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The Willingness of Dutch Citizens to Participate in a Prosumer Community: A Stated Choice Experiment

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1 ABSTRACT

The demand for energy in the world is continually rising. The local prosumer communities can be well-placed to identify local energy needs, establish and support initiatives to reduce the energy demand. This paper aims to understand people's willingness to participate in a prosumer community and the influential factors based on socio-demographic characteristics and attitudes. For that purpose, a stated choice experiment is designed to measure the preferences of Dutch citizens to participate in a prosumer community. In this research, two alternatives are presented to the respondents: own initiative and outsourcing of energy efficient implementations. In addition to the stated choice experiment, environmental statements were given to the respondents to assess their environmental attitudes. As a result of the data collection, 184 respondenses are obtained. A latent class model is used to analyse the data and rho-square is found to be 0.264. According to the results, two groups can be identified respectively as enthousiasts and conservatives with regard to willingness to participate in a prosumer community. In terms of socio-demographics and attitudes, there are statistically significant differences between the groups. These results are found to be useful to promote bottom-up initiatives and to suggest policies in order to form prosumer communities in local territories.

Keywords: stated choice experiment, energy demand, prosumer community, latent class analysis, bottom-up initiative

2 INTRODUCTION

Due to the increase in population and economic development, the demand for energy in the world is rising while the non-renewable energy resources are diminishing. Besides industrial activities and transportation, today's major energy demand is caused by the existing building stocks, depending on various factors including construction technologies, energy systems, and household behaviour. In recent years, researchers and policy makers are mainly looking for new cost-effective solutions and new technology to increase household efficiency and conservation (Frederiks et al., 2015). However, according to Frederiks et al. (2015), these energy efficient implementations are required to reduce the extensive emissions of greenhouse gases, yet their net benefits have been overestimated. The world's energy-related problems cannot be solved by only technological advances, but changes in human behaviour are also required. However, a problem occurs due to the little attention that is paid to energy behaviour of individuals. This behaviour of individuals needs to be shifted towards a more efficient and sustainable direction. Schweizer-Reis (2008) underlines that energy efficient technologies are developed to solve the problem, but finally the end-users "decide" whether they adopt an energy-saving behaviour and decrease their energy consumption.

A potential solution to decrease the energy demand in cities is the encouragement of citizens to reduce their energy consumption and to become both producer and consumer (prosumers) of the renewable energy. Such a solution requires transitioning towards decentralised future energy systems, in which there are new opportunities for local energy concepts such as prosumer and prosumer communities. A prosumer can be defined as (Rathnayaka et al., 2014): "an individual or a household that does not only consume energy, but also produces energy by renewable energy resources and either stores the excess energy or shares the excess energy generated with the utility grid". Instead of individual prosumers, local prosumer communities can be useful to identify local energy needs, establish and support initiatives and bring people together to achieve a common goal such as energy efficiency (Koirala, 2017). The objective of a prosumer community is to maintain the energy generated as much as possible in the community while reducing the need for the main energy grid. In a prosumer community, a large share of the electricity and heat is generated decentrally, in which the demand and supply is matched by flexibility in the energy grid. The decentralised energy generated arises from the integration of renewable energy into buildings, which involves several technologies and infrastructures. These energy efficient implementations include solar heating and cooling,

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low-energy or "passive" buildings, district heating and cooling, "building-integrated" solar PV, borehole thermal energy storage (BTES) and battery (Ren21, 2013).

According to Walker & Devine-Wright (2008), there are two interlinked motivational dimensions of being involved in a local energy initiative: process dimension that relates to the developer and actors involved; and the outcome dimension that relates to the financial and social benefits. As many researchers state (Das et al., 2018; Frederiks et al., 2015; Wang et al., 2011), the immediate high initial cost for people to invest in energy-efficient house improvements may constrain people's decisions. Therefore the type of investment and how it is implemented is one of the most important motivational factor and defines the financial and social concequences. In general, the investments can be realised in two ways: own initiative or outsourcing to an Energy Service Company. In the case of realising the investment by own initiative, people realise the initial investment on their own, but this leads to substantial financial benefits each year. On the other hand, people can also decide to outsource the investment to an Energy Service Company and gain small financial benefits each year. In the second alternative, people conclude a contract for multiple years and after this period, they own these energy efficient implementations including the financial benefits.

