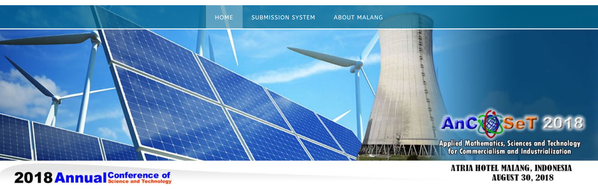

2018 Annual Conference of Science and Technology

ATRIA HOTEL MALANG, INDONESIA
AUGUST 30, 2018

The Proceeding of Annual Conference of Science and Technology 2018 is already available in IOP Journal of Physics: Conference Series Digital Library

Dear colleagues,

We are happy to inform you that the Proceeding of Annual Conference of Science and Technology 2018 is already available in IOP Journal of Physics: Conference Series Digital Library, and you can access it by clicking this Link:

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This proceeding is now in the middle of indexing process to SCOPUS by the publisher (IOP). We really hope that this process will be fast.

Thank you and have a great day.

Regards,

Invited Speakers

Selected papers will be published in Internationally indexed publishers i.e, Scopus and Thomson Reuters. All articles published will get Digital Object Identifier (DOI).

Background

One way to accomplish its internationalization programs, Universitas Kanjuruhan Malang hosts international conferences with prominent speakers. Its first conference, Universitas Kanjuruhan International Conference on Education and Social Sciences (UK-ICESS), was held on November 9-10, 2016. This conference was attended by lecturers, researchers, and practitioners within the fields of education and social sciences across Indonesia and overseas. Universitas Kanjuruhan Malang also hosted Annual Conference on Social Sciences and Humanities (ANCOSH) on April 24, 2018 with its thought-provoking theme "Revitalization of Local Wisdom in Global and Competitive Era". The upcoming conference is Annual Conference on Science and Technology (ANCOSET) that will be held on August 30, 2018 with the theme "Applied Mathematics, Science, and Technology for Commercialization and Industrialization". This conference offers a forum for intellectual propositions and academic discussions on how science and technology could result in social prosperity through commercialization and industrialization. Therefore, this conference welcomes researchers, scientists, engineers, practitioners, lecturers, and students to share and to discuss their insightful and innovative ideas on applied mathematics, science and technology.

Conference Scope

1. Mathematics
2. Physics
3. Computer Science
4. Material Science
5. Chemistry
6. Biology
7. Pharmacology
8. Sport Science and Technology
9. Management Science
10. Mechanical Engineering
11. Chemical Engineering
12. Civil Engineering
13. Electrical Engineering
14. Electronics Engineering
15. Material Engineering
16. Environmental Engineering
17. Industry Engineering
18. Information Engineering
19. Computer and Communication Engineering
20. Architecture

Venue and Activities

Atria Hotel & Conference Malang
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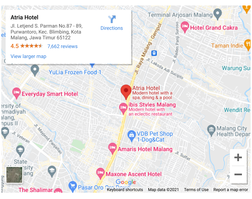

Important Dates

- Abstract Submission Deadline: ~~**30 June 2018**~~, Extended to **16 July 2018**
- Notification of Abstract Acceptance: ~~**13 July 2018**~~, Extended to **23 July 2018**
- Payment Deadline: **15 August 2018**
- Full paper submission Deadline: **29 August 2018**
- Coaching Clinic: **29 August 2018**
- Conference Date: **30 August 2018**

Publication

Publication: **Indexed by:**

Full papers submitted to the conference will be peer reviewed. Authors are requested to submit abstract to the Organizing Committee by **July 16, 2018**. The abstract is maximum 200 words and should consist of the following: aim of study, method used, result, and implication. The papers should be written in English and must be between 4 to 8 pages.

Abstract and Paper Submission

(**IMPORTANT**) To submit an abstract, authors must register first (click here). Then they can submit their abstracts by logging in to this site (menu "Submission System" then "Login"). The manuscript (full paper) can be submitted only after authors submit their abstracts. The whole submission process is done fully online (**NOT by email**) to guarantee smooth administration. Letter of Acceptance (LoA) and Letter of Invitation (LoI) can be downloaded directly from your account once your abstract is accepted to be presented at the conference.

