Managerial and Technical Perceptions in Decision Making Process of Adaptive Reuse: Malaysian Heritage Building

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Abstract: Adaptive reuse is a process of rebranding heritage buildings without jeopardizing their authentic values. There is a need for a proper guideline for authorities and private sectors to adaptively reuse a building. With this in mind, this paper evaluated and compared the perceptions of two groups of stakeholders in the conservation industry (managerial and technical groups) on the important components that should be taken into account before an adaptive reuse of a building. Questionnaires containing adaptive reuse projects were sent to the experts of the groups. The data obtained from the survey were evaluated through a descriptive analysis and t-test technique using SPSS software. The preliminary findings indicate that physical and technological aspects are two (2) important components that should be taken into consideration. Apart from that, this report acknowledges these components from both the managers and technocrats' point of view. All in all, this study may be used as a blueprint for the authorities and private sectors in the execution of adaptive reuse of a building. A Good Abstract Should Consist Of Introduction, Problem Statement, Quantitative Results & Discussion And Quantitative Conclusion.

Keywords: Highway traffic flow, unmanned aerial vehicle, quadrotor, real time video Keywords Required : 5.

I. INTRODUCTION

In 1987, the Brundtland Report of the World Commission on Environment and Development (WCED) introduced the sustainable development concept (Brundtland 1987). The concept is concerned about the equity and balance among the three pillars of economy, social and environment. Since its introduction, governments, industries, and communities have been striving to achieve the sustainability goals set by the report. This situation can also be seen in the construction industry. The green index, sustainable constructions, and waste management are among the efforts made to increase the sustainability of the construction industry.

Although there seems to be more focus on the construction of new buildings or infrastructures, existing buildings, particularly those with heritage values, are still being protected. One of the efforts taken to sustain a heritage building is adaptive reuse (AR). This approach can benefit the environment by extending the life of a building and avoiding demolition and rebuilding. It is worth noting that demolition and building have been shown to produce more waste and use more energy, resources, and materials (Bullen and Love 2011a; Kalaci and Dervishi 2014; Mohamed and Alauddin 2016; Yung and Chan, 2012). Apart from that, adaptive reuse retains the "embodied energy" of the original building (Akhtarkavan et al. 2008), Adaptive reuse of a building can also be used to preserve a heritage building and its cultural identity for future generation (Mısırlısoy and Gunce 2016; Wilson and Desha, 2016). This approach is ideal in preserving a heritage building that can longer serve its original purpose. As eloquently discussed by Sanchez and Haas (2018), AR of heritage buildings is one of the ways to conserve and preserve the heritage building and the environment simultaneously. As mentioned before, adaptive reuse is a favored alternative to demolishment in sustaining heritage buildings in Malaysia. Rather than extracting raw materials during demolition, adaptive reuse will utilize the basic structure of the building and modify its initial use (Langston et al. 2008).

II. LITERATURE REVIEW

Adaptive reuse should be one of the main strategies to achieve sustainability in Malaysia as we have quite a huge number of heritage buildings. Without proper maintenance or continuous use, these valuable buildings may end up as old, dilapidated buildings (Ahmad 2009; Ghafar and Nurwati 2003; Mohamed and Alauddin 2016). The main reasons for conserving a building are to prolong the building's lifespan and protect the building from defective agents.

In previous years, the level of awareness in preserving heritage buildings in modern countries is low compared to developing nations. Malaysia is not excluded. In Malaysia, the Heritage Act 2005 dictates the laws and guidelines in handling Malaysia's heritage assets.

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There was a case before the establishment of the Act. According to (Kamal, Wahab, and Ahmad 2008), the destruction and demolishment of the historic Metropole Hotel (built in 1900) in George Town, Penang in 1993 prove the inadequacy of Malaysia law enforcement. The action also caused disputes among stakeholders until 2005, which was also the year that the Heritage Act 2005 was established.

