A situational study on sustainable housing features in Johor

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Abstract. Sustainable housing brings an innovation in Malaysia housing industry scene. The trend has witnessed a surge in the demand for this offering by house buyers which in return has encouraged housing developers to incorporate it's features in their products. The features offered by the housing developers varies while customers are encouraged by the noble causes that their purchased will make. As demand for the products increase, errant and irresponsible developers are unreasonably taking the advantage by charging exorbitantly for the product that they market. In this instance, the words "Eco" and "Green" have been used as the gimmick for marketing purposes while there are no evidences that show whether the features have been truly incorporated in the housing products sold to the customers. The situation thus called for a situational study to be carried out, which aim to clarify the situation happening in the housing industry. Accordingly, the objectives of the study are: (1) To identify the sustainable housing features provided by developers to the buyers; and (2) To identify the house occupant's satisfaction with the sustainable features available to them. The research is an exploratory research which seeks to provide data in respond to the situation facing the industry. Therefore, both quantitative and qualitative research strategies will be employed by way of a checklist together with a satisfaction survey focusing on housing projects in Johor. Data for the study will be analyzed by employing descriptive analysis as well as thematic coding analysis. A comprehensive discussion will be offered as the possible outcome of the study. This includes the contentment of house buyers towards the sustainable features that are offered by housing developer and how it can be classified as sustainable housing in virtue of the three pillars of sustainable development.

1. Introduction
Based on the Cambridge English Dictionary, sustainable is defined as into several statements which are "able to be maintained or continued", "lasting for a long time" and "causing little or no damage to the environment and therefore able to continue for a long time". Meanwhile, the Sustainable Development is defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs from the Brundtland Report.

Literally, a sustainable definition is developed from an easy definition to an application definition and it is important for us to understand this meaning inwardly. This is because there is a misapprehension of sustainable occur by many parties, especially the stakeholders and the homebuyers and cause the sustainable development goals cannot be achieved. Due to the misconception of sustainable application, it causes the sustainable responsibility approach to become ineffective effort by

the stakeholders. In fact, it poses another new problem to the sustainable construction application, in terms of the creation of a new product named as "Sustainable House".

Sustainable house is the new product that initiated from the integration of the sustainability, construction industry as well as the housing industry. For decades, the conventional method of building houses has standing firm in Malaysia. Then, by introducing this new housing products, there are a lot of changes in various angles that need to be considered such as the innovation of technology, human aspects, financial and resources. Moreover, the transition from conventional into sustainable approach will consume time as it requires changes from different facet in the industry ranging from individual, organizational to industry level [6]. [17] also highlighted that some of sustainable materials and technology used in a sustainable house cannot be obtained in Malaysia despite the sustainable housing development has been promoted by the government. Here it is the reason why the price of a sustainable house is expensive compared to conventional house.

Although this product is still in its commencement stage in Malaysia, the demand from the consumer is quite encouraging which makes the developers racing with each other to build this sustainable housing. It is proved from the result of a study by [3] which showed that Malaysian home buyers are willing to pay a premium to have the sustainable features included in their homes.

So, the initiatives towards the implementation of this new product by the developers are seen clearly with the existence of sustainable housing project consisting of various housing schemes. For instance, it was found that the private housing developers supported the sustainable development policy in Iskandar Malaysia [21]. The secrets behind all these initiatives are because the developers will follow the market demands as they are the profit digger. Furthermore, the developers are looking at this opportunity as a new profitable investment and if this opportunity is released, they will lose in this racing game.

The issue that arises was the developers may take advantage from sustainable housing promotion by charging exorbitant rate to buyers, whereas the sustainable features do not meet the requirements of sustainability. Therefore, this research attempt to find the balance of what has been offered by developer and what are the true features that can be accepted by house buyers. The approach taken in this research is by identifying the sustainable housing features as claimed to be provided by the developers and comparing it with the level of satisfaction of house buyers/ occupant of so-called sustainable housing.

