



Analytical Study on the Viability of Adaptive Reuse of Heritage Building, Case study of Asia Heritage Row, Kuala Lumpur

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Abstract: Historic buildings maintain the local characteristics and preserve the culture and history of a country. It is mainly through conservation of heritage buildings that we can pass on currently identified cultural significances to future generations. Adaptive Reuse is an effective way to preserve building heritage, especially when the building is no longer able to function its original purpose. In the pursuit of sustainable development, adaptive reuse holds different dimensions of sustainability. The aim of this study is to investigate the viability of adaptive reuse application to historic buildings as an approach to achieve .Sustainable Heritage. In this regard in this paper, an attempt has been made to explore adaptive reuse with .sustainability through literature review. After that, the case study of Asian Heritage Row located in Doraisami Street and Jalan Yap Ah Shak, Kuala Lumpur has been used for the hypothesis testing. The variable measured as parameters in achieving .sustainability are categorized into cultural, aesthetical, .and human comfort. Data collections were obtained from case study, survey questionnaires at Asia Heritage Row and literature review. The associations between variables are examined by correlation. The findings of this research have presented facts that the successful adaptive reuses of historical buildings hold .value approach. It preserves the heritage significance of a building, ensures its sustainability, and generates the building into a .interaction place. By the means of adaptive reuse, the .life of the inhabitants in historical buildings at Kuala Lumpur can be preserved sustainably in the end and passed on to future generations.

Keywords: Adaptive Reuse, .Sustainability, Sustainable Preservation, Built Heritage, Architecture, Historic Building

1. INTRODUCTION

The Heritage is something that is passed down from one generation to another. Thus, the identity of a people and nation is largely defined by their heritage and one of the heritage objects, which have to be kept for the future generations, is heritage building. United Nations Educational, Scientific and Cultural Organization (UNESCO) considered heritage building as a tangible man made environment with its cultural (heritage) significances. It is mainly through conservation of heritage buildings that we can pass on to future generations what is currently identified as being of cultural significance today.

An important phrase to consider when discussing cultural conservation is "adaptive reuse," the process of retrofitting building for new uses, which allows structures to retain their historic integrity, while providing for the occupants' modern needs³. Where a building is no long able to function with its original purpose, a readapted use may be the only way to preserve its heritage significance.

2. BACKGROUND

Preserving and reusing historic buildings has long-term benefits for the communities that value them. If adaptive reuse is applied well, it can restore the heritage

values of the building, help to ensure its survival, and become a place for community .interaction. New relationships between human and architecture is adapted through reuse. Without understanding and prioritizing .sustainability, buildings, no matter how environmentally and economically sustainable, are not truly sustainable. Several initiatives of adaptive reuse have been applied to heritage buildings throughout the world. In Malaysian Context, since 1990's until 2000, the government, through the Department of National Heritage has taken several initiatives to protect and conserve the Malaysian heritage buildings. Many historic buildings have been preserved and conserved while others have been converted to become premises for a bank, restaurant, information centre or a printing office. The adaptive re-use of the Central Market building, in 1986, in Kuala Lumpur has opened the eye of all Malaysian on local heritage building conservation. In addition, building conservation has long been of concern, although its popular application is relatively recent in origin, particularly in Malaysia⁵. The conservation in Malaysia is guided by the three types of laws and regulations relating to the conservation of historic buildings: Johore Enactment 1988, Malacca Enactment 1988, and National Heritage Act 2005. Asia Heritage Row, located in Doraisami

Street and Jalan Yap Ah Shak, Kuala Lumpur, is a classic example of adaptive reuse applied to valuable heritage building in Malaysia. Asia Heritage Row was 80-year old pre-war houses, that were once abandoned with dilapidated structures. After adaptive reuse application, the building was turned into elegant and charming restaurants, cafes, and bars; that contributing not only in maintaining the heritage and identity of the place, but also increasing the activities around the area.

3. RESEARCH FRAME WORK

In the pursuit of the sustainable development, sustainability has been the new parameter to investigate the viability of adaptive reuse. In this regard, an attempt has been made as a main objective to investigate the viability of adaptive reuse and its sustainability. Asia Heritage Row is used for the hypothesis testing.

The variables that are measured as parameters in achieving sustainability are categorized into cultural, aesthetical, and human comfort.