In addition, other social and financial consequences can be due to the community involvement, people's participation in the community organisation and the level of control of appliances in the prosumer community. In terms of community involvement, the amount of local citizens that are involved in the prosumer community project can have an effect on other citizens in the neighborhood. According to Lin (2015) and Yue et al. (2013) perceived social pressure and peer education can modify people's energy behavior even without receiving an economic reward. Moreover, the collaboration of local citizens in a prosumer community is also dependent on the level at which people prefer acting as a community and taking an organisational role. The realisation of a prosumer community, depends on people's initiative, effort and financial support, especially in the beginning. According to Koirala (2017), there are three levels of organisational responsibility, starting with an active role in which people are willing to participate with substantial responsibility of steering the prosumer community project, such as member of the board. On the second level, people are willing to participate with a minor responsibility, such as attending member meetings. At the last level, people are willing to participate, but without organisational responsibility. Furthermore, in a prosumer community, the flexibility of users' control on electric appliances might differ and influence the motivation of people. In prosumer communities, electricity is generated decentrally and is dependent on the weather conditions. A balanced system to reduce the import of electricity requires demand side management and a software is installed to manage the production and consumption of energy. In this system, energy consumption patterns can be changed in which large consuming appliances (such as dishwasher, washing machine and dryer) are used during the energy peak moments of a day. Ususally, there are three leves of flexibility for the control of appliances such as own control, automatic control and semi-automatic control.

Individuals' attitudes on environmental issues are also decisive for such initiatives. According to Wang et al. (2011), attitude refers to the degree of people's pro-environmental awareness of performing sustainable behaviour. This behaviour contributes to energy curtailment and/or energy investment behaviour of people. Barreto et al. (2014) added that most people are concerned about future generations' access to renewable sources, which influences their attitude. In addition, Frederiks et al. (2015) describes that people with a greater knowledge, awareness and understanding of the environmental issues tend to have more pro-environmental intentions. However, intentions can be obstructed from being realised into actual behaviour. Intervening factors are for example: lack of knowledge, social norms, perceived personal responsibility, cost-benefit trade-offs, situational and institutional factors. Although there is research from technical perspective of prosumer communities, very little research is done on it specifically in the context of attitudes, process and outcome dimensions. Therefore, our research focuses on the questions of "To what extent are local citizens willing to change their behaviour to participate in a prosumer community? And to what extent is their willingness influenced by decisive motivational factors?". The rest of the paper is structured as follows. First the methodology section explains the experiment and the survey. Then, the data section describes the data collection and sample characteristics. After that, the results of latent class model are described. Finally, we conclude the paper with with a discussion of major conclusions and directions for the future research.

3 METHODOLOGY

This paper aims to understand the influential factors on people's willingness to participate in a prosumer community based on socio-demographic characteristics and attitudes. For that purpose, a stated choice experiment is designed to measure the preferences of Dutch citizens to participate in a prosumer community. Stated choice experiments are used to measure the preferences of people by observing their choices out of different available choice options in a given hypothetical choice situation. In stated choice experiments, individuals are usually given a sequence of choice situations, and asked to choose their preferred alternative from several alternatives in each hypothetical choice situation. The levels of attributes of each alternative vary systematically across the choice situations so that a researcher could investigate people's decisions based on the trade-offs between the levels of attributes in the different choice alternatives. Therefore, stated choice experiments enable estimating which weights individuals attach to the different attributes and the probability of an option is chosen among a set of alternatives. This method is used mainly in health, economics and transport related fields for understanding consumer behaviour and defining target groups for products or policies (Louviere et al., 2000).

In this research, two alternatives are presented to the respondents: own initiative and outsourcing of energy efficient implementations. Four attributes were selected from the literature to define the alternatives: financial consequences, community involvement, control of appliances and organisational participation. Three levels are assigned to these attributes. The list of attributes and their levels can be seen in Table 1. A fractional factorial design is used with 27 profiles, in which 9 profiles are presented to each respondent. When the experimental design and choice sets were generated, 9 randomly selected choice sets were presented to each respondent. Furthermore, the questionnaire was designed in the web questionnaire system and included three main sections. The first section, included socio-demographic characteristics to gain insight in the socio-demographic status of the respondents. In the second part, the choice experiment is conducted. The choice experiment part included a context description and the invitation to choose one alternative out of two alternatives from each of the 9 choice sets.