2. Literature review

2.1 Sustainable housing

House is a basic need for human as it acts as the shelter, protection and comfort for the user. It becomes an essential necessity for the human because of its important function to retain human well- being. Eventually, nowadays, the function of the house has become a simultaneous source of wealth, asset, luxury and investment property. This is due to the demand by the consumers. There is a statement by Dr. B Edgerton which is, "houses are being valued as speculative assets, not as homes for Australians anymore" [10].

The housing industry is one of the crucial sectors of construction industry. This is because the housing sector involves the construction works to build various kinds of house like condominium, terrace house, bungalow, flat and others. The Malaysian construction industry has started to apply the green technology on the housing industry in Malaysia to diffuse the sustainability concept in house. There are green movements that has been done by the government to promote the concept of sustainable construction in the Malaysian housing industry. This movement is in line with the second strategic thrusts of Construction Industry Transformation Programme (CITP), which is Environmental Sustainability also with the sixth strategic thrusts of 11th Malaysian Plan, which is to pursuing green growth for sustainability and resilience. Therefore, the sustainable housing is the new approach by the government and developers to promote the sustainable awareness and practices to the house users.

[18] defined sustainable housing as 'energy efficient' or 'low carbon' housing. Not only that, [21] defined sustainable building as a structure that is designed, built, renovated, operated or reused in a resource-efficient manner; in a way that will not compromise the health of the environment or the well-being of the building's occupants, construction workers, the public or future generations. The same idea also has been outlined by [19] who claimed that sustainable housing is characterized as available (sufficient offer and information on such offers), quality (from the technical and provision point of view), economical (greater number of households have opportunities to purchase it and cover the exploitation expenses), ecological (energy saving, etc.), comfortable and cosy (from the social-psychological point of view). These sustainable housing definitions are initiated from different practitioners which are based on their vantage points but meaning of the sustainable housing must be based on the triple bottom line framework which is claimed by [4]. As a result, sustainability in the context of housing development is a complex, controversial, and challenging phenomena [4].

2.2 Sustainable features
According to [9], characteristic is a particular feature that use to differentiate the sustainable housing projects from others. In essence, [34] defined the sustainable features as the features that supplies to occupants' health, safety and facilities over the life of the house. The word of sustainable feature can be clarified as "sustainable characteristics" and "sustainable criteria" because there is no standardized term to convey the nature of the sustainable house itself.
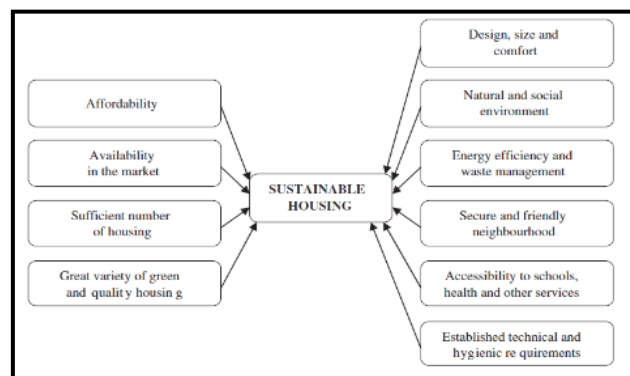

Figure 1. Criteria characterising sustainable housing [19].

The key features as identified from review of literature are given in Table 1 below:

Table 1. List of sustainable features

Economy Sustainable Features	Environment Sustainable Features	Social Sustainable Features
1. Solar Panels (Trivess et al, 2018)	11. Thermal Comfort (Trivess et al, 20180	18. Public Transport Facilities (Turrent, 2000)
2. LED Lightings (Kim et al, 2016)	12. Daylighting (Chakraborty, 2019)	19. Pedestrian Friendly Street (Fadala et, 2018)
3. Motion Sensor (Colistra, 2019)	13. Acoustical Environment (OC & Ogonsemi, 2019)	20. Playground (Santy, 2012)
4. Occupancy Sensor (Colistra, 2019)		21. Schools (Gilderbloom et al, 2015)
5. Light Sensor (Colistra, 2019)		22. Medical Centre (Mohit & Ali, 2015)

