provides a brief history of heritage conservation in Hong Kong. It is followed by the Literature Review on architectural heritage, in particular on the practice of adaptive reuse in the academic arena of sustainable development. The Methodology section explains the empirical framework of this research. The Case Studies section presents two distinctive architecture projects, each followed by the respective hedonic pricing regression of their adjacent properties. Based on the quantitative results, this paper evaluates the findings and research significance. The final section suggests the implications of the research findings and provides recommendations for future architectural heritage projects.

2 | BACKGROUND

Hong Kong had served as a British colony from 1843 until its sovereignty was transferred back to China in 1997. The strong influence of both Chinese and Western cultures has been manifested in the city's urban landscape and architecture. To preserve the unique characteristics of Hong Kong, which reflect a hybrid of Chinese and Western historic contexts, the Antiquities and Monuments Office (AMO) was first established in 1976 to ensure the best examples of Hong Kong's heritage are protected appropriately. Aside from declaring historic monuments and grading heritage buildings, the Hong Kong Government initiated the Revitalizing Historic Buildings Through Partnership Scheme (the R-Scheme) in 2008, also known as the Adaptive Re-use (ARU), as one of the key policies on the Government's sustainable development agendas to conserve and revitalize the selected government-owned historic buildings. Since the launch of the R-Scheme, five batches of heritage buildings have been released and opened for proposals, allowing the adaptive reuse of these heritage buildings for new layouts and business operations. This research has selected two R-Scheme projects with heritage grading as case studies to illustrate how adaptive reuse can act as a catalyst for the transformation of urban landscape to bring substantial positive economic impact to the neighborhood. Meanwhile, it also investigates how a participatory approach involving local communities into the decision-making process of revitalization could help achieve a balance between the three tripod pillars of sustainability (Alker & McDonald, 2003; Purvis, Mao, & Robinson, 2019).

3 | LITERATURE REVIEW

Adaptive reuse is an architectural conservation practice that converts old buildings for new purposes with an intrinsic challenge to reconcile historic preservation and sustainable design (Rodrigues & Freire, 2017). Much of the sustainable heritage research stresses the importance of environmental sustainability (Bullen, 2007; Yu, Shaw, Fu, & Lai, 2000) and demonstrates how the reuse of old building envelopes is a sound measure to save building materials and building costs. Adaptive reuse has become a ubiquitous heritage conservation strategy as it can effectively reduce construction wastes by lowering material and energy consumptions (Douglas, 2006; Gregory, 1997) and improving the environmental sustainability of existing buildings (Ball, 1999, 2002; Brand, 1995; Cooper, 2001; Douglas, 2006; Gregory, 1997; Kohler, 1999; Kohler & Hassler, 2002; Latham, 2000; Pickard, 1996). Empirical findings suggest that architectural heritage can promote economic sustainability via its impact on property prices of adjacent housing (Ahlfeldt & Maennig, 2010; Franco & Macdonald, 2018; Ruijgrok, 2006). Driven by the pro-market forces for economic gains, architectural heritage has been repositioned as a capital asset to generate revenue by providing a boost to urban development and local tourism. It is undeniable that renowned heritage sites, complemented with well-organized infrastructure and modernized facilities, can bring investments and jobs to their adjacent neighborhood (Graham, Ashworth, & Tunbridge, 2016; Rypkema, 2008). There is literature supporting that developing heritage sites as tourist hotspots or prestigious real estates can help to secure the economic viability of the adaptive reuse projects, although how to balance

commercialization and conservation values remains highly controversial (Nasser, 2003; Teo & Huang, 1995).