Moving on, the Malaysian government has been trying to increase people's awareness of the importance of preserving heritage buildings. This is being done by promoting both tangible and intangible national heritage pride. An example of a fruitful effort is the recognition of Melaka and Georgetown as UNESCO's World Heritage Site on July 8th, 2007 after successful marketing and promotion done by the government. Despite the recognition, there are still concerns on tourism and sustainability of cultural and natural world heritage sites (Schmutz and Elliott 2016) Malaysia's heritage assets seem to share the same pattern as other heritage sites. Typically, there will be a clash of interests between building owners and local authorities due to economic pressure against unjustified heritage values. Some approaches that can be taken to avoid this are strengthening the laws on demolishing old buildings for commercial purpose and introducing adaptive reuse concept as a new economic model. Preserving the authentic value of national heritage is a challenge, particularly in judgment and decision-making process (Harun 2011)

Adaptive reuse will involve many parties who will have their own perspectives, complicating decision-making process (Mohamed and Alauddin 2016). With this in mind, a guideline on the important components of the adaptive reuse process will assist in a smooth decision-making process. Conserving heritage buildings will involve two group of stakeholders; managerial and technical. Both managerial and technical play a critical role in successful adaptive reuse in term of technical and experience aspect. Some of the experiences may focus on different types of buildings such as colonial buildings, eclectic Chinese shop houses, and Sino Palladian bungalows. The differences in building type may cause some disagreements on the method and specification of conservation work. For example, the Marseilles tiles (a type of roof tiles) in colonial buildings and the V-shape tiles for shop houses are both made of lime, also known as terracotta. Both tiles have different tensile with different level of treatment, but financial constraint may limit the steps that can be taken. Meanwhile, technocrats are concerned on following work specifications completely while managers are focusing on the due date of the project. These differences must be handled wisely. Considering this, this paper aims to identify the perceptions of the managerial and technical group on the important components that should be considered in the decision-making process of adaptive reuse. This thesis will also compare their perceptions to acquire some insights from the stakeholders in the adaptive reuse of heritage buildings.

Moreover, the contribution of this paper is in three-fold. Firstly, the evaluation of the components considered in the decision-making process for adaptive reuse is evaluated comprehensively based on ten (10) components identified from other literature. This is different from previous studies that considered five (5) components – economic, environment, social, legislative and architecture (Mohamed and Alauddin 2016) – or six (6) components – physical, economic, functional, technological, social, legal and political (Conejos, Langston, and Smith 2013). Secondly, comparing managerial and technical perception is a new approach as previous studies tend to consider only technical perception (Mohamed and Alauddin 2016;Plevoets and Van Cleempoel 2011) or combine the perceptions of both groups (Bullen and Love 2010). Thirdly, this study focuses on the components and decision-making the process of AR in Malaysia context. Malaysia heritage buildings are different from other countries' based on the former's unique character and complex architecture that envelope their existing footprint. As acknowledged by UNESCO, Melaka and Georgetown are both made of a mixture of influences, creating a unique architecture, culture, and townscape unparalleled to other heritage sites. Although the buildings look similar, they vary in materials as these are affected by climate change and material availability. This study may guide practitioners in their decision-making process of adaptive reuse.

Adaptive reuse can be defined recycling an old, obsolete building and develop its new function to sustain the building (Ariffin et al. 2017; Ijla and Brostrom 2015; Clark 2013). Langston et al. (2008) explained that the adaptive reuse of heritage building gives a "new life" to the building, apart from retaining the national heritage. Furthermore, Ghafar and Nurwati (2003) asserted that adaptive reuse maintains the building's original form but changes the function of the building. In the present study, adaptive reuse is defined as transforming an old, dilapidated, and unused heritage building into a new functioning building to prolong the life cycle of the particular building. Systematic changing of the building's function will promote new activities around the area. Also, rectifying the building's function is pertinent and is typically executed for commercial gain. For example, turning an old building to a hotel will attract people to visit, creating a new financial income. This will retain the buildings authenticity and existence for future legacy.

Components that should be considered for AR of a building

Implementing adaptive reuse is not just "reusing the building for another purpose". There are a number of aspects that must be considered in the decision-making process. It should be noted that an adaptive reuse of a building can be complicated and time-consuming, particularly for a heritage building (Bullen and Love 2011c). This is because there have to be some evaluations being made on the value of the building. As stated by Akhtarkavan et al. (2008), "the most successful developed heritage adaptive reuse projects are those that respect and retain the building's heritage significance and add a contemporary layer that provides value for the future". Moving on, Bullen and Love (2010) interviewed construction professionals and found seven (7) components for adaptive reuse. The components are commercial performance (measured by cost adapting and employee productivity), building demand and function, cost factors of reuse, the risk associated with reuse, operational attributes, sustainability of building to undertake adaptive reuse and sustainability performance. Some authors suggest financial (Langston et al. 2008), environmental (Langston et al. 2008; Mohamed and Alauddin 2016), social (Langston et al. 2008; Mohamed and Alauddin 2016), politics (Nepravishta 2015), economy (Mohamed and Alauddin 2016; Nepravishta 2015), technology (Nepravishta 2015), legislative and architecture (Mohamed and Alauddin 2016) as components that should be taken into account in an adaptive reuse process. Another important component in an adaptive reuse process is the physical state of the building (Bullen and Love 2011b; Nepravishta 2015; Rani 2015).