6. Rainwater Harvesting System (Wong et al, 2018))	14. Natural Ventilation (Edwards,2000)	23. Sport Facilities (Abdul Ghani & Lee, 2015)
7. Greywater System (Byrne et al, 2016)	15. Landscaping (Prochorskaite et al, 2016)	24. Community Space (Oliviera & Marco, 2018).
8. Dual Flush Toilet (Ahmad, 2016)	16. Green Roof (Radaei, 2015)	25. Vehicular Circulation (Rossi, 2016)
9. Faucet Aerator (Akason et al, 2017)	17. Garbage & Recycling Bin (Xia et, 2015)	26. Communal Parking Areas (Bertram et al, 2015)
10. Shopping Facilities (Akindele, 2018)		27. Speed Limit (Frilund, 2017)
		28. ICT Infrastructure (Yeon et al, 2017)
		29. Gated & Guarded Community (Abdullah et al, 2019)

3. Research methodology

3.1 Checklist

A checklist of sustainable features will be developed by the researcher based on the three pillars of sustainable development definition that has been discussed in the literature review which are the context of Economy, Environment and Social. Then, the overall total of the sustainable features that has been discovered by the researcher in the literature review is 29 features. From the checklist in Table 1, the researcher can observe whether there is or is not sustainable features that developers had provided in the sustainable house.

3.2 Questionnaire Survey Form

Survey method was adopted to learn the magnitude of which sustainable features that achieve the satisfaction of house occupants. The method of data needs to be selected first as it affects the quality and the cost of data, also prevent the bias of the interviewer. The variables were derived from the literature review which helps in identifying the house occupants' satisfaction towards the sustainable features that supposedly install in their house.

3.3 Population and Sampling

The population for this research is the house occupants who lived in the sustainable house residential in Johor. Meanwhile, the targeted population is the house occupants who are truly understand about sustainable house concepts. Furthermore, the criteria of the respondents can protect the accuracy of the data.

In terms of location, the survey population of the research is within Johor. Johor was ranked top in the list of housing accommodation business compared to other states in Malaysia [23]. Plus, there are massive sustainable housing development in this state and it was proven by the analysis of categorized location in [21] based on the flagship of Iskandar Johor as shown in Table 2:

Table 2. Location of sustainable housing in Iskandar Malaysia in 2012

Flagship	No. of Development
Johor Bahru City	14
Pasir Gudang and Tanjung Langsat	4

Senai – Kulai	4
Skudai	3
Nusajaya	6
Total	31

3.4 Method of data analysis

To learn the magnitude of which sustainable features can achieve the satisfaction of the house buyers, a questionnaire survey was conducted among construction developers in Johor focusing on their understanding on this subject matter. This survey focused on five sustainable housing development which developed by the developers. The data collected was analysed quantitatively and SPSS software was used to analyse the data.

After the data has been collected, all the values are added and divided by the total number of values, then the mean has been computed. To have an accurate result in a systematic way, the data analysis tools that available in SPSS will be used. Then, variables of total mean of sustainable features and the variables of house occupants' satisfaction with the sustainable features will be computed to form the Importance-Performance Analysis (IPA) grid. Fundamentally, IPA combines measures of attribute importance and performance into a two-dimensional grid to simplify the data interpretation [12].
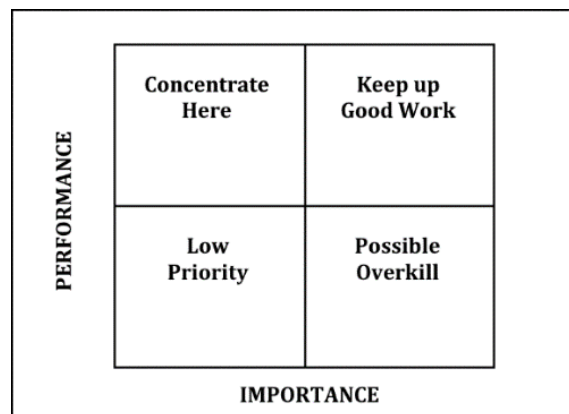
Figure 2. Importance - Performance Analysis Grid [13].