Registration Fee and Payment

- Indonesian Presenter: **IDR. 2,250,000/presenter**
- Indonesian Participant: **IDR. 1,000,000**
- International Presenter and participant: **USD. 300/presenter**

Please do bank transfer for the registration fee to:

- Bank Name: **Bank Negara Indonesia, Branch Malang, Indonesia**
- Swift/ BIC: **BNINIDJAMLG**
- Account Number: **0100403813**
- Account Holder: **Ati Retno Sari**

(**IMPORTANT**) After making the payment, author **MUST** upload the transfer proof via this website (**NOT Email**). Author can upload by logging in to our submission system. Payment receipt can be downloaded directly from your account once your payment is confirmed by the committee.

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Preface

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Preface

One of factors that influences the growth of industry is the rapid and advanced enhancement of research on science and technology. There is a wealth of opportunities for science in industry, government, and in areas of applied science. This conference offers a forum for intellectual propositions and academic discussions on how science and technology could result in social prosperity through commercialization and industrialization.

Annual Conference of Science and Technology (Ancoset) was held by Universitas Kanjuruhan Malang. The conference aimed at showcasing the latest technological research and providing a forum in which to discuss insightful and innovative ideas on mathematics and science practice as well as facilitating debate, networking and professional development opportunities. The conference was conducted in Malang, Indonesia on August, 30th, 2018, and attended by more than 150 participants from mathematics, science and technology enthusiasts.

Five experts from Australia, Thailand, Malaysia and Indonesia contributed to give their knowledge and experiences on relevant themes. Audience came from several countries such as Indonesia, Malaysia and Australia. More than 130 papers were presented in the conference. With respect to more than 100 papers selected. The Ancoset committee herewith would congratulate the authors whose papers were published in this conference series. The committee hopes that all the findings and knowledge shared in this venture give beneficial impacts on the quality of mathematics and science.

The Editors
Dr. Ade Gafar Abdullah
Dr. Asep Bayu Dani Nandiyanto
Dr. Enike Dwi Kusumawati, S.Pt., M.P.
Riza Weganofa, M.Pd

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The millennials' perceived behavioural control on an eco-friendly house purchase intention

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Abstract. The millennial generation has an important role in actualizing environmentally friendly residence. Referring to the behavioural theory, a consumer's Perceived Behavioural Control (PBC) is one of purchase intention antecedents. Studies revealing the millennials' control behaviour on purchasing an eco-friendly house, especially in Indonesia, are still limited. Moreover, environmentally friendly housing is still new to prospective house buyers in Indonesia; so, how to control their behaviour toward purchasing behaviour or willingness to pay has not been clearly known. Therefore, this study is conducted to explore the millennial generation's PBC on an eco-friendly house purchase intention. This is a qualitative research with a phenomenological approach focusing on observing the perceived behavioural control phenomenon of prospective house buyers. The data was collected through a semi-structured in-depth interview with nine prospective house buyers in Surabaya, East Java. This research found that the themes of millennial house buyers perceived behavioural control toward an eco-friendly house purchase intention were 'perceived difficulty' and 'perceived benefit'. The finding implies that housing developers and government should provide convenience to develop eco-friendly houses and be consistent to complete the buildings with facilities; the facilities will especially support the millennial costumers' sustainable living and the sustainable development in Indonesia.

1. Introduction

The natural resources depletion and environment deterioration are the result of increased goods and services consumption. This has been going on for the last few decades and has shown impacts on environmental pollution, global warming and decline in flora and fauna ecosystems [1]. Therefore, public awareness and concern for the environment promote the emergence of a 'sustainable development' movement encouraging various environmental innovations and green consumption. Green innovation focuses on combining environmental sustainability practices at each stage of the goods and services creation [2], whereas green consumption is related to the environmentally responsible consumption; in other words, consumers consider the environmental impact of purchasing, using, and decomposing various products and various green services [3].

One of the contributing factors to global warming is the use of energy in building construction. Therefore, it is necessary to apply the concept of sustainable development in the building construction industry, which is known as the 'Green Building' concept. The green building aims to reduce and eliminate negative impacts on the environment by improving unsustainable building quality in terms of

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planning and implementing the design, construction, and operational practices; which ultimately results in eco-friendly housing of homes, apartments and condominiums [2].

In Indonesia, eco-friendly housing is being offered to the community since there are many houses and settlements that have exceeded the carrying capacity [4]. These days, eco-friendly houses emerge as a new trend because most Indonesian consumers have different perspectives when dealing with choices to consume green products or the products that are environmentally friendly. Some of the consumers have the same awareness and goals to save the environment. On the contrary, a part of them is influenced by the culture of only buying the best products [5].