In general, previous studies recommended some components that can be included during the decision-making process of adaptive reuse. Inadequate information on the adaptive reuse of heritage building leads to poor handling of the buildings. A holistic approach of the components must be reviewed meticulously based on relevant theories and practices. Based on formative academic assessment, there are ten (10) components that should be considered, which are physical, economic, social, politic, laws, environment, finance, infrastructure, function, and technology. In certain components such as physical, social, and law and regulation, the heritage significance of a building is taken into account. A summary of the literature review is tabulated in Table 1:

Table. 1 Essential Entity in a decision-making process, directly and indirectly, for an adaptive reuse model towards heritage building listed by international and Malaysian researchers

No	Entity	Sub Entity
1	Physical	Physical Character, interior and exterior integrity, Structural integrity, durability of materials, workmanship, treatment, design & originality
2	Economy	Population density, market, site access, disclosure, design constraints, the size of the plot, location,
3	Function	Flexibility, compartmentalization, disassembly, stream room, function ability , atrium, grid structure, channel services and corridor, rental,
4	Technology	Scientific approach, Orientation, glazing, insulation and shading, natural light, natural ventilation of the building management system, solar access, complexity,
5	Social	Image, aesthetics, landscape, history, facilities, human scale, the neighbourhood and the environment,
6	Law and Regulation	Heritage Management plan, fire protection, internal quality, occupational health and safety, security, comfort, convenience of the disabled, energy efficiency, acoustics, conservation plan
7	Politic	The adjacent building, site ecology, conservation, public, urban master plans, zoning, ownership,
8	Environment	Carbon emission, renewable energy, climate change, waste management, ozone depleting substances, temperature, air velocity, humidity, pollution source,
9	Finance	Financial resources, Financial planning, acquisition budget
10	Infrastructure	Transport, utility and services,

Source: Hanizun et al., 2018

III. METHODOLOGY

The present study implemented cross-sectional survey setting. A sample was drawn from the whole population at one specific time and the data were collected once in a range of time specified by the researcher (Louis, Lawrence, and Keith 2007). The survey took four (4) months to complete. In selecting the sample, this study used expert sampling (Klein, Calderwood, and Macgregor 1989; Zanni, Soetanto, and Ruikar 2017), in which individuals with knowledge, skill, and experience in heritage building conservation were selected. Furthermore, there were some criteria in selecting the participants: 1) the expert was registered with the authority in built environment and 2) the expert had worked with heritage buildings whether as a designer, consultant or contractor. A questionnaire was distributed to managers and technocrats in the conservation field. The questionnaires were administered to the 532 respondents via email (194), telephone (187) and interviews with a questionnaire (151). The questionnaire was made of two parts. The first part was on the respondents' profile and the second part was related to stakeholders' perception of the importance of these components; physical (7 items), function (9 items), economy (7 items), technology (7 items), financial (3 items), law and regulations (9 items), politics (7 items), environment (9 items), social (7 items) and infrastructure (3 items). The rate of importance were ranged as follows; 1 (very important), 2 (important), 3 (neutral), 4 (unimportant), 5 (very unimportant). The data were then compared using the t-test from Statistical Packages Software for Social Science (SPSS). The results from t-test would have shown whether there were different perceptions between the groups of respondent through the sig. (2-tailed) value. If the values were equal or less than .05, there were significant differences between the mean score of the two groups. If the values were above .05, then there were no significant differences. In other words, both groups agreed on the important components in adaptive reuse.