For the checklist instrument, the data will be analyzed using Thematic Coding Analysis. Thematic analysis is a method for identifying, analyzing, organizing, describing and reporting themes found within the data set [32]. Meanwhile, the thematic coding is the strategy of data reduction which the data are segmented and categorized through the inclusion of analytic insights and inquiries [11].

Utilizing the NVivo to facilitate the thematic analysis is ultimately helpful in organizing and managing the data in this research. On top of that, model will be developed based on the several reasons that has been stated by the developer's representative regarding on the absence of the sustainable features. By having a model, the reasons can be connected to each other and it enhances the ideas to be a simplified diagram which is a mind map.

4. Result and discussion

4.1 Checklist of sustainable features that provided by developer

A total of 5 selected developers have responded to the checklist survey and these developers have been active in the sustainable housing industry. Based on the Figure 4, UM Land is the first ranked among the developers as UM Land can fulfil the checklist by having a total of 29 sustainable features too in their sustainable residential. This is followed by Johor Land, Mah Sing and SP Setia that does not

provide 2-9 sustainable features to the house occupants. Meanwhile, the UDA Land is placed on the last ranked as UDA Land only can provide 16 out of 28 sustainable features to the house occupants.
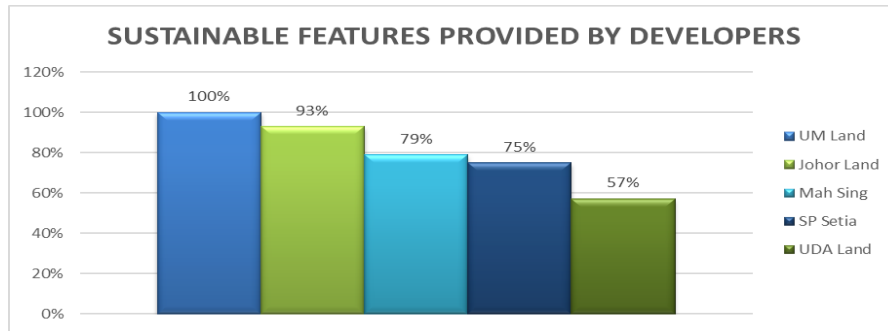
Figure 3. Sustainable features provided by developer satisfactions of house occupants towards sustainable feature.
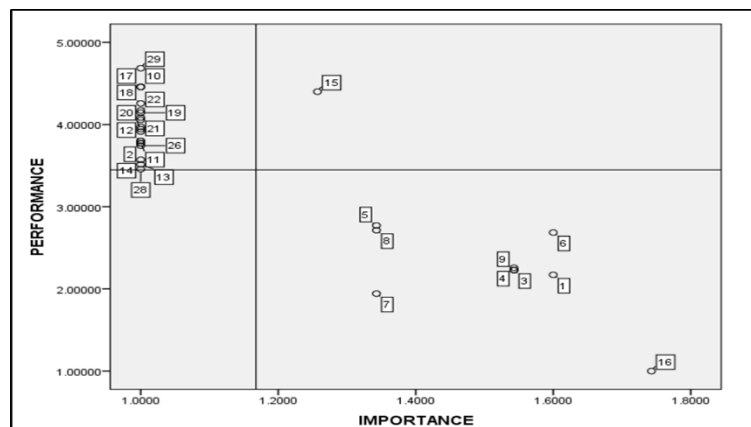

Figure 4. Performance-Importance analysis graph quadrant.

From the findings, we can see that the sustainable features that are the most important and performance as compared to other sustainable features is Landscaping [15]. It implies that the developers pay more attention and gives the best performance to the landscaping itself. As we know, the sustainable concepts are often associated with green environment by the developers, whereas there are more sustainable features that need to be focused on like the Economy and Social sustainable features.

