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Abstract. The young generation today inherited an environment that is badly polluted by many human activities. Environmental protection on the other hand is by far not sufficient in view of the fact that it simply could not cope with the pace of damage being done. Apparently leading a green lifestyle is no longer an option but a necessity primarily for the sake of the environment. Sustainability begins at home. The young generation was concerned for the reason that it was burdened with the responsibility to clean up the wastes left by previous generations, and also to restore the environment back to its original or near-original state. Hence, this research aimed to identify the levels of likelihood in home greening efforts in young generation. A questionnaire survey was implemented in Klang Valley, Malaysia to collect quantitative data through closed-ended questions from 88 young generation males and females residing in that region. Statistical analysis on the usable 85 responses showed that in general, participants were moderately likely to green their homes as the various measures to save the environment achieved reasonable high index values. Underlying structure of home greening efforts revealed 4 underlying dimensions: reduce usage, tap natural sources, adopt energy-efficient technologies, and use green products. This research provided an overview of current home greening efforts in young generation as a tool to promote more specific ways to save the environment while adding further insights to the literature on young generation in this era as consumers and citizens.

1. Introduction and literature review

Environmental pollution is a serious global phenomenon. It takes place everywhere in the world. Both developed and developing countries are just too busy with doing business to create more wealth to improve their own economies. Apparently, there are always other more important issues to be tackled besides issues related to the environment. Leaders in many countries continuously neglect the importance of having a clean and unpolluted environment until something bad happened [1,2]. Developed countries export many of their wastes to developing countries in order to look clean while developing countries exploit their natural resources extensively in order to develop at a faster pace [3,4]. Most people in the world are living in a seriously polluted environment today. Environmental

pollution is getting worse day by day and there seems to be no sign of improvement. Environmental protection is not sufficient enough to reverse the negative impacts human activities imposed on the environment to the original or near-original state [5,6]. Obviously, there should be more green movements by the governments and non-governmental organisations worldwide to preserve and protect the environment. At the macro-level, green movement should also be the top agenda for any government because education and enforcement are the keys to create a greener space for mankind. At the micro-level, the people should be leading a green lifestyle to sustain a clean and unpolluted environment that will last for generations [7,8]. This seems to be the only way out. Sustainability begins at home. Information in various forms including texts, images, and videos on ways of going green, green living, and green home designing are widely available [9,10]. However, researches on the likelihood among the people to green their homes could hardly be found. Therefore, this research was conducted to identify the levels of likelihood in home greening efforts in young generation. Young generation was targeted as its actions today would determine the future of the environment in the next few decades to come. To get better insight, further analysis was also carried out to group the various measures to save the environment used in this research into several groupings. This research gave an overview of home greening efforts in young generation at present as a tool to promote more specific ways to save the environment and at the same time adding new knowledge to the literature on young generation in this era as consumers and citizens. Results of the literature review on home greening efforts identified ten measures to save the environment. All of these measures were empirically investigated and reported accordingly in the following sections and subsections.