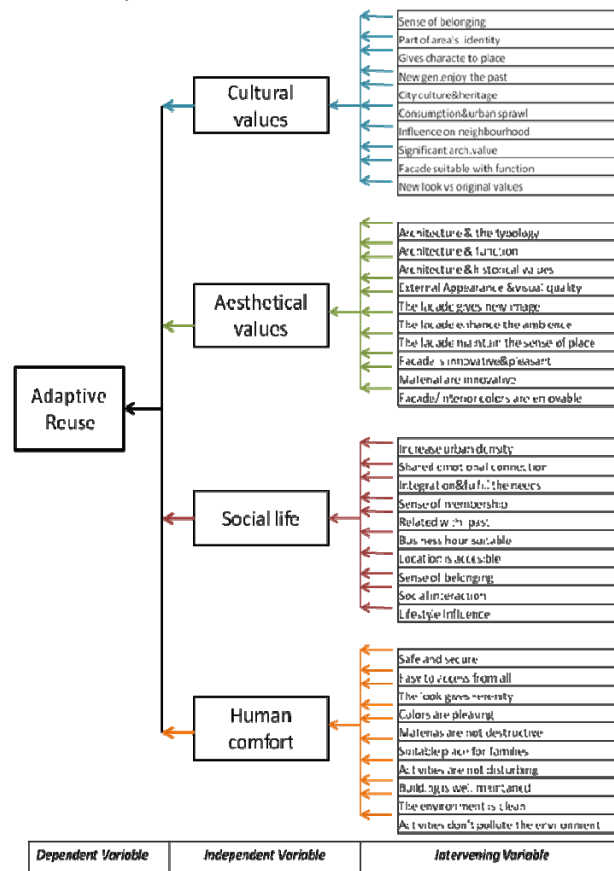


Fig.1: Independent and Dependent Variables

The data is mainly collected from literature review, case study and questionnaires distributed to the users of the case study area. 150 respondents, as end users of the building, were asked on the main important factors in sustainability. For measuring the satisfaction levels, a

five-point liker's scale is used. The values in the scale are as follows: 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, and 5- Strongly Agree.

The data is analysed by determining the statically reliable relationship between adaptive reuse and sustainability parameters. This research uses parametrical statistical data collection and consequently parametric analyses have been applied. Initial analysis comprises a variety analysis to determine the baseline data for the respondents. The second phase consists of determining that exist statistically reliable relationship between adaptive reuse and sustainability parameters⁶. The association between variables are examined by correlation. (Fig. 1) shows the independent and dependent variables.

4. DISCUSSION

4.1 Correlation analysis

Correlation analysis is the study of the relationship between variables. Correlation is a measure of strength of the linear relationship between independent variable and dependent variable. The aim of correlation is to evaluate the degree of relationship of co variation that exists between them. The value of correlation coefficient is between -1.0 to 1.0. Thus, Table 1 shows the Pearson Product Moment Correlation between independent variables (Cultural Value; Aesthetical Value; Sense of Community; and Sense of Comfort) and depended variable (Adaptive Reuse).

Table 1: Pearson Product Moment Correlation for Independent Variables

	Construct	Correlation of Coefficient, r	p -value
1.	Cultural Value (X1)	0.597	0.000
2.	Aesthetical Value (X2)	0.234	0.004
3.	Sense of Community (X3)	0.185	0.024
4.	Sense of Comfort (X4)	0.142	0.083

(Table 1): shows the table of Pearson product moment correlation for independent variables (Cultural Value(X1), Aesthetical Value (X2), Sense of Community (X3), and Sense of Comfort (X4)) with Adaptive Reuse. Since, the p -value for the independent variables is less than $\alpha=0.10$ this indicates that the independent variables (Cultural Value (X1), Aesthetical Value (X2), Sense of Community (X3), and Sense of Comfort (X4)) are statistically significant on adaptive reuse of historical buildings.

Thus, there are the interpretations of correlation:

1. For variables Cultural Value (X1)

Since $r = 0.597$, there is a moderate positive relationship between Cultural Value and Adaptive Reuse.

2. For variables Aesthetical Value (X2)

Since $r = 0.234$, there is a weak positive relationship between Aesthetical Value and Adaptive Reuse.

3. For variables Sense of Community (X3)

Since $r = 0.185$, there is a weak positive relationship between Sense of Community and Adaptive Reuse.

4. For variables Sense of Comfort (X4)

Since $r = 0.142$, there is a weak positive relationship between Sense of Comfort and Adaptive Reuse.