When the developers put more priority on landscaping, the house occupants also will be more concerned about the environment as they will think that their house is not sustainable enough if the landscaping is not good. Hence, the developers need to balance and sustain the performance of all these types of sustainable features so that the shallow perception of the sustainable concept by society can be changed.

The least important and performed sustainable feature is ICT infrastructure [28]. As we discussed before, the examples of ICT infrastructure are the internet of things, Wi-Fi facility, video surveillance through CCTV system and emergency management. After the survey distributed to the house occupants, it can be seen that the example of ICT infrastructure that provided by developer is CCTV system. They claimed that the CCTV system is not so important as the sustainable housing is equipped with gated and guarded community. What they expect more by the developer is to have the internet of things and Wi-Fi facility so they can have the internet access around the sustainable housing development.

4.2 Comparison of the availability of the sustainable features
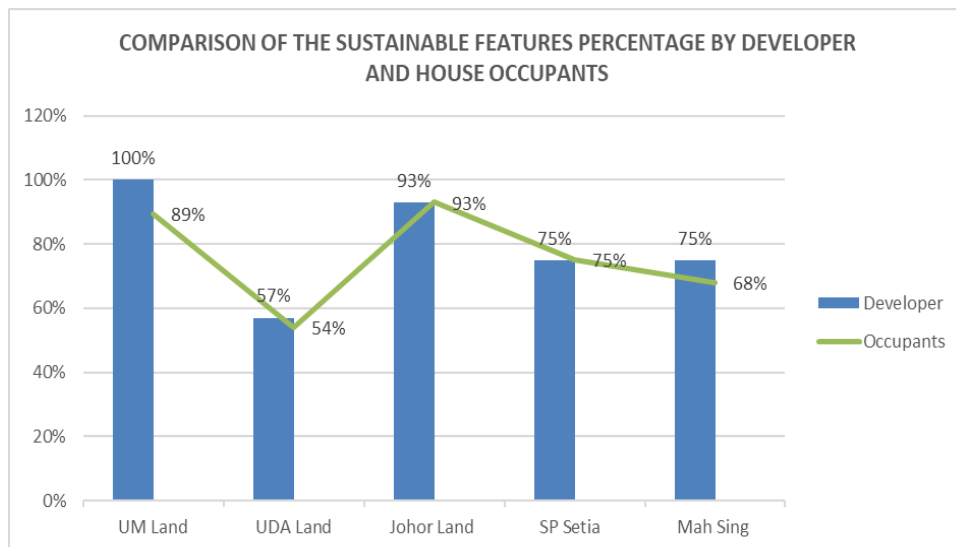
Figure 5. Comparison of the sustainable features percentage by developer and house occupants.

Based on the analysis, a graph has been developed to compare the percentage reading of the sustainable features from both sides. Based on Figure 35, it can be seen that the Johor Land and SP Setia have an equal percentage reading with the occupant's side. From the equal percentage, it can be concluded that the occupants from Johor Land and SP Setia received the same sustainable features that has been offered by the developer. However, there are also some developers who does not gained the percentage reading coincide with the house occupants. Developers that meant here is UM Land, UDA Land and Mah Sing. The unbalanced percentage reading from those developers shown that there are unfairness issue developers to the occupants as they did not pay their pledge to provide sustainable features offered to the home buyers and occupants.

Based on the analysis, there are three developers which do not deliver the sustainable housing development properly. The features that are not provided by those developers are Faucet Aerator, Dual Flush Toilet, Rainwater Harvesting System, Solar Panels and Green Roof. It can be seen that the delivery of those features had not been fulfilled as these features are relatively new feature of sustainable development in Malaysia. Unsuccessful delivery of some sustainable features that should be provided to the house occupants illustrates the fact that some developers have overlooked this matter which can be considered as un-fulfilment of the contract conditions.