The next step after t-test analysis was the calculation of effect size. Effect size statistics provided the magnitude of the differences between groups. There are a number of effect size statistics, with the most commonly used being Eta squared and Cohen's d. Eta squared can range from 0 to 1 and represents the proportion of variance in the dependent variable that is explained by the independent (groups tested) variable. The formula for eta squared is as follows:

Eta squared = t^2/(t^2 "+(N1+N2-2)") (1)

Where t = N1 = samples in group 1; N2 = sample in group 2. The interpretation of Eta squared based on Cohen (1988) and Pallant (2013) are .01 = small effect; .06 = moderate effect; .14 = large effect. The conceptual framework for this study is illustrated in Figure 2.

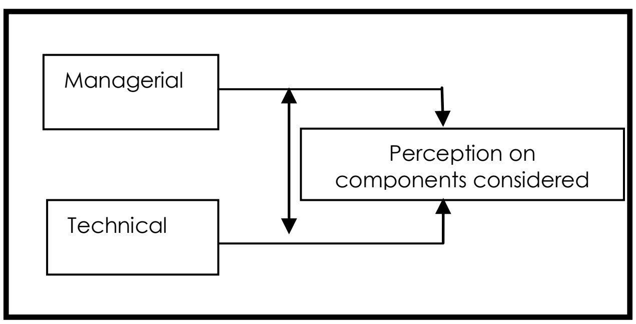

Fig. 2 Conceptual Framework

IV. RESULTS AND DISCUSSION

There were 129 responses received (7 emails, 36 telephone interviews, and 86 interviews with questionnaire), creating a 24.25% response rate. This rating was adequate for a survey-based study (Chileshe, Fester, and Haupt 2005; Malhotra and Grover 1998). The responses were from project managers, construction managers, assistant project managers, site engineers, architects, civil engineers, mechanical engineers, quantity surveyors, and conservators. From these 129 responses, this study identified three (3) group of respondents which were managerial, technical and conservation. Nevertheless, the responses from conservator had to be excluded from this study as the sample size was small (N=24) and it was disproportionate with the other two groups (refer to Pallant (2013)). The groups included in the analysis are indicated in Table 2.

Table. 2 Sample (N) for each group and mean for a total score

Types of Respondent	N	Mean	SD
Managerial Project managers, construction managers, assistant project managers	52	1.61	.311
Technical Site engineers, architects, civil engineers, mechanical engineers, quantity surveyors	53	1.85	.388

Source: Authors 2018

Moving on, the first analysis done was a descriptive analysis. This analysis was executed to identify respondents' background and their ratings on the components in the decision-making process during adaptive reuse of a heritage building. It was found that 72.1% of the respondents were male and 27.9% of the respondents were female. Furthermore, 68.2% of the respondents were between 35 to 44 years old and 3.1% of them were aged between 25 and 34. The rest is made of 14.7% of 45 to 54-year-olds, 13.2% of 55 to 64-year-olds and 0.8% of above 65-year-olds. Most respondents completed their undergraduate studies (84.5%) and the rest completed their postgraduate studies. One of the requirements for the selected respondents was their experience in dealing with building conservations. Table 2 shows the respondents and their experience in the construction industry and building conservation.

Table 3 shows that respondents in the construction industry had more than 5 years' experience while those in building conservation tend to have less than that. None of the respondents had more than twenty years' experience in conservation work.

Table. 3 Respondents' experience in the construction industry and conservation building

	Years of experience									
	>2		2 - 5		5 < x >10		10 - 20		<20	
E	F	P	F	P	F	P	F	P	F	P
CI	-	-	-	-	93	72.1	22	17.1	14	10.8
CW	4	3.1	16	12.4	89	69	20	15.5	-	-

Note
E=Experience: CI=Construction Industry:
CW=Conservation Work: F = Frequency of respondents:
P = Percentage of respondents

Source: Authors 2018

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After the descriptive analysis of the respondents' profile, the same analysis was done to determine the rate of importance (ROI) for each component. Table 4 demonstrates the results of both groups towards the important components in the decision making the process for adaptive reuse. For the managerial group, the physical and technology components were considered to be "very important" compared to the other components which were rated as "important". Physical and technology factors might affect the process of adaptive reuse construction more than other components. With this in mind, both of the components should be carefully observed. Meanwhile, the technocrats considered all components as important, with only a slight difference in mean scores among the components. Still within the range of "important", the physical and economy components were at the top of the list with the mean of 1.66. At the bottom of the list was infrastructure with the mean of 2.11, while for the managerial group was politics with the mean of 1.77. The total mean score for the managerial and technical group were 1.61 and 1.85 respectively (as shown in Table 2).