Aside from acknowledging the benefits of adaptive reuse, there is also a wealth of literature focusing on its negative impact and pinpointing urban problems such as noise, pollution, and urban gentrification due to heritage designation (Cervelló-Royo, Garrido-Yserte, & Segura-García del Río, 2012; Donaldson et al., 2013; Moro, Mayor, Lyons, & Tol, 2013; Wang & Aoki, 2019). Over-commercialization in heritage sites, accompanied by a rapid surge in the number of visitors, can bring about negative externalities such as degradation of historic authenticity (Bianchi & Boniface, 2002). Traffic congestion, pollution, and noise are the major adverse environmental impacts (Bieletto-Bueno, 2017; Chen & Chen, 2010; Pham, 2012) that detract from the sustainable development of many tourist-destined communities. Some extreme conditions in popular tourist destinations result in excessive tourist visits especially during the peak tourist seasons (Pedersen, 2002; Taniguchi, Koike, & Seto, 2006). Many renowned world heritage sites are now becoming over-commercialized (Jimura, 2011), and the enormous visitor flows are putting a strain on the local host communities.

In addition, heritage tourism accompanied by excessive commercialization can dramatically increase prices associated with the heritage industry and eventually drive up the living cost of the neighboring local communities. In some extreme cases, these heritage sites have suffered from urban gentrification, leading to social homogeneity and unaffordability in goods and services (Atkinson, 2000; Bélanger, 2012; Donaldson & Williams, 2005; Lawrence, 2010). Much of the literature on urban gentrification has mentioned over-tourism on heritage sites, and that many social impacts generated are arguably negative (Gibson, 2006; Gibson & Homan, 2004; Wirth & Freestone, 2003).

4 | METHODOLOGY—EMPIRICAL FRAMEWORK

4.1 | Research objectives and significance

In light of the inconclusive debates on the benefits and unintended negative consequences of built heritage conservation, this research aims to investigate the cultural, social, and economic values of architectural heritage within the overall discussion of sustainable development. The research sets itself apart from other heritage studies by employing case studies to demonstrate the collective values of urban built heritage conservation. Two case studies, the Blue House and 7 Mallory Street in Wan Chai, Hong Kong are studied to exemplify the social and cultural values of architectural heritage. Furthermore, each case is complemented with respective hedonic regression analysis for estimating the economic impact of architectural heritage on the adjacent area. The results of analysis offer new insights into the discourses upon the implications of preserving architectural heritage, and provide empirical evidence to stipulate the external economic effects of designated heritage on nearby housing prices.

This study not only adds to the academic knowledge of the sustainable built environment, but also allows urban planners, government policymakers, and architects to have a better understanding of how to assess the values of heritage conservation holistically.

4.2 | Hedonic pricing model

There is a considerable amount of economic literature that has put forward models to measure and describe the economic impacts of cultural heritage on a local economy (Bowitz & Ibenholt, 2009; Rypkema, 2008). A study conducted by van Duijn, Rouwendal, and Boersema (2016) investigates the external effects of the redevelopment of industrial heritage by analyzing the price movements of residential properties in the neighborhood of selected heritage sites, before and after their redevelopment. Upon reviewing several preceding statistical models for measuring external price effect (Ahlfeldt, Maennig, & Richter, 2013; Brooks & Phillips, 2007; Koster & Van Ommeren, 2013; Koster & Rouwendal, 2017; Rosen, 1974; Rossi-Hansberg, Sarte, & Owens, 2010), this research employs a log-linear hedonic pricing model, to estimate the effect of housing attributes on housing prices:

$$\begin{aligned} Ln(\mathrm{RP}) = {} & c + \beta_1(\mathrm{SFA}) + \beta_2\left(\mathrm{SFA}^2\right) + \beta_3(\mathrm{FL}) + \beta_4\left(\mathrm{FL}^2\right) + \beta_5(\mathrm{AGE}) \\ & + \beta_6\left(\mathrm{AGE}^2\right) + \beta_7(\mathrm{SV}) + \beta_8(\mathrm{MTR}) + \beta_9(\mathrm{COMP}) \\ & + \beta_{10}(\mathrm{DIST}) + \beta_{11}(\mathrm{COMP} * \mathrm{DIST}) + \beta_{12\ldots37}(\mathrm{DISTRICT}) + \varepsilon \end{aligned}$$

The Real Price (RP) of the residential properties transacted can be obtained from the database of real estate transactions in Hong Kong. SFA is the saleable floor area of the property measured in ft^2; FL is the floor level; AGE is the building age measured in years, which is the difference in time between the property completion date and its transaction date; MTR is the distance of the property to the nearest MTR subway station exit measured in meters; SV is a dummy variable given the value of one for the availability of sea view and zero otherwise; COMP is a dummy variable given the value of one if the building is transacted after the heritage grading being confirmed and zero otherwise; DIST is the distance of the residential units to the nearest heritage measured in meters; DISTRICT is a dummy variable that identifies residential property locating in the same district; ε is an idiosyncratic error term; $\beta_{1\ldots37}$ are parameters to be estimated.