This practice causes housing occupants not being able to enjoy a home that is worth the cost they have invested in. This matter has also retarded the growth of sustainable house and at the same time exacerbates the image of sustainable development in Malaysia. In a nutshell, the developers need to realize these mistakes and rectify this problem by providing an honest service to the house occupants in delivering sustainable housing development.

5. Conclusion
The results of this study will contribute to the awareness of the house buyers on the importance of sustainable features in their sustainable house. Besides, this study also identifies the sustainable features that supposedly available in their house and provided by the developer. Moreover, the correct implementation of sustainable housing in Johor is almost negligible by the local or foreign developer. To improve the delivery of sustainable housing implementation in Johor, this study needs supreme involvement and constructive interaction from the demand side which is the house buyers, also with the supply side, which is the developer too.

References
[1]   AL Fadala, E Saleh, F Raffaello (2018), Sustainable Neighborhoods in the State of Qatar: Msheireb Downtown Doha, http://dx.doi.org/10.21276/sjeat.2018.3.7.2

[2]   Abdul Ghani, S. and Lee, Y.F. (2015) Exploring the Perception Of Lifestyle Housing Development In Malaysia. In: The Asia Pacific Network for Housing Research (APNHR) 2015., 09 - 12 April 2015, Asia Cultural Complex, Gwangju, South Korea.

[3]   A. Syahid et al. (2016). Sustainability or Burst: Malaysian Home Buyers' Stated Preferences for Sus-Tainable Housing. MATEC Web of Conference 68 (pp. 1-5). Kuala Lumpur: EDP Sciences.

[4]   A H Kadir Pakir, A A Tabassi, M Ramli, A HAbu Bakar & K M Roufechaei (2012). Sustainable Housing Development and Leadership: A Review, Australian Journal of Basic and Applied Sciences, 385-395.

[5]   A Prochorskaite, C Couch, N Malys & V Malien (2016), Housing Stakeholder Preferences for the "Soft" Features of Sustainable and Healthy Housing Design in the UK,   Int. J. Environ. Res. Public Health, 13(1), 111; https://doi.org/10.3390/ijerph13010111

[6]   A Z Zainudin et al. (2012). Housing Developers' Initiative in Supporting Sustainable Housing Development in Iskandar Malaysia. International Journal of Real Estate Studies, Volume 7, Number 1, 25-29.

[7]   A L Yeon, N A Basarudin, Z Mohamed Yusof, N H Md Dahlan, N Mahdzir (2017) Preservation of Green Environment in Smart Home Project: Formulation of Sustainable Legal Framework, 4th International Conference on e-Commerce

[8]   B Xia, J Zuo, M Skitmore, Q Chen & A Rarasati (2014), Sustainable retirement village for older people: a case study in Brisbane, Australia, Pages 149-158, https://doi.org/10.3846/1648715X.2015.1029564

[9]   Chau et al. (2015). An Insight of Sustainable Housing in Malaysia. ICUPD (pp. 1-9). Tehran, Iran: Universiti Tun Hussein Onn Malaysia.

[10] Commonwealth of Australia. (2008). Select Committee on Housing Affordability in Australia. Canberra: Parliament House.

[11] Given, L. (2008). Thematic Coding and Analysis. The SAGE Encyclopedia of Qualitative Research Methods, 868.

[12] H Oh. (2001). Revisiting Importance–Performance Analysis. Tourism Management, 617- 627.

[13] H Sihombing et al. (2012). Revisited The Importance and Performance Analysis (IPA) and Kano Model for Customer Satisfaction Measurement. Global Engineers & Technologists Review, Vol. 2 No. 1, 22-35.

[14] J Colistra (2019), Innovations in Housing for Smart Cities, Journal of Architectural Engineering, Volume 25 Issue 4

[15] J I Gilderbloom, W W Riggs & W L Meares, (2015), Does Walkability Matter? An Examination of Walkability's Impact on Housing Values, Foreclosures And Crime, Cities, Volume 42, Part A, Pages 13-24, https://doi.org/10.1016/j.cities.2014.08.001

[16] J Byrne, C Eon & P Newman (2016) , Sustainability Tools and Frameworks for High Performance Housing.