2. Methods

This research adopted a quantitative approach rather than a qualitative approach. This was because the various measures to save the environment used in this research were identified earlier on and that the research intended to provide an overview on how the people were likely to green their homes. Thus, a questionnaire survey was carried out in one of the cities in Klang Valley, Malaysia to gather the quantitative data required in achieving the research objective. The questionnaire included a total of ten questions on the various measures to save the environment and the respondents were asked to respond to all of the questions by choosing only one answer to each of the questions to reflect their levels of likelihood in home greening efforts on a five-point scale where 1 = 'not at all likely' and 5 = 'extremely likely'. Data on gender were gathered from a different database which was accessible by the researchers. Eighty-eight young adults who had knowledge on ways of going green, green living, and green home designing answered the self-administered structured questionnaire but only eighty-five sets of the questionnaire were analysable after detecting outliers [11]. An index ranking analysis, bivariate analysis on index values and gender, and the Mann-Whitney U test were performed to produce the results. Further analysis based on exploratory factor analysis was also performed to examine if the various measures to save the environment used in this research were measuring some underlying constructs and could be grouped into several groupings for further interpretation. The index values ranged from 0 to 100. The use of index values rather than mean values had the advantage of enabling direct comparison of the values of home greening efforts between different researches without having to concern about the number of scale categories used in the survey instrument that will generate different mean values for different numbers of scale categories [12]. At this point, it was also interesting to find out if gender would have any statistical effect on the index values and ranking of the home greening efforts and therefore bivariate analysis on index values and gender was important to be conducted. The Mann-Whitney U test, a non-parametric test, was used to determine whether or not there was any statistically significant difference in the home greening likelihood levels of males and females. In the exploratory factor analysis, principal components analysis and varimax rotation were used to identify underlying constructs among the questions. The correlation matrix, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin value were subsequently assessed to determine whether exploratory factor analysis was appropriate for the data [13].

3. Results

To let readers comprehend the research being conducted, the results of this research were presented in the following subsections, namely, overall ranking, ranking of the male respondents, ranking of the female respondents, interpreting the rankings of the male and female respondents, did males and females differ in terms of their levels of likelihood in home greening efforts?, factor analysis result, and summary on the main findings.

3.1 Overall ranking

Out of the total of eighty-five respondents, forty-five were males and forty were females. In terms of percentage, 52.94% were male and 47.06% were female. The proportions for both males and females were quite similar. This enabled a valid comparison to be made between these two groups. All of the eighty-five responses from all of the eighty-five respondents were complete without any missing data. All of the responses were statistically analysed. Overall, 'Q10 – How likely is it that you would use energy-efficient appliances and water-saving devices, fixtures, and technologies for your home to save the environment?' with an index value of 81.60 was ranked first. 'Q09 – How likely is it that you would switch to compact fluorescent light bulbs for your home to reduce electricity use to save the environment?' with an index value of 80.20 was ranked second. 'Q02 – How likely is it that you would reduce energy use at your home to save the environment?' with an index value of 76.40 was ranked third. 'Q01 – How likely is it that you would reduce water use at your home to save the environment?' with an index value of 75.60 was ranked fourth. 'Q08 – How likely is it that you would install motion detectors at your home to switch off lights if there is no one in the room to reduce electricity use to save the environment?' with an index value of 69.40 was ranked fifth. 'Q04 – How likely is it that you would select products made from recycled materials or designed to be safer for the environment for your home to save the environment?' with an index value of 67.60 was ranked sixth. 'Q03 – How likely is it that you would use reusable products or borrow, rent, or share items used infrequently for your home to save the environment?' with an index value of 61.00 was ranked seventh. 'Q07 – How likely is it that you would install a photovoltaic system for your home to generate electricity for household use to save the environment?' with an index value of 60.80 was ranked eighth. 'Q06 – How likely is it that you would install a rainwater harvesting system for your home to collect rainwater for household use to save the environment?' with an index value of 60.20 was ranked ninth. 'Q05 – How likely is it that you would find creative ways to recycle household goods at your home to save the environment?' with an index value of 59.00 was ranked last.