4.2 Scatter Diagram

(Fig. 2): shows the matrix scatter plot of independent variables (Cultural Value (X1), Aesthetical Value (X2), Sense of Community (X3), and Sense of Comfort (X4)) and dependent variable (Adaptive Reuse). From the matrix scatter plot above, there is positive linear relationship between independent variables (Cultural Value (X1), Aesthetical Value (X2), Sense of Community (X3), and Sense of Comfort (X4)) and dependent variable (Adaptive Reuse) since all directions are moving upward.

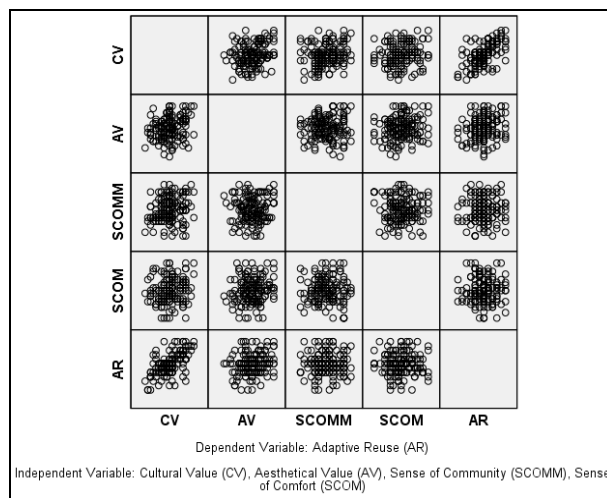


Fig. 2: Scatter diagram for Correlation Matrix between Dependent Variable and Independent Variables.

4.3 MULTIPLE LINEAR REGRESSION ANALYSIS

4.3.1 Stepwise Selection Procedure

Stepwise selection procedure in SPSS 22.0 has been used to obtain the models in Multiple Linear Regression analysis. The Stepwise selection procedure is combination of the backward and forward techniques. The stepwise selection begins with the backward selection so that each step in which the independent

variables was added, all four variables (cultural, aesthetical, community, comfort) in the model are checked to see if their significance has been reduced below the tolerance value. The variables are removed if it is non-significant. The model is presented as follows in the (Table 2):

Table 2: Final Model for Variables Significant

Model	Independent Variables Involved
Final Model	Cultural Value (X1)

(Table 2): shows the independent variables for the final model after using the Stepwise Selection procedure the Cultural Values are statistically significant on an adaptive reuse of historical buildings.

4.3.2 Overall F-test- Test for Significance of Regression Model

(Table 3): below shows the results testing of the F-test.

Table 3: The results testing of the F-test

Model	Sum of Squares	Degree of Freedom	Mean Square	F	p-value
Regression	12.320	1	12.320	82.126	< 0.000
Residual	22.202	148	0.150		
Total	34.522	149			

The tabulated value for F-test was 82.126 with degree of freedom for regression and residual were 1 and 148 respectively. Since the p-value was less than alpha value, $\alpha=0.05$, it indicates that the regression model was statistically significant and the null hypothesis was rejected. Therefore, the regression model is significant in this study.

4.3.3 Coefficient of Multiple Determinations, R^2

Table 4: below table shows the coefficient of multiple determinations, R^2 .

Table 4: Coefficient of Multiple Determinations

Independent Variables	R^2
Cultural Value (X1)	0.357

The value of R^2 was 0.357 that strongly fits. Meaning that, 35.70% of the total variations of the Adaptive Reuse of Historical Buildings were explained by the Cultural value. The balance of 64.30% was explained by others factors.

4.3.4 Significance of Individual Predictor Variables

(Table 5) below shows the significant for the Independent variables.

Table 5: The Significant for the Independent Variables.
B=Beta Coefficient

Variables	B	Standard Error	t-statistic	p-value
(Constant)	1.028	0.328	3.137	0.002
Cultural Value (X1)	0.736	0.081	9.062	0.000

Based on the (Table 5-10) shows, the p -value of Cultural Value is less than $\alpha=0.05$. This indicates that, there is a significant relationship between Cultural Value on Adaptive Reuse of Historical Buildings.

4.3.5 Estimated Regression Equation

Given below is the estimated regression equation model:

$$Y = 1.028 + 0.736X_1$$

Where: X_1 =Cultural Value

Furthermore, additional information can be obtained from the coefficient value. The adaptive reuse of historical buildings is expected to be increased by 1.028 when there is no change in Cultural Value on Adaptive Reuse of Historical Buildings. One unit increase in the score of Cultural Value, the Adaptive Reuse of Historical Buildings will increase by 0.736 when all the other variables are holding constant.