[17] Kai et al., (2013). Challenges of Implementing Sustainability in Malaysian housing Industry. The International Conference on Sustainable Built Environment for Now and the Future (pp.   153-158). Hanoi: Universiti Tun Hussein Onn Malaysia, Batu Pahat, Malaysia

[18]   Lovell, H. (2004). Framing sustainable housing as a solution to climate change. Journal of Environmental Policy & Planning Volume 6, 35-55.

[19]   N Maliene & V Malys. (2009). High Quality Housing - A Key Issue in Delivering Sustainable Communities. Building and Environment, 426-430.

[20]   M Chakraborty (2019), Passive Design Strategies for Affordable Housing in Indian Tropical Region, Book Chapter No 12- Greening Affordable Housing: An Interactive Approach- edited by Abdullateef Olanrewaju, Zalina Shari & Zhonghua Guo, CRC Press, Taylor & Francis Group

[21]   M Jamaludin et al. (2008). Towards the Implementation of Sustainable Housing in Malaysia: Awareness and Readiness Assessment Framework. 2nd International Conference on Built Environment in Developing Countries (pp. 1259-1277). Penang, Malaysia: Universiti Sains Malaysia.

[22]   M Abdul Mohit, M S Ali, (2016), Neighbourhood Satisfaction and Qoul In Middle-Income Housing In Kuala Lumpur City, Malaysia, DOI: http://dx.doi.org/10.21837/pmjournal.v14.i5.185

[23]   NAPIC. (2008, 10 12). Summary of New Launches. Retrieved from http://www.jpph.gov.my.

[24]   N Zainul Abidin. (2012). A Foresight into Green Housing Industry in Malaysia. International Journal of Environmental, Chemical, Ecological, Geological and Geophysical Engineering, 373-381.

[25]   N Bertram, C Murphy, B Meyer, D Rowe (2015), Design Research Towards Improving Liveability and Sustainability in Medium Density Infill Housing in South East Queensland, State of Australian Cities Conference 2015, Monash University

[26]   C M Rossi, "A Floating Community: a 'Platform' for Future Sustainable Development" (2016). Architecture Theses. Paper 108. http://docs.rwu.edu/archthese/108

[27]   S Dean, C Kyle, T Ron, (2016), Garden Cities, Sterling Ranch and Sustainable Urban Development In The American West, Journal of Urban Regeneration & Renewal, Volume 9, Number 2, Winter, 2015-16, pp. 172-180(9), Henry Stewart Publications

[28]   S Y Wong et al. (2018). Improving Information Gathering and Distribution on Sustainability Features In The Australian Residential Property Market. Journal of Cleaner Production, 342-352.

[29]   S Oliveira & E Marco (2018), Role of 'Community Spaces' in Residents' Adaptation toEnergy-Efficient Heating Technologies—Insights from a UK Low-Energy Housing Development, Sustainability 2018, 10(4), 934; https://doi.org/10.3390/su10040934

[30]   S F Ahmad (2016), Techniques for Improving Lives by Green Low-Income Housing, Fourth International Conference on Sustainable Construction Materials and Technologies, http://www.claisse.info/Proceedings.htm

[31]   T Moorea, L Nicholls, Y Strengers, C Maller & R Horne (2017), Benefits and challenges of energy efficient social housing, Energy Procedia 121, page 300–307

[32]   V Braun & V Clarke. (2006). Using Thematic Analysis in Psychology. Qualitative Research in Psychology, 1-41.

[33]   Y Kim, A K Prakash, M Matossian, Y Xu & S Zhu (2016), Sustainable Housing Futures at Carnegie Mellon University- Final Project. (https://www.andrew.cmu.edu/user/anandkrp/assets/reports/SustainableBuildingsFinalReport.pdf)

[34]   W S Yee & S Connie (2018) Your Green Guide – Residential Real Estate 2018. PRD Nationwide, Brisbane, Qld, Australia.