Table. 4 Summary of both stakeholders' perceptions of the important components in the decision-making process for adaptive reuse in Heritage buildings.

Components considered	Mean (M)	ROI (M)	Mean (T)	ROI (T)
Physical	1.42	Very important	1.66	Important
Function	1.55	Important	1.77	Important
Economy	1.52	Important	1.66	Important
Technology	1.49	Very important	1.73	Important
Financial	1.72	Important	2.10	Important
Law & Regulation	1.68	Important	1.89	Important
Politics	1.77	Important	1.80	Important
Environment	1.66	Important	1.85	Important
Social	1.73	Important	1.96	Important
Infrastructure	1.56	Important	2.11	Important

Note
M - Managerial T - Technical ROI - Rate of Importance

Source: Authors 2018

The next analysis was to compare the mean score between the two groups. The results from the t-test analysis in Table 5 shows that eight (8) out of ten (10) components showed significant differences between the two groups of respondents. The components were physical (p=.001), function (p=.005), technology (p=.000), financial (p=.000), law and regulation (p=.013), environment (p=.024), social (p=.005), and infrastructure (p=.000). Only economy and politics component showed no significant difference between the two groups (p > .05). Furthermore, the overall result for the t-test indicated that the significant difference between the two groups of respondents was p=.000. The result also showed that the nature of work in managerial and technical translated into their perceptions towards most of the components except for economy and politics where their perceptions were the same.

Table. 5 T-test result in comparing managerial and technical perception

	Levene's test for equality of variance		t-test for equality of means				
Important component	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std Error Difference
P	.187	.666	-3.379	103	.001	-.237	.070
FN	.940	.003	-2.879	99.1	.005	-.224	.078
E	.543	.463	-1.955	103	.053	-.141	.072
T	.872	.352	-3.727	103	.000	-.241	.065
F	11.427	.001	-6.528	100.6	.000	-.376	.058
LG	.411	.523	-2.538	103	.013	-.206	.081
P	2.687	.104	-.315	103	.754	-.033	.104
ET	.139	.710	-2.287	103	.024	-.185	.081
S	9.143	.003	-2.90	100.4	.005	-.234	.081
I	81.250	.000	-6.298	76.6	.000	-.549	.087
O	**.7132**	**.009**	**-4.140**	**102.01**	**.000**	**-.243**	**.059**

Note
P =Physical: FN=Function: E=Economic: T=Technology: F=Finance: LG=Law and Regulation: P=Politic: ET=Environment: S=Social: I=Infrastructure: O=Overall

Source: Authors 2018

The next step is to calculate the effect size to identify the proportion of variance in the dependent variable that is explained by the independent (managerial and technical) variable. Using the formula

$$\text{Eta squared} = t^2/(t^2 + (N1+N2-2)) \quad (1)$$

Where t = result from t-test; N1= sample in group 1; N2 = sample in group 2. The results obtained are:

$$= (-4.140)^2/((-4.140)^2+(52+53-2) \quad (2)$$

$$= 0.14 \quad (3)$$

With reference to Cohen (1988) and Pallant (2013), the value of Eta squared = .14 has a large effect.

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It demonstrated that 14 % of the overall important components were explained by the test group respondents (i.e.: managerial and technical).

Moving on, the analysis showed an interesting result. Management was more concerned with "technical" aspects such as physical structure, design, and technology such as solar access and natural ventilation. Meanwhile, the technical group perceived physical and economy component as the top two important component among other components that were also considered as "important". This confirms Bullen and Love (2011) study which asserted that practitioners have their own opinions on the important components in the adaptive reuse process.

V. CONCLUSION

The main purpose of this paper is to compare the perceptions from two groups of practitioners that are involved in the conservation of heritage building industry on the important components of an adaptive reuse process. This comparison can provide owners, authorities and the public sectors some insights on the factors that should be considered before an adaptive reuse process can be implemented. The comparison is also important in identifying the important components from the managerial and technical point of view.

The results revealed a significant difference between the perceptions of the groups. Most of the components were deemed as important, but the managerial group put a stronger emphasis on physical and technology components. This is similar to previous studies that highlighted physical states such as the condition and structural composition of the building. Severe defects might affect the adaptive reuse process of the building (Rani 2015). Furthermore, deteriorating buildings demand high maintenance and large repair cost (Bullen and Love 2011a). This will affect financials of other components of an adaptive reuse. Technology is also perceived to be of high importance and this might be due to the current demand for sustainable technology such as natural ventilation and solar access. This is parallel to a study done by Mohamed and Alauddin (2016), which highlighted the green building index in adaptive reuse projects.