Environmentally responsible purchases are very important because unplanned goods purchases can seriously damage the environment. According to Hong [6], consumers' household purchase is responsible for 40% of environmental damage. Consumers have the ability to prevent or reduce environmental damage by buying green products. Consumers act as an important factor in successful marketing and development of the eco-friendly housing; and there are various factors influencing their behaviour, which includes determining the behavioral intention in purchasing an eco-friendly house.

The theory most often used to determine consumers' behavioural intention in purchasing environmentally friendly products is the Theory of Planned Behavior (TPB) [7]. There are three main factors in TPB that influence the prediction of behavioural intention: attitude, normative belief, and perceived behavioural control. In a number of previous studies, researchers have tested TPB's ability by using a quantitative method, both to test the relationship between parts or all of the factors and even to add other variables to predict consumers' intention and buying behaviour towards environmentally friendly products [8–10]. Although these studies aim to improve the ability to use TPB on green purchasing behaviour, a personal study of each consumer is still needed to support and enrich the research on green purchases. Therefore, it is necessary to conduct a research to find out a valid measure of consumers' perceived behaviour control in terms of green purchase intention, so that it can deepen the consumers' understanding of the relationship between green, healthy and socio-economic buying behaviour along with the variations influencing consumers' confidence in green purchases, as well as to find out the method to increase that intention.

This research focuses on the millennial generation, because according to a research conducted by Schmeltz [11], this generation shows more concern for, pays more attention to and has a positive attitude towards saving the environment. Millennials also have better knowledge of the environment than the previous generations, because they have been taught since they were children [12]. Therefore, it is expected that in the future they will be able to give a better impact by bringing forth new rules that support sustainable development. However, a research conducted by Hume [13] reveals that although they have a positive attitude towards the environment, it does not affect their actions in buying environmentally friendly products.

Based on the results of the previous studies, further studies on the phenomenon of the millennial generation and their perceived behavioural control towards an eco-friendly house purchase intention are needed. Therefore, this research's objective is to explore and investigate the millennial generation's perceived behavioural control on an eco-friendly house purchase intention. Furthermore, this study respectively explains the theory, the research methods, the results and discussion as well as the implications of the research results.

2. Literature review

2.1. Perceived behavioural control

Perceived behavioural control is one of three behavioural intention antecedents in the TPB beside attitude and subjective norm. Perceived behavioural control describes an individual's perception of the simplicity or adversity of executing the behaviour [7]. Perceived behavioural control is constructed with control beliefs which represent the personal evaluation of the existence or the availability of behaviour's facilitators and inhibitors (time, money and skills); and the perceived power is defined as the personal assessment of the simplification or obstruction of the particular behaviour [7].

Ajzen [7] stated that the availability of particular product and price has become the main contribution for the difficulty perception of an individual to conduct the given behaviour. Smith and Paladina [14] that the main factor influencing consumers' decisions to purchase green products is price. In addition, a study conducted by Michaelidou and Hassan [15] in the UK shows that Perceived Behavioural Control was measured by the availability of green products for consumers so they have intention to buy them. The above researches were carried out in developed countries with green products as objects so the research in developing countries is needed specifically for eco-friendly house. Thus, availability and price have the possibility to restrict, to impede and to potentially limit or even to prevent the individual from behaving in the context of green products purchase behaviour.

2.2. Eco-friendly house in Indonesia

An eco-friendly house is a wise choice in land use; it is efficient and effective in energy and water usage. Its materials adhere to the conservation of natural resources; it is also healthy and safe for the house occupants. The green residence's treatment and safety are also essential since the sustainability of an eco-friendly residence must be accompanied by its inhabitants' eco-friendly behaviour. Understanding the concept of an eco-friendly residence is the main factor that should be prioritized in order to avoid a misunderstood idea asserting that an environmentally friendly house is a residence requiring high maintenance costs or just having a lot of green land [16].

House buyers in Indonesia are now starting to realize the serious impact of environmental damage due to the environment's quality decline such as the danger of flooding. Therefore, they are seeking houses in an environment with "green" housing projects [17]. According to Raspati [18], the green housing property concept is equipped with a green open space and complete facilities such as markets, shopping malls, hospital, school, sports venues and others. An eco-friendly house concept with a green open space has finally turned into a trend for housing developers, although it is not fully 'green' yet. They emphasize only on green landscapes and have not prioritized the problem on waste management, water, and energy efficiency [18]. However, the concept of an eco-friendly house is still in an early stage for house buyers in Indonesia. Moreover, there have not been many researches that discuss behavioural intention toward an eco-friendly house in Indonesia and study the prospective house buyers' reason or background when deciding to purchase a house.