In our model, the COMP variable is interacted with the DIST variable as a spatial component to measure the distance decay of the heritage grading price effect after the confirmation of heritage grading. The quadratic form of SFA, AGE, and FL is also included to identify the non-linear effects of structural characteristics.

The target group is defined as the private residential apartments within a 100 m radius of the two selected historic buildings. Transactions of these apartments over a span of 10 years, namely 5 years before to 5 years after the heritage designation, are examined. The robustness of the overall model is indicated by its adjusted R-squared statistics and F-statistics. Adjusted R-squared statistics indicates the

ability of the model in predicting the dependent variable with its value ranging from 0 to 1. The F-statistics represents the overall significance of the model, of which a significant value indicates that the null hypothesis where all the coefficients are zero is to be rejected.

5 | CASE STUDIES FROM HONG KONG

The first case study is Blue House Cluster (BHC), which is a series of 1920s residential tenement buildings showing a synthesis of Chinese and colonial architecture styles, thereby manifesting the history of urban development in Hong Kong. The BHC project is an example showcasing the exceptional worth of public participation in the process of revitalization and its success highlights the significance of socio-cultural values in the overall sustainable development. The second case is 7 Mallory Street (former Comix Home Base, CHB), another tenement block comprising a cluster of ten historic buildings, which has been converted into a new vibrant hub of creative arts. Revitalized into a multi-purpose hall for community events and cultural activities, CHB illustrates how adaptive reuse can serve as an innovative urban renewal initiative to rejuvenate dilapidated districts and contribute to sustainable urban development while retaining the architectural fabric of its history for the benefit of future generations.

5.1 | Blue House, Wan Chai—Creating a sustainable social network

BHC is a group of tenement houses located in the district of Wan Chai. Among the BHC cluster, the four shophouses of Blue House constructed in the 1920s have been accorded officially as Grade I historic buildings. This formal grading of Blue House affirms that it is of outstanding architectural merit and every effort should be made to preserve the building whenever possible.

5.1.1 | Project background

The BHC hosts special historical values to the community. The project information of Blue House is presented in Table 1. It is an example of a typical architectural configuration of the period—where shops are on the ground floor with residential quarters on the upper floors—that appeared as the predominant 20th-century tenement housing type in Hong Kong, as illustrated in Figure 1. The project reflects the historical residential significance through preserving the bygone traditions, stories, wisdom, and local skills of the community.

The uniqueness of BHC, apart from being a historic building cluster, comes from its indigenous residents and their intangible social network. Residents were consulted throughout the entire revitalization process. The intensive involvement of grassroots community members and the preservation of their intertwined social network were rare in the history of heritage conservation and urban renewal projects in Hong Kong at that time (Ng, 2002). This inclusive approach calling for bottom–up public engagement referenced many Western precedents (Healey, 1997; Jacobs, 1961; Sanoff, 2000) and the series of participatory events yielded a consolidation of the social network of the community. The revitalization of the BHC is an exemplar of urban adaptive reuse, as the project successfully conserved not only the architecture of the built heritage but also its unique neighborhood-based socio-cultural network.