In short, the decision-making process for adaptive reuse is a complicated process. Further studies on the individual components are a must to mitigate the research outcomes. The detail components with subcomponents namely physical (physical character, interior and exterior integrity, structural integrity, durability of materials, workmanship, treatment, design & originality) and technology (scientific approach, orientation, glazing, insulation and shading, natural light, natural ventilation of the building management system, solar access, complexity) must be explored in an effort to expand the existing knowledge in this field.

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REFERENCES

1. Adair, Alastair, Jim Berry, and Stanley McGreal. 2003. "Financing Property's Contribution to Regeneration." Urban Studies 40 (5–6):1065–80. https://doi.org/10.1080/0042098032000074326.
2. Ahmad, A Ghafar. 2006. "The Framework of Historical Building Conservation." Sejarah@Malaysia, 2006. http://www.hbp.usm.my/conservation/.
3. Ahmad, A. G. 2009. "Treatment of Rising Damp and Replastering at Heritage Buildings." Paper presented at the Bengkel Bersiri 2009, Konservasi Bangunan Warisan Siri 2: Lepaan Kapur, Dewan Pusat Pelancongan Negeri Perak, Ipoh, July 17-19
4. Akhtarkavan, M., A. Alikhani, J. Ghiasvand, and H. Akhtarkavan. 2008. "Assessing Sustainable Adaptive Re-Use Of Historical Buildings." Paper presented at the WSEAS International Conference Proceedings on Cultural Heritage and Tourism (CUHT'2008), Heraklion, Crete Island, Greece, July 22-24.
5. Ariffin, A. B., M. S. M. Zahari, S. M. Radzi, & M. Z. Kutut. 2017. "Adaptive Reuse of Historical Buildings and Local Residents Actual Visitation." Journal of Tourism, Hospitality & Culinary Arts (JTHCA) 9 (2): 35-46
6. Anakkayan, Brit, Farid Wajdi, and Nor Hanizaishak. 2013. "The 3 Rd International Building Control Conference 2013 Conservation Plan for Historic Buildings from Building Control Administration Perspective," no. 1998.
7. Brundtland, G. H. 1987. Report of the World Commission on Environment and Development:" our Common Future.": Oxford: Oxford University Press
8. Bullen, Peter, and Peter Love. 2011. "Factors Influencing the Adaptive Re-use of Buildings." Journal of Engineering, Design and Technology 9 (1):32–46. https://doi.org/10.1108/17260531111121459.
9. Bullen, P., and P. Love. 2011a. "Factors Influencing the Adaptive Re-use of Buildings." Journal of Engineering, Design and Technology 9 (1): 32-46.
10. Bullen, P., and P. Love. 2011b. "A New Future for The Past: A Model for Adaptive Reuse Decision-Making." Built Environment Project and Asset Management 1 (1): 32-44.
11. Bullen, P. A., and P. E. D. Love. 2011c. "Adaptive reuse of heritage buildings." Structural Survey 29 (5): 411-421.
12. Bullen, P. A., and P. E. D. Love. 2010. "The Rhetoric of Adaptive Reuse or Reality of Demolition: Views from the Field." Cities, 27 (4): 215-224. doi: https://doi.org/10.1016/j.cities.2009.12.005
13. Chileshe, N., F. Fester, and T. C. Haupt. 2005. "Desirable Construction Management Skills in the South African Construction Industry: Methodology for Assessment." In Proceedings of 3rd Postgraduate Conference on Contruction Industry Development, Johannesburg (pp. 9-11).
14. Clark, J. 2013. Adaptive Reuse of Industrial Heritage: Opportunities and Challenges. Melbourne :Heritage Councils of Victoria. Retrieved on 15 March 2018, from http://heritagecouncil.vic.gov.au
15. Cohen, J. 1988. Statistical Power Analysis for The Behavioral Science. 2nd ed. Hillsdale : Erlbaum Associates.
16. Conejos, Sheila, Craig Langston, and Jim Smith. 2011. "Improving the Implementation of Adaptive Reuse Strategies for Historic Buildings." Sustainable Development 52:11. http://epublications.bond.edu.au/sustainable_development/52.
17. Conejos, Sheila, Craig Langston, and Jim Smith. 2013. "AdaptSTAR Model: A Climate-Friendly Strategy to Promote Built Environment Sustainability." Habitat International 37.