2.3. Millennial generation

These days, rapid technological development can easily lead the millennial generation to consume and to buy the desired products. The typical characteristics of millennial generation influence their buying behaviour [12]; therefore, they are assured that most of their activities bring negative impacts on global climate change, and this ultimately encourages them to buy environmentally friendly products. Consumer market analysts have even estimated that the millennial generation has greater purchasing power than the previous generations [12].

Global demography always plays an important role in economic growth. Now is the time when the millennial generation as the majority has entered the workforce. Their income is relatively high and grows rapidly. This is determining the desirability of the present and future generations' characteristics; thus, it increasingly affects business and economic markets.

This generation is also projected to take over 39% of Indonesia's population or about 110 million of 285 million in 2025 [19]. Thus, this study uses the millennial generation as the subject of research because most of the people in this era are from their generation, and they have the control over internet use. In the future, this generation is also believed to be very influential in determining trends of products and services use, especially since we have entered the digital era. With the digital technology, the millennials are very active in using social media and online media to interact with their chosen brands. However, from the surveys' results in developing countries, 83% of the millennial generation will not be interested in using products and services if the producers cannot provide the best experience for them [20].

3. Materials and method

The qualitative method is employed in this study because it can reveal a new understanding based on an existing phenomenon. According to Creswell [21], a qualitative research explores the informants' views about a specific phenomenon. This research is expected to explore the informants' experiences in order to understand the perceived behavioural control of the millennial generation prospective house buyers. The prospective house buyers' point of view was used in order to obtain new discoveries and information that would contribute to science. A qualitative research provides an understanding of problems that might be overlooked by a quantitative study [22].

Moreover, this study works with Schutz's phenomenological approach since the research subjects were the individuals engaging in social interaction. Schutz's phenomenological approach perceives that one's social action reflects his past experience, and that one's action is not only based on an individual's inner influence; it also involves the others' influence as well as the socio-culture around the person [21].

The informants were selected from prospective house buyers visiting the marketing offices of nine housing development regions in Surabaya that promoted their "green" area. The informants were selected by purposive sampling method based on their birth years (1980-2000). A person from each housing area was selected so that there were 9 key informants in total. Demographically, there were five males and four female informants; and their education levels ranged from senior high school to bachelor degree.

The research instrument was in the form of questions used as a guideline for the researchers to gain the required information. This study utilized general questions in order to get broad answers from the informants. The instrument was not only used to get direct answers from informants, but it was also used as a guideline for the researchers to focus on the observation and to avoid unnecessary expansion. The informants gave their answers orally; the information was recorded and used as the data to be processed.

The interview responses were transcribed, interpreted, encoded, and analysed to obtain the theme. The validity process was conducted in order to validate the data. The data was compared to the available literatures, researchers' notes and observation results during the research; it was also compared to other data [23]. The process of data triangulation was conducted by comparing notes, photos and videos made during the process of data retrieval. Then, the next triangulation process was conducted by randomly re-interviewing five different informants to make sure whether their answers were the same as their previous ones. The results showed no significant difference.

4. Results and discussion

The results of the in-depth interviews with informants, supporting data analysis, and literature studies were processed using qualitative data processing methods. The data obtained were encoded to look for similarities and summarized in sub-theme. Finally, the researchers found two major themes related to the millennials' Perceived Behavioral Control (PBC) towards the eco-friendly house buying intention; both of the millennial's PBC themes are discussed in the following details.

4.1. Perceived difficulty

The millennial generation's perceived behavioral control toward an eco-friendly house purchase intention was explained in their difficulty to buy and to live in the house. All informants had the same concept: it might be difficult for them to buy eco-friendly houses. They assumed that an eco-friendly house is more expensive and complicated in the construction process. Their views are illustrated by one of the informants' opinions as follows:

"An eco-friendly house, in my opinion, is a house that is friendly to the environment such as having a large garden, lots of greenery and trees, complete playing spaces in the area. However, the possibility of buying a house like that is certainly difficult because it is definitely expensive because the cost of construction materials and the processes must be complicated."

The informant described the difficulties faced when intending to buy an eco-friendly house, one of which is related to the cost problem. This shows that the informants' behavioral control towards an eco-

friendly house is related to their financial capacity. Still related to financial difficulties, other than personal financing factors are also influenced by funding from other parties such as banks with a Home Ownership Credit (KPR) system, such as the opinion of two informants as follows:

Informant a: "We are actually interested in buying environmentally friendly dwellings but for the purchase funds there are none, even though they are assisted by home loans from the Bank, but paying attention to the continued increase in interest rates ... we are worried that we cannot pay them off until the end of the loan repayment period."