5.1.2 | Public consultation and engagement—A bottom–up approach

Since the start of the revitalization project, participatory activities have been carried out with residents to collect oral narratives as part of the conservation of living history and invoking public engagement. Various activities including focus group and semi-structured interviews with residents, external volunteers, and Hong Kong Housing Society were conducted under the auspices of the research unit "Community Project Workshop" between 2015 and 2016 with the assistance of Blue House Resident Rights Group and the Blue House Conservation Group. Besides defining the roles and objectives of residents engaged and obtaining their socioeconomic backgrounds, communication with stakeholders was sought to consolidate important consensus between different interest groups on the community agendas. On the other hand, an archival analysis was conducted to observe how the cultural significance of Blue House was constructed among different interested parties. Historical information was retrieved from the Public Records Office and Government Records Service. Newspapers, government announcement reports, and social media reports were also used as important sources of desktop research on the documentation of events in the history of the Blue House project. The heritage impact assessment and conservation management plan were documents produced by consultant team LWK & Partners (2011) and they supported that the overall socio-cultural sustainability of a conservation project should be founded on sound heritage conservation principles with community attributes. It was suggested that a participatory approach with stakeholders' engagement can generate significant social contribution, which is evident as stated in the objectives of the project:

> "Blue House project has strived for conserving Hong Kong's living heritage: to encourage people to share their time, skills and experience to benefit both themselves and others and, by doing so, to conserve a community way of living that is relevant to and valued by future generations. It revitalized the community relationships and networks and developed a community-oriented mutual and sustainable economy" (About Blue House—Vision, Mission, Value, 2020).

The observation that public engagement in the Blue House project has enhanced community cohesion is supported by findings of semi-structured interviews[1] conducted with the Urban Renewal

TABLE 1 Project Information: Blue House

Location	72-74A Stone Nullah Lane, Wan Chai
Site area	930m^2
Previous use	School
Current use	Lam Chun-hin Clinic (No. 72), residential unit (partial vacant) (No. 72A), Wan Chai Livelihood Museum (No.74), residential unit (No. 74A) and rear yard
Built year	The 1920s
Grading	Grade I historic building
Project team	St. James' Settlement, Community Cultural Concern, Hong Kong Foundation Limited, LWK & Partners Architects and Heritage Hong Kong Foundation Limited
Property owner	HKSAR Government
Operator	St. James' Settlement
Project start	2013
Project completion	2017

FIGURE 1 Elevation of Blue House

TABLE 2 Descriptive Statistics of Blue House (N = 801)

	Mean	S.D.	Min.	Max.
Structural characteristics				
Deflated transaction price **RP** (in HK$million)	11.34595	39.57834	0.621957	1,113.286
Saleable floor area **SFA** (in ft^2)	445.3346	183.3802	175	1,520
Squared saleable floor area **SFA**^{2}	231,909.2	212,654.5	30,625	2,310,400
Building age **AGE**	12.22847	14.17263	0.002738	55.00342
Squared building age **AGE**^{2}	350.1482	614.851	7.50e-06	3,025.376
Floor level **FL**	19.31086	14.27557	1	49
Squared floor level **FL**^{2}	576.4469	669.8428	1	2,401
Locational characteristics				
Sea view **SV** (1 = yes)	0.153558	0.36075	0	1
Displacement to the nearest MTR station **MTR** (in m)	313.9663	62.02848	240	426
Displacement to heritage **DIST** (in m)	70.40749	16.78838	19.2	99.5
Transaction period				
After confirmation of heritage grading **COMP** (1 = yes)	0.418227	0.493576	0	1

Authority, private consultants (LWK & Partners), and a non-profit organization (St. James' Settlement). The interview results have revealed that Blue House, as a case study, has effectively created bonding among local stakeholders, strengthened the old Wan Chai residents' sense of belonging and fostered the enhanced appreciation of the cultural significance of the heritage. Such contribution is also supported by literature which advocates how heritage conservation brings about enhancements in the overall sense of place of the city (Lowenthal & Binney, 1981; McKercher & Du Cros, 2002; Rossi, 1982) and sustainable community building (Ng, 2017, 2018). The participatory approach undertaken has brought impacts on every resident engaged, as denoted by the sharing from the Service-in-charge of the "Viva Blue House" Project, St. James' Settlement:

> "The experiences in the participation of the conservation activities alter their old perceptions and provide them with a new way of understanding and managing the social encounter. It is significant that the Blue House Complex community-led conservation movement not only changed policy but also changed the values of the individuals involved" (Nic Fong, personal communication, May 2019).