4.3.6 Simple Linear Regression Analysis

According to Kirchner (2001), Simple linear regression is the most commonly used technique for determining how one variable of interest (the response variable) is affected by changes in another variable (the explanatory variable). The terms "response" and "explanatory" mean the same thing as "dependent" and "independent". Simple Linear regression analysis was used to answer questions.

Firstly, life variable was checked to see if its significance has been reduced below the tolerance value.

4.3.6.1 Overall F-test- Test for Significance of Regression Model

(Table 6): below shows the results testing of the F-test.

Table 6: The results testing of the F-test

Model	Sum of Squares	Degree of Freedom	Mean Square	F	p-value
Regression	0.041	1	0.041	0.176	0.675
Residual	34.481	148	0.233		
Total	34.522	149			

The tabulated value for F-test was 0.176 with degree of freedom for regression and residual were 1 and 148 respectively. Since the p -value was greater than alpha value, $\alpha=0.05$, it indicates that the regression model not statistically significant and the null hypothesis was accepted. Therefore, the regression model is not significant in this study.

4.3.6.2 Significance of Individual Predictor Variables

(Table 7): shows the significant for the Independent Variables.

Table 7: The Significant for the Independent Variables

Variables	B	Standard Error	t-statistic	p-value
(Constant)	3.793	0.456	8.309	0.000
Sense of Community (X3)	0.050	0.119	0.420	0.675

B=Beta Coefficient

(Table 7) shows, the p -value of Sense of Community is greater than $\alpha=0.05$. This indicates that, there is no significant relationship between Sense of Community on Adaptive Reuse of Historical Buildings. Therefore, the Sense of Community does not affect the Adaptive Reuse of Historical Buildings.

After that, Human comfort variable was checked to see if its significance has been reduced below the tolerance value.

4.3.7 Overall F-test- Test for Significance of Regression Model

(Table 8) below shows the results testing of the F-test were presented.

Table 8: The results testing of the F-test

Model	Sum of Squares	Degree of Freedom	Mean Square	F	p-value
Regression	0.015	1	0.015	0.064	0.800
Residual	34.507	148	0.233		
Total	34.522	149			

The tabulated value for F-test was 0.064 with degree of freedom for regression and residual were 1 and 148 respectively. Since the p -value was greater than alpha value, $\alpha=0.05$, it indicates that the regression model not statistically significant and the null hypothesis was accepted. Therefore, the regression model is not significant in this study.

4.3.8 Significance of Individual Predictor Variables (Table 9): below shows the significant for the Independent variables.

Table 9: The Significant for the Independent Variables.
B=Beta Coefficient

Variables	B	Standard Error	t-statistic	p-value
(Constant)	4.073	0.353	11.533	0.000
Sense of Comfort (X3)	-0.022	0.088	-0.254	0.800

Based on the Table 9: shows, the *p*-value of Sense of Community are greater than $\alpha=0.05$. This indicates that, there is no significant relationship between Sense of Comfort on Adaptive Reuse of Historical Buildings. Therefore, the Sense of Comfort does not affect the Adaptive Reuse of Historical Buildings.

5. CONCLUSION

As a conclusion, it is found that Asia Heritage Row has a feasible input towards sustainability. End users of Asia Heritage Row and the community around the site agreed to be comfortable with adaptive reuse of the old historic buildings. Based on the results, Asia Heritage Row adaptive reuse is most significant in terms of cultural values and lesser in terms of human comfort level, or life of the community.

Although the overall responses on Asia Heritage Row were complimentary on sustainability, however, there are few aspects need to be reconsidered and improve for the future projects. The component in which Asia Heritage is lacking is in the life and human comfort aspect. Most of the activities held inside the buildings are commercial (such as restaurants, clubs) and religion considerations are absent. Few of the restaurants offer alcohol at night, the clubs will hold dancing and singing. Muslim families are unable to attend under this atmosphere. Another element found from observation is that the activities do not involve people of all ages. Most of the users of the buildings vary between the ages 20-55. Consequently, children and elderly somehow do not visit the place. Another weakness found during observation was absence of the design consideration for people with special needs, such as ramp, lift, and signboards.

All the designers, architects, urban planners, and policy makers should be to create a place where people want to be, and live longer. The upcoming approaches need to consider the aspect crucially in decision-making process. It is recommended, that an earlier investigation must take place before embarking in any future adaptive reuse projects. Public should be involved in decision-making process seriously.

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