3.2 Ranking of the male respondents

For the male respondents, 'Q10 – How likely is it that you would use energy-efficient appliances and water-saving devices, fixtures, and technologies for your home to save the environment?' with an index value of 82.20 was ranked first. 'Q09 – How likely is it that you would switch to compact fluorescent light bulbs for your home to reduce electricity use to save the environment?' with an index value of 81.40 was ranked second. 'Q01 – How likely is it that you would reduce water use at your home to save the environment?' with an index value of 74.20 was ranked in between third and fourth. 'Q02 – How likely is it that you would reduce energy use at your home to save the environment?' with an index value of 74.20 was ranked in between third and fourth. 'Q08 – How likely is it that you would install motion detectors at your home to switch off lights if there is no one in the room to reduce electricity use to save the environment?' with an index value of 72.40 was ranked fifth. 'Q04 – How likely is it that you would select products made from recycled materials or designed to be safer for the environment for your home to save the environment?' with an index value of 69.80 was ranked sixth. 'Q07 – How likely is it that you would install a photovoltaic system for your home to generate electricity for household use to save the environment?' with an index value of 67.20 was ranked seventh. 'Q06 – How likely is it that you would install a rainwater harvesting system for your home to collect rainwater for household use to save the environment?' with an index value of 66.60 was ranked eighth. 'Q05 – How likely is it that you would find creative ways to recycle household goods at your

home to save the environment?' with an index value of 59.60 was ranked ninth. 'Q03 – How likely is it that you would use reusable products or borrow, rent, or share items used infrequently for your home to save the environment?' with an index value of 58.60 was ranked last.

3.3 Ranking of the female respondents

For the female respondents, 'Q10 – How likely is it that you would use energy-efficient appliances and water-saving devices, fixtures, and technologies for your home to save the environment?' with an index value of 81.00 was ranked first. 'Q02 – How likely is it that you would reduce energy use at your home to save the environment?' with an index value of 79.00 was ranked in between second and third. 'Q09 – How likely is it that you would switch to compact fluorescent light bulbs for your home to reduce electricity use to save the environment?' with an index value of 79.00 was ranked in between second and third. 'Q01 – How likely is it that you would reduce water use at your home to save the environment?' with an index value of 77.00 was ranked fourth. 'Q08 – How likely is it that you would install motion detectors at your home to switch off lights if there is no one in the room to reduce electricity use to save the environment?' with an index value of 66.00 was ranked fifth. 'Q04 – How likely is it that you would select products made from recycled materials or designed to be safer for the environment for your home to save the environment?' with an index value of 65.00 was ranked sixth. 'Q03 – How likely is it that you would use reusable products or borrow, rent, or share items used infrequently for your home to save the environment?' with an index value of 63.60 was ranked seventh. 'Q05 – How likely is it that you would find creative ways to recycle household goods at your home to save the environment?' with an index value of 58.60 was ranked eighth. 'Q07 – How likely is it that you would install a photovoltaic system for your home to generate electricity for household use to save the environment?' with an index value of 53.60 was ranked ninth. 'Q06 – How likely is it that you would install a rainwater harvesting system for your home to collect rainwater for household use to save the environment?' with an index value of 53.00 was ranked last.

3.4 Interpreting the rankings of the male and female respondents

Thus, the male respondents had a higher likelihood than the female respondents to: 'select products made from recycled materials or designed to be safer for the environment for their homes to save the environment', 'find creative ways to recycle household goods at their homes to save the environment', 'install a rainwater harvesting system for their homes to collect rainwater for household use to save the environment', 'install a photovoltaic system for their homes to generate electricity for household use to save the environment', 'install motion detectors at their homes to switch off lights if there is no one in the room to reduce electricity use to save the environment', 'switch to compact fluorescent light bulbs for their homes to reduce electricity use to save the environment', and 'use energy-efficient appliances and water-saving devices, fixtures, and technologies for their homes to save the environment'. Nonetheless, the female respondents had a higher likelihood than the male respondents to: 'reduce water use at their homes to save the environment', 'reduce energy use at their homes to save the environment', and 'use reusable products or borrow, rent, or share items used infrequently for their homes to save the environment'.