Despite inevitable criticism that residents had to experience "in situ displacement" and the identified urban gentrification surrounding the built environments, the case of Blue House nevertheless "provides valuable insights into the merit of adapting heritage buildings by those relationship-rich community members and local stakeholders where they have worked together to resist wholesale redevelopment and to (re)build with new residents a sustainable community" (Ng, 2018, p. 495). Blue House is one exemplar among Hong Kong's myriad preservation efforts. Although adopting a bottom–up approach has been criticized for the lengthening of the conservation process, community engagement has consolidated the local community network and created a more sustainable urban neighborhood as a result.

TABLE 3 Regression Results of Blue House

	0–100 m	
Treatment radius	**Coefficient**	**Standard error**
SFA	0.002789***	(0.00022)
SFA^2	−3.82e-07**	(1.72e-07)
FL	−0.00454	(0.003119)
FL^2	0.000169***	(6.25e-05)
AGE	−0.02708***	(0.003539)
AGE^2	0.000201***	(7.15e-05)
SV	−0.00088	(0.031878)
MTR	−3.18e-05	(0.000274)
COMP	0.672417***	(0.090638)
DIST	0.004852***	(0.001006)
COMP*DIST	−0.00789***	(0.001275)
Observations	801	
Adjusted R^2	0.83027	
F-statistics	356.7601***	

Note: Dependent variable is ln(RP). Robust standard errors are reported between parentheses.
Note: *p < .10, **p < .05, ***p < .01.

5.1.3 | Regression results of the Blue House

For the statistical regression of BHC, a total of 801 transaction records are included in the analysis with its descriptive statistics and results are being shown in Tables 2 and 3, respectively. The adjusted

R^2 is above 0.83, suggesting that the model has a good performance in predicting the deflated transaction price. Furthermore, its F-statistic is significant which rejects the null hypothesis that all coefficients in the model are zero, thus variables included in the model are meaningful and useful.

Meanwhile, the coefficients of the structural characteristics variables and their quadratic forms, except FL, are significantly different from zero at a 5% significance level. Saleable floor area and floor level contribute to an apartment's attractiveness while the increase in building age has a price-depreciating effect. For every ft^2 increase in SFA, the natural log of property price will be 0.24% higher while it will increase by 0.20% if the property is 1 floor higher. At the same time, if the building is 1 year older, the dependent variable will drop by 2.22%. For every 100 m further away from the nearest MTR station, there is a discount of 0.32% on the property price of the residential towers. On the other hand, the variable COMP shows a significant positive relationship with the dependent variable, reflecting that there is a positive increase in property price after the grading of Blue House is confirmed. The coefficient of the interactive variables COMP*DIST is negative, suggesting there is a distance decay of heritage grading price effect. When the property is further away from the heritage, its transaction price will experience a smaller positive effect from the historic building. As their coefficients cannot be interpreted independently, the real transaction price has experienced an 11.7% increase on average after the heritage grading is confirmed, whereas it will be reduced by 0.30% if the property is 1 m further away from the heritage.

The overall statistical analysis has supported the research in three ways: (a) it shows a positive economic impact in relation to residential property prices and architectural heritage site; (b) the assignment of official conservation grading can bring substantial external effect to an area of concern; and (c) the distance to the heritage site has a negative correlation with the price effect, suggesting that the closer the residential unit is to the heritage site, the higher the economic impact. This quantitative methodology supports the arguments that graded architectural heritage contributes positively to housing prices in the long run.

5.2 | 7 Mallory Street, Wan Chai—An adaptive reuse of old and new

5.2.1 | Project background

7 Mallory Street, formerly known as the Comix Home Base (CHB), is an adaptive reuse of historic buildings to house public art exhibitions. The project information of 7 Mallory Street is presented in Table 4. The outlook of the pre-war Grade II Tong Lau is shown in Figure 2. This project demonstrates how to deliver heritage conservation with three sustainable objectives including (a) preserving a cluster of historic buildings, (b) providing a public open space within a tight urban site, and (c) reusing the archaic building's architecture for innovative art and creative industries by adaptive reuse of this pre-war building cluster built in the 1910s. A series of territory-wide public consultation activities, including workshops and questionnaire surveys, was conducted in the early stages of the heritage conservation project to understand the aspirations of district stakeholders, as the consolidation of views of interested parties and its incorporation into the grand plan is deemed possible to enhance the social sustainability of the project (Weingaertner & Moberg, 2014). The results confirmed the community's preference for adaptive reuse of 7 Mallory Street as a place of art, culture, and creative industries. An initial business plan was also conducted to decide the most suitable operation model for the project. To create a diverse mode of operation, the business plan recommended “Art Community” as the central concept of this project, which allows diversified and innovative reuse of the site. The adaptive reuse project adopted this concept as its main theme, which fits the creative industries well and is considered suitable for the site.