https://doi.org/10.1016/j.habitatint.2011.12.003.
18. Fournier, Donald F, and Karen Zimnicki. 2004. "Integrating Sustainable Design Principles into the Adaptive Reuse of Historical Properties," no. May.
19. Ghafar, A., and B. Nurwati. 2003. "Adaptive Re-use for Sustainable Heritage Tourism in Malaysia." Tourism (Zagreb) 51 (2): 205-214.
20. Grammenos, F, and P Russell. 1997. "Building Adaptability: A View from the Future." In Buildings and the Environment. International Conference.
21. Hanafi, Mohd Hanizun, Mohd Umzarulazijo Umar, Arman Abdul Razak, and Zul Zakiyudin Abdul Rashid. 2018. "Essential Entities towards Developing an Adaptive Reuse Model for Organization Management in Conservation of Heritage Buildings in Malaysia." Environment-Behaviour Proceedings Journal 3 (7):265. https://doi.org/10.21834/e-bpj.v3i7.1241.
22. Harun, S. N. 2011. "Heritage Building Conservation in Malaysia: Experience and Challenges." Procedia Engineering 20:41–53. https://doi.org/10.1016/j.proeng.2011.11.137.
23. Hasbollah, Hasif Rafidee Bin. 2015. "A Conceptual Framework for Conserving Heritage Buildings in Malaysia from the Perspective of Facilities Management." International Journal of Economics and Financial Issues 5 (Special Issue):45–51. https://doi.org/10.1108/JFM-06-2013-0031.
24. Heritage Act. 2005. "National Heritage Act 2005 (Act 645)."
25. Hudson, John, and Philip James. 2007. "The Changing Framework for Conservation of the Historic Environment." Structural Survey 25 (3/4):253–64. https://doi.org/10.1108/02630800710772836.
26. Ijla, A., and T. Brostrom. 2015. "The Sustainable Viability of Adaptive Reuse of Historic Buildings: The Experiences of Two World Heritage Old Cities; Bethlehem in Palestine and Visby in Sweden." International Invention Journal of Arts and Social Sciences 2 (4): 52-66.
27. Ismail, I. R. 2015. Sustainable Development: Issues and Challenges Associate in Malaysia. Centre For Global Sustainability Studies (CGSS), USM.
28. Jokilehto, Jukka. 1988. "Conservation Principles And Their Theoretical Background." Durability of Building Materials.
29. Kalaci, E., and S. Dervishi. 2014. "Implementation Challenges to the Adaptive Reuse of a Heritage Building in Tirana, Albania." Paper presented at the Proceedings of the 2nd ICAUD International Conference in Architecture and Urban Design, Epoka University, Tirana, Albania, May 08-10 May.
30. Klein, G. A., R. Calderwood, and D. Macgregor. 1989. "Critical decision method for eliciting knowledge." IEEE Transactions on Systems, Man, And Cybernetics 19 (3): 462-472.
31. Kamal, Kamarul Syahril, Lilawati Ab Wahab, and Ghafar Ahmad. 2008. "Pilot Survey on the Conservation of Historical Buildings in Malaysia," no. Icbedc:104–15. https://doi.org/10.5897/JAERD12.088.
32. Kit, T.E. 2001. National Conservation Legislation in Malaysia. Faculty of Built Environment, University of Malaya, Malaysia.
33. Langston, C., F. K. W. Wong., E. C. M. Hui, and L. Shen. 2008. "Strategic Assessment of Building Adaptive Reuse Opportunities in Hong Kong." Building and Environment 43 (10): 1709-1718.
34. Langston, Craig. 2012. "Validation of the Adaptive Reuse Potential (ARP) Model Using IconCUR." Facilities 30 (3/4):105–23. https://doi.org/10.1108/02632771211202824.
35. Langston, Craig, Francis K.W. Wong, Eddie C.M. Hui, and Li-Yin Shen. 2008. "Strategic Assessment of Building Adaptive Reuse Opportunities in Hong Kong." Building and Environment 43 (10):1709–18. https://doi.org/10.1016/j.buildenv.2007.10.017.
36. Louis, C., M. Lawrence, and M. Keith. 2007. Research Methods in Education. New York: Routledge.