3.5 Did males and females differ in terms of their levels of likelihood in home greening efforts?

For 'Q01 – How likely is it that you would reduce water use at your home to save the environment?', 'Q02 – How likely is it that you would reduce energy use at your home to save the environment?', 'Q03 – How likely is it that you would use reusable products or borrow, rent, or share items used infrequently for your home to save the environment?', 'Q04 – How likely is it that you would select products made from recycled materials or designed to be safer for the environment for your home to save the environment?', 'Q05 – How likely is it that you would find creative ways to recycle household goods at your home to save the environment?', 'Q08 – How likely is it that you would install motion detectors at your home to switch off lights if there is no one in the room to reduce electricity use to save the environment?', 'Q09 – How likely is it that you would switch to compact

fluorescent light bulbs for your home to reduce electricity use to save the environment?', and 'Q10 – How likely is it that you would use energy-efficient appliances and water-saving devices, fixtures, and technologies for your home to save the environment?', the Mann-Whitney U test revealed no statistically significant difference ($p > 0.05$) in the home greening likelihood levels of males [(Q01: Md = 4.00, n = 45); (Q02: Md = 4.00, n = 45); (Q03: Md = 3.00, n = 45); (Q04: Md = 3.00, n = 45); (Q05: Md = 3.00, n = 45); (Q08: Md = 4.00, n = 45); (Q09: Md = 4.00, n = 45); (Q10: Md = 4.00, n = 45)] and females [(Q01: Md = 4.00, n = 40); (Q02: Md = 4.00, n = 40); (Q03: Md = 3.00, n = 40); (Q04: Md = 3.00, n = 40); (Q05: Md = 3.00, n = 40); (Q08: Md = 4.00, n = 40); (Q09: Md = 4.00, n = 40); (Q10: Md = 4.00, n = 40)], [(Q01: U = 803.500, z = -0.939, p = 0.348); (Q02: U = 774.500, z = -1.216, p = 0.224); (Q03: U = 741.000, z = -1.473, p = 0.141); (Q04: U = 779.000, z = -1.118, p = 0.264); (Q05: U = 869.000, z = -0.284, p = 0.776); (Q08: U = 768.500, z = -1.195, p = 0.232); (Q09: U = 820.000, z = -0.759, p = 0.448); (Q10: U = 866.000, z = -0.320, p = 0.749)]. However, for 'Q06 – How likely is it that you would install a rainwater harvesting system for your home to collect rainwater for household use to save the environment?' and 'Q07 – How likely is it that you would install a photovoltaic system for your home to generate electricity for household use to save the environment?', the Mann-Whitney U test revealed statistically significant differences ($p \leq 0.05$) in the home greening likelihood levels of males [(Q06: Md = 3.00, n = 45); (Q07: Md = 3.00, n = 45)] and females [(Q06: Md = 3.00, n = 40); (Q07: Md = 3.00, n = 40)], [(Q06: U = 634.500, z = -2.394, p = 0.017); (Q07: U = 618.000, z = -2.555, p = 0.011)]. With exclusion of Q06 and Q07, the null hypothesis was accepted at a 95% confidence level and that the alternative hypothesis was rejected. In general, there was no statistically significant difference in the home greening likelihood levels of males and females.

3.6 Factor analysis result

The ten questions on the various measures to save the environment were subjected to principal components analysis with varimax rotation. The suitability of the data for exploratory factor analysis was assessed before conducting the principal components analysis. Examination on the correlation matrix showed the existence of some coefficients higher than 0.30. The Kaiser-Meyer-Olkin value was 0.524, more than the recommended value of 0.50 and the Bartlett's test of sphericity reached significant result ($p < 0.001$), confirming the factorability of the correlation matrix. The principal components analysis extracted four components, each with eigenvalues exceeding 1, explaining 18.564%, 16.525%, 13.249%, and 11.535% of the variance, respectively, totalling 59.873% of the total variance.

3.7 Summary on the main findings

The main findings of this research, specifically, index ranking and factor groupings of the measures to save the environment were tabulated for better illustration and understanding, Table 1.