5.2.2 | Adaptive reuse—New function as art community

This project embraces adaptive reuse with respect to the historic architectural fabric and aims high to undertake the best practice principles in conservation for the adaptive reuse of heritage buildings. Yet, it also seeks to deliver modern functional performances, in order to explore how the Asian historic urban environment can be sustained and modernized by innovative architecture. It not only reinstates the nostalgic scenery but also creates an avant-garde architecture that integrates the traditional urban lives and original building materials with modern technology and performances. Retaining most of the ensemble's bricks, timber configuration, and other character defining elements, the revitalized cluster conserves both the architecture fabric and other significant relics which reflected the transformation of the local community (Kee, 2019, pp. 154–165).

7 Mallory Street is an innovative project as it has revitalized a dilapidated historic building cluster into a home not only for the art community but also a public open place for ordinary citizens, to meet the public and creative artists’ aspirations.

CHB not only becomes a creative hub that energizes new businesses and new creativity into the old Wan Chai district, but it also consolidates the sense of place by engaging local shop owners, artists, and the public. It can be seen as a popular location for cultural events such as exhibitions and movie nights where visitors can mingle with the locals to appreciate the artistic atmosphere that has been built into the place. This project engaged various stakeholders including community residents, volunteers, designers, scholars, non-governmental organizations, and professionals in the planning process which allowed their concerns being genuinely considered in the formulation of conservation blueprint and later operation model. As suggested by Singh and Keitsch (2016), the active participation of the local communities and the fair distribution of decision-making power among local and external stakeholders play a significant role in the thriving of social and cultural sustainability in this conservation project.

TABLE 4 Project Information: 7 Mallory Street

Location	6–12 Burrows Street/ 1–11 Mallory Street, Wan Chai, Hong Kong
Site area	780m^2
Previous use	Tong Lau group
Current use	Comic-themed complex
Built year	1916–1922
Grading	Grade II historic tenement houses
Project team	Urban Renewal Authority
Operator	Urban Renewal Authority and the Hong Kong Arts Centre till 2018
Project start	2009
Project completion	2013