37. Malhotra, M. K., and V. Grover. 1998. "An Assessment of Survey Research in POM: From Constructs to Theory." Journal of Operations Management 16 (4): 407-425.
38. M Feilden, Bernard. 2003. "Conservation of Historic Buildings." Book.
39. Mısırlısoy, D., and K. Gunce. 2016. "Adaptive Reuse Strategies for Heritage Buildings: A Holistic Approach." Sustainable Cities and Society 26: 91-98.
40. Mofidi, S M, A M Moradi, M Akhtarkavan, and H Akhtarkavan. 2008. "Assessing Challenges in Developing Sustainable Adaptation Strategies by Considering Climate Changes."
41. Mohamed, N., and K. Alauddin. 2016. "The Criteria For Decision Making In Adaptive Reuse Towards Sustainable Development." Paper presented at the MATEC Web of Conferences, The 4th International Building Control Conference 2016 (IBCC, 2016), Kuala Lumpur, Malaysia, Mac 7-8.
42. Mohd Umzarulazijo Umar, Mohd Hanizun Hanafi, Normah Abdul Latip. 2015. "Analysis of Non-Destructive Testing of Historic Building Structures." Aust. J. Basic & Appl. Sci 9(7) (April 2015):336–320. http://ajbasweb.com/old/ajbas/2015/April/326-330.pdf.
43. Nepravishta, F. 2015. "Industrial Heritage in Albania and the Opportunities for Regeneration and Adaptive Re-use." Journal of International Academic Research for Multidisciplinary 3(6): 381-391.
44. Osbourn, Derek. 1985. "Introduction to Building." Procedings of the 1982 Winter Simulation Conference Higland CHao Madrigal Editors.
45. Pallant, J. 2013. SPSS Survival Manual. UK: McGraw-Hill Education.
46. Pilowtowiez.G. 1995. Eco-Interior: A Guide to Environmentally Conscious Interior Design. New York. John Wiley & Son Inc.
47. Plevoets, B., and K. Van Cleempoel. 2011. "Adaptive Reuse as a Strategy towards Conservation of Cultural Heritage: A Literature Review." In WIT Transactions on The Built Environment, 118:155–64. WIT Press. https://doi.org/10.2495/STR110131.
48. Rani, Prihatmanti. 2015. "The Impact of Adaptive Reusing Heritage Building as Assessed by the Indoor Air Quality Case Study:UNESCO World Heritage Site Penang." Procedia - Social and Behavioral Sciences 179:297–307. https://doi.org/10.1016/j.sbspro.2015.02.433.
49. Sanchez, B., and C. Haas. 2018. "A Novel Selective Disassembly Sequence Planning Method for Adaptive Reuse of Buildings." Journal of Cleaner Production 183: 998-1010.
50. Schmutz, Vaughn, and Michael Elliott. 2016. "Tourism and Sustainability in the Evaluation of World Heritage Sites, 1980–2010." Sustainability 8 (3):261. https://doi.org/10.3390/su8030261.
51. Shehada, Ziad M.M., Yahaya Bin Ahmad, Naziaty Mohd Yaacob, and Nila Inangda Manyam Keumala. 2015. "Developing Methodology for Adaptive Re-Use: Case Study of Heritage Buildings in Palestine." Archnet-IJAR 9 (2):216–29.
52. Smith, Jim. 2005. "Cost Budgeting in Conservation Management Plans for Heritage Buildings." Structural Survey 23 (2):101–10. https://doi.org/10.1108/02630800510593675.
53. Sodangi, Mahmoud, Mohd Faris Khamdi, Arazi Idrus, Dabo B. Hammad, and Abdullahi Ahmedumar. 2014. "Best Practice Criteria for Sustainable Maintenance Management of Heritage Buildings in Malaysia." In Procedia Engineering, 77:11–19. Elsevier. https://doi.org/10.1016/j.proeng.2014.07.017.
54. Sweden, ICOMOS, Central Board of National Antiquities, Swedish National Commission for UNESCO, and Svenska Unescorådet. 1994. "Information as an Instrument for Protection against War Damages to the Cultural Heritage." Svenska Unescorådets Skriftserie, 0348-8705 ; 4/01994 NV - 21 Cm.
55. UNESCO. 2015. "List of Factors Affecting the Properties." United Nations Educational,