4. Discussion and conclusion

The results showed that, in general, the respondents were moderately likely to green their homes as the various measures to save the environment achieved reasonable high index values. Index values that were more than 50.00, the middle index value, could be considered high. Even though all of the index values found each achieved a score of more than 50.00, most measures to save the environment each had not achieved a score of more than 80.00. The outcome of this research provided a very clear overview on how the young generation participated in saving the environment. No doubt, the young generation was aware of the current environmental issues and was determined to improve the situation. This could reflect that the environmental education for the young generation was successful to some extent. Young generation had many challenges in going green and was always restricted by its capabilities to only take smaller actions in greening the environment such as reusing, reducing, and recycling. While the young generation would invest in using technologies to go green, high cost remained as a barrier to installing more effective and efficient systems that were usually costly.

Apparently, knowledge and skills in home greening should continue to be developed as they are imperative in creating a cleaner and healthier living space for all [14]. The male respondents had showed more interest than the female respondents in greening their homes to save the environment. Nonetheless, this merely indicated the ways the male and female respondents took to live green. In fact, both the male and female respondents had their roles to play in living sustainably.

Table 1. Index ranking and factor groupings of the measures to save the environment.

Question	Index Ranking	Factor Grouping (Variable Number)
Q10 – How likely is it that you would use energy-efficient appliances and water-saving devices, fixtures, and technologies for your home to save the environment?	1	Component 3: Adopt energy-efficient technologies (Variable 1)
Q09 – How likely is it that you would switch to compact fluorescent light bulbs for your home to reduce electricity use to save the environment?	2	Component 3: Adopt energy-efficient technologies (Variable 2)
Q02 – How likely is it that you would reduce energy use at your home to save the environment?	3	Component 1: Reduce usage (Variable 2)
Q01 – How likely is it that you would reduce water use at your home to save the environment?	4	Component 1: Reduce usage (Variable 1)
Q08 – How likely is it that you would install motion detectors at your home to switch off lights if there is no one in the room to reduce electricity use to save the environment?	5	-
Q04 – How likely is it that you would select products made from recycled materials or designed to be safer for the environment for your home to save the environment?	6	Component 4: Use green products (Variable 2)
Q03 – How likely is it that you would use reusable products or borrow, rent, or share items used infrequently for your home to save the environment?	7	Component 4: Use green products (Variable 1)
Q07 – How likely is it that you would install a photovoltaic system for your home to generate electricity for household use to save the environment?	8	Component 2: Tap natural sources (Variable 2)
Q06 – How likely is it that you would install a rainwater harvesting system for your home to collect rainwater for household use to save the environment?	9	Component 2: Tap natural sources (Variable 1)
Q05 – How likely is it that you would find creative ways to recycle household goods at your home to save the environment?	10	-

Four underlying constructs were identified. ‘Q01 – How likely is it that you would reduce water use at your home to save the environment?’ and ‘Q02 – How likely is it that you would reduce energy use at your home to save the environment?’ were grouped under component 1: reduce usage. ‘Q06 – How likely is it that you would install a rainwater harvesting system for your home to collect rainwater for household use to save the environment?’ and ‘Q07 – How likely is it that you would install a photovoltaic system for your home to generate electricity for household use to save the environment?’ were grouped under component 2: tap natural sources. ‘Q10 – How likely is it that you would use

energy-efficient appliances and water-saving devices, fixtures, and technologies for your home to save the environment?' and 'Q09 – How likely is it that you would switch to compact fluorescent light bulbs for your home to reduce electricity use to save the environment?' were grouped under component 3: adopt energy-efficient technologies. 'Q03 – How likely is it that you would use reusable products or borrow, rent, or share items used infrequently for your home to save the environment?' and 'Q04 – How likely is it that you would select products made from recycled materials or designed to be safer for the environment for your home to save the environment?' were grouped under component 4: use green products. In short, the respondents would reduce usage, tap natural sources, adopt energy-efficient technologies, and use green products as their main home greening efforts. Recommendations and strategies in line with these main home greening efforts might gain popularity in and perceived as useful by the young generation.

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