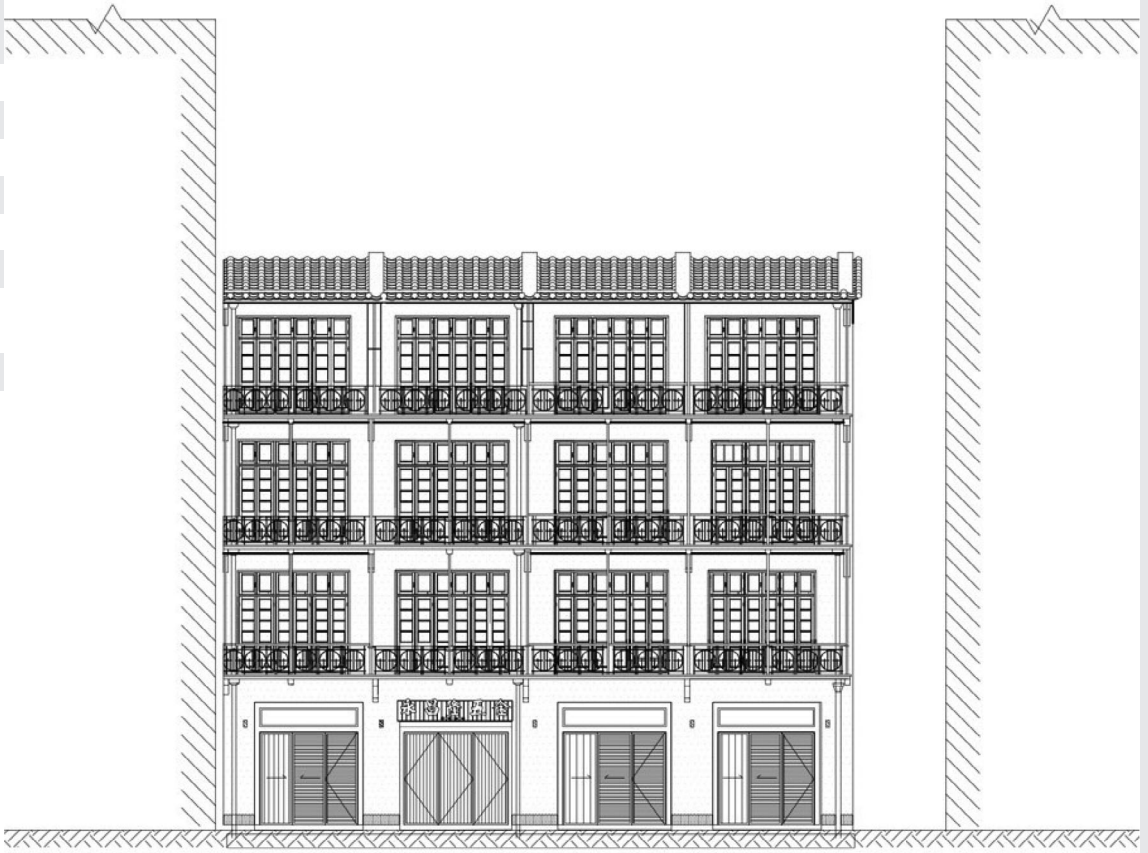

FIGURE 2 Elevation of 7 Mallory Street

5.2.3. | Regression results of 7 Mallory Street

Tables 5 and 6, respectively, show the descriptive statistics and regression results of 7 Mallory Street. The adjusted R^2 is 0.47, suggesting that the model is moderate in predicting the deflated transaction price. Additionally, its F-statistic is significant; hence, variables included in the model are meaningful and useful. The null hypothesis regarding all coefficients being zero is rejected at a 1% significance level.

Meanwhile, the coefficients of SFA and AGE are significantly different from zero at a 1% significance level. Saleable floor area, floor level, and the availability of sea view have a positive impact on property prices while building age has a contrasting adverse effect on the dependent variable. With 1 ft^2 increase in SFA, the natural log of property price will increase by 0.18%, whereas the availability of sea view can raise housing prices by 3.06%. The dependent variable will also have a premium of 0.13% if the property is 1 floor higher but will experience a 1.03% reduction if it is 1 year older.

Notably, a positive sign of COMP but a negative sign of COMP*DIST suggests that there will be a positive price effect after confirming the heritage grading; however, such effect diminishes when the distance between the property and the heritage increases. By interpreting COMP and DIST together, the natural log of the real transaction price will increase by 14.8% after the grading of heritage is confirmed. Besides, the property will experience a decrease of 0.13% in transaction price for every meter away from 7 Mallory Street. Similar to the Blue House, the regression supports the arguments of external effects in three ways, namely, (a) there is a positive economic impact in relation to residential property prices and architectural heritage sites; (b) the economic sustainability in the conservation of 7 Mallory Street is signified by the increase in property prices after its heritage grading; and (c) there is a distance decay of the price effect suggesting that the closer the residential unit is to 7 Mallory Street, the higher the economic impact. These statistical analyses are consistent in both case studies, confirming that the research assumption that a positive correlation exists between heritage conservation and property prices nearby.