Informant b: "For me, banks should be able to provide facilities in providing loans to have environmentally friendly houses. Because the government now has a rule that there is an increase in the number of down payments for the purchase of second homes and subsequent homes."

In addition, there were other difficulties stated by an informant related to the ability to manage an eco-friendly house, which is written as follows:

"Even if I have the budget to buy an eco-friendly house, I will surely face difficulties in managing the house to stay environment-friendly."

The informants' opinions were not entirely wrong because their knowledge on eco-friendly houses were limited; and there are not many available literatures that are easy to read and known by the informants. Furthermore, when viewed from their environmental backgrounds, the informants' opinions are very reasonable because they rarely or even never discuss eco-friendly houses. This situation was revealed in the study related eco-friendly house buyers conducted by Wijayaningtyas (24). The informants only heard or read pieces of information from electronic or printed media. This depiction appeared in the interviews, most informants seemed to misunderstand when asked about their experiences in encountering with eco-friendly houses in their lives. They only revealed a recap of their thoughts counting on people's words on an eco-friendly house.

In addition to the informants, perceived difficulty is also experienced by consumers of other green products as found by some experts such as Tamashiro and Silveira [25] and Elias *et al.* [2]. Smith and Paladina [14] in Australia also found that price was the most important factor of consumer to buy green product. The condition of financial difficulties to purchase eco-friendly homes is also experienced by the younger generation in China. The phenomenon revealed in this study is almost the same as Zhang et al [26] research in China, that due to the rapid urbanization it causes a significant increase in house prices every year, including eco-friendly home. So most young couples who want to purchase a house were mostly assisted with funds or funding from other parties.

4.2. Perceived benefit

The next perceived behavioral control of the millennials which also greatly influences their buying intention towards eco-friendly houses is related to 'perceived benefit'. Influenced by the behavioral control in the previous section, it is important for the informants to gain both financial and health benefits when they purchase an eco-friendly house. One of the informants stated that according to the information from the media, an eco-friendly house should save electricity so it can reduce electricity expenses; the statement is as follows:

"Since an eco-friendly house usually has parks and plants, it will chill the room and can significantly reduce air conditioning usage. So, it can reduce electricity consumption."

There are other informants who argue that their behavioral control of being able to purchase eco-friendly houses is a rapid increase in the value of investments. This is because buying a house that is environmentally friendly must have a good design and planned in detail, in a well-managed environment and close with integrated facilities and public infrastructure; it can be concluded that the developer is committed to maintaining and improving the quality of the environment.

Moreover, the informants agreed that buying an eco-friendly house would bring benefit in a healthier life due to its concept of large green area, adequate lighting, and energy saving as stated by the informant:

"The thing that prompted me to purchase an eco-friendly house was because it would provide comfort and health for me and my family. When I saw examples of eco-friendly homes, the house was designed

with wide windows and high ceilings so that it was enough to use natural ventilation in the house. If developer serious to build that house, surely I will try to purchase it."

This perceived benefit is supported by Elias et al. [2] that investigated a related topic in Malaysia; as they live in a developing country, potential house buyers in Malaysia would also consider health benefit in their purchase intention of a sustainable house. Research conducted in other developing countries by Synodinos [27] also revealed a similar phenomenon that the younger generation has had the environmental knowledge to protect the environment so that when faced with the choice to buy environmentally friendly products they would certainly consider it. Their knowledge of the benefits received when practicing environmentally conscious behaviors such as healthy living greatly influences the purchase behavior of the millennial generation, especially toward the eco-friendly house.

5. Conclusion

From the analysis results, it can be concluded that the millennial generation's perceived behavioural controls which influences their eco-friendly house purchasing intention are 'perceived difficulty' in finance ability as well as post-purchase maintenance, and 'perceived benefit' in financial and healthy life. These controls are important for them; because as reported by the information about an eco-friendly house, they understand that this house concept does not only offer benefits to human life but it also offers difficulties that will be faced either before or after the purchase. Therefore, it is essential for the government and all parties to have good cooperation related to sustainable development, in the purpose of providing the correct information on the importance of an eco-friendly house, especially for the millennial generation. In addition, the millennials' perceived behavioural control could be further analysed with the quantitative study to find out which control will influence the behaviour of an eco-friendly house purchase intention.

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