6 | SIGNIFICANCE AND CONCLUSION

This paper combines two case studies and quantitative methodologies to examine the impact of architectural heritage conservation within

TABLE 6 Regression Results of 7 Mallory Street

	0–100 m	
Treatment radius	**Coefficient**	**Standard error**
SFA	0.00209***	(0.00069)
SFA^2	−3.17e-07	(6.55e-07)
FL	−0.00212	(0.006098)
FL^2	0.000157	(0.000224)
AGE	−0.0296***	(0.010402)
AGE^2	0.00031	(0.000189)
SV	0.030607	(0.139886)
MTR	0.000436	(0.000329)
COMP	0.194896	(0.119134)
DIST	−0.00059	(0.001047)
COMP*DIST	−0.00067	(0.001653)
Observations	530	
Adjusted R^2	0.472603	
F-statistics	44.09458***	

Note: Dependent variable is ln(RP). Robust standard errors are reported between parentheses.
Note: *p < .10, **p < .05, ***p < .01.

TABLE 5 Descriptive Statistics of 7 Mallory Street (N = 530)

	Mean	S.D.	Min.	Max.
Structural characteristics				
Deflated transaction price **RP** (in HK$million)	5.930328	4.979472	0.036679	47.79645
Saleable floor area **SFA** (in ft^2)	433.1283	129.4545	254	1,185
Squared saleable floor area **SFA^2**	204,327	163,694.7	64,516	1,404,225
Building age **AGE**	31.06016	8.739699	0.049281	50.18207
Squared building age **AGE^2**	1,040.972	454.8261	0.002429	2,518.24
Floor level **FL**	10.88679	7.703779	1	55
Squared floor level **FL^2**	177.7585	284.8632	1	3,025
Locational characteristics				
Sea view **SV** (1 = yes)	0.028302	0.165991	0	1
Displacement to the nearest MTR station **MTR** (in m)	365.2547	53.67779	257	435
Displacement to heritage **DIST** (in m)	69.90132	20.97216	22.5	96.2
Transaction period				
After confirmation of heritage grading **COMP** (1 = yes)	0.379245	0.485658	0	1

the overall topic of sustainable development. The regression results from the hedonic pricing model have confirmed that graded heritage architecture in Hong Kong can impose a positive external effect on neighboring property prices. Our findings demonstrate that a more significant positive economic impact on adjacent properties can be observed from heritage conservation sites that are formally assigned a heritage grading, and at the same time, such effect is also more prominent when these residential properties are located within a closer distance of the selected heritage site.

The quantitative analyses on the adaptive reuse of the two heritage buildings demonstrate the substantial economic impacts on adjacent property prices, 11.7% in BHC and 14.8% in CHB, generated after the heritage had been graded. This research provides practical implications that can conduce to policy recommendations to strategize sustainable heritage conservation in the context of old district renewal. This study suggests the formation of an assessment framework to evaluate the potential of adaptive reuse of built heritage to the sustainable development of an area. In such a way, future urban planners, architects, interior designers, and conservationists can henceforth have a more solid basis to assess the value of heritage conservation concerning the overall urban sustainable development. The study offers policymakers and property developers some evidence to decide on future heritage strategies and management policies.

On the other hand, this research also sheds light on the social and cultural sustainability of an urban community. The two selected architectural heritage case studies support that a socially inclusive conservation approach can contribute to the building of a sustainable community with an urban context. The BHC is an example where voices of different stakeholders can be combined, epitomizing how public engagement can bring extraordinary results to such a comprehensive conservation project. The 7 Mallory Street case study also illustrates how active stakeholder engagement such as discussions in focus groups can help formulate the master plan for adaptive reuse, where innovations were integrated into the welfare of the community as a whole. Residents and other community members have benefitted from a range of social events and the districts' sense of place has been enhanced as a result. For other Asian cities attempting heritage conservation, this paper provides valuable insights into the merit of adapting heritage buildings as a base for economic, social, and cultural sustainability. An inclusive adaptive reuse approach, a sound heritage grading system, and active community engagement are recommended for the formulation of heritage conservation policy to fit the ever-changing landscape of urban development and the rising demand for the comprehensive conservation practices. The understanding of the external effect of architectural heritage, together with the systematic planning in future infrastructure, interior design, and business operation model can increase the productivity of a city as well as contribute to the sustainable development for its future.

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ENDNOTE

[1] The series of semi-structured interviews and desktop research were undertaken by the Community Project Workshop under the auspices of The University of Hong Kong between 2012 and 2015 as part of the community engagement, and the full research report was submitted to the Blue House.

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