Financial consequence	Solar panels € 4.500 investment € 800 decrease annual energy costs 6 years payback period	Solar panels Investment by ESCO € 100 decrease annual energy costs 7 years contract
	Solar panels and Borehole Thermal Energy Storage (BTES) system € 18.500 investment € 1.200 decrease annual energy costs 13 years payback period	Solar panels and BTES system Investment by ESCO € 200 decrease annual energy costs 14 years contract
	Solar panels, BTES system, battery € 24.500 investment € 1.350 decrease annual energy costs 19 years payback period	Solar panels, BTES system, battery Investment by ESCO € 250 decrease annual energy costs 20 years contract
Community involvement	25 percent participation 50 percent participation 75 percent participation	25 percent participation 50 percent participation 75 percent participation
Control of appliances	Own control Semi-Automatic controlled Automatic controlled	Own control Semi-Automatic controlled Automatic controlled
Organisational participation	Active role (4 hours / month) Minor participation (2 hours / month) Passive role (0-1 hours / month)	Active role (4 hours / month) Minor participation (2 hours / month) Passive role (0-1 hours / month)

Table 1: List of Attributes and Levels

In the last part of the questionnaire, multiple statements were given to the respondents in order to measure respondents' environmental attitudes. These statements are considered to find out whether people who identify themselves as having an environmental attitude have a different choice behaviour than people who identify themselves as having a less environmental attitude. The statements are presented to the respondents

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on a five-point Likert scale. These statements can be seen in Table 2. For the experimental design considerations, it is decided to use effect coding for the attribute levels. After the data collection, a latent class model is used to find homogenous clusters of respondents and their preferences for choice alternatives. Finally, the differences in clusters in terms of socio-demographics and environmental attitudes are tested with chi-square tests.

I am worried about global warming.
The majority of the population is not acting environmentally conciously.
I am prepared to pay more for environmentally friendly implementations.
The government should conduct more action to tackle the climate problem.
I would like to be more independent of large energy providers.
I am willing to adopt a more environmentally friendly lifestyle.
I would like to be seen with solar panels on my house.
I am willing to participate in a prosumer community.

Table 2: List of environmental attitude statements

Characteristic	Level	Sample	Dutch Population	Chi-Square
Gender	Male	59.2%	49.6%	7.861 (0.006)
	Female	40.8%	51.4%	
Age	21 to 30 years	32.6%	18.1%	33.507 (0.000)
	31 to 50 years	39.1%	36.5%	
	51 to 75 years	28.3%	45.3%	
Education	Secondary vocational education	26.6%	66.3%	85.322 (0.000)
	Higher professional education	47.3%	21.2%	
	Scientific education	26.1%	12.5%	
Income	0 to 25000 euro	19.0%	41,7%	38.936 (0.000)
	25001 to 45000 euro	50.0%	36,2%	
	>45000 euro	31.0%	22,1 %	
Household composition	1-person household	10.3%	38.0%	60.977 (0.000)
	2-person household	44.0%	32.6%	
	3-person household	18.5%	11.9%	
	≥4-person household	27.2%	17.5%	
Children	No children	58.2%	65.9%	5.852 (0.016)
	Children	41.8%	33.1%	
Dwelling type	Detached house	10.9%	23.0%	10.548 (0.014)
	Semidetached house	35.9%	19.6%	
	Terraced house	36.4%	42.5%	
	Apartment / Gallery home	16.8%	15.0%	
Property ownership	Property owner	73.4%	56.9%	20.116 (0.000)
	Property renter	26.6%	43.2%	

Table 3: Sample characteristics

4 DATA

The data collection took place between May 2nd and May 16th 2018 by distributing the online questionnaire via social media. During that period, 184 respondents completing all the questions. Table 3 shows the sample characteristics and its comparison with the Dutch population. The results of the chi-square test shows that the sample is not representative of the Dutch population. In the sample, males, high income, high educated people and property owners are represented more. Table 4 shows the distribution for agreement of respondents on environmental attitudes. The 5 point likert scale has been reduced to a 3 point likert scale because the frequency of strongly agree and strongly disagree was too low. The results show that people generally agree with the environmental statements. Moreover, people disagree more with the statements “I

would like to be seen with solar panels on my house", "I would like to be more independent of large energy providers" and "I am prepared to pay more for environmentally friendly implementations" respectively. Regarding these eight different statements, the internal consistency reliability (Cronbach's alpha) has been tested. According to Gliem and Gliem (2003), a coefficient of >.80 indicates a high reliability, coefficients <.50 indicate insufficient reliability and a scale with a coefficient of >.70 is considered as reliable. For these eight statements, Cronbach's Alpha is found to be equal to 0.710. This means that 71 percent of the variability in a composite score by combining the eight statements, is considered as internally consistent reliable.

Statements	**Disagree (%)**	**Neutral (%)**	**Agree (%)**
I am worried about global warming.	7.6	15.8	76.6
The majority of the population is not acting environmentally concious.	4.9	13.0	82.1
I am prepared to pay more for environmentally friendly implementations.	15.2	32.6	52.2
The government chould conduct more action to tackle the climate problem.	2.7	12.5	84.8
I would like to be more independent of large energy providers.	17.4	27.7	54.9
I am willing to adopt a more environmentally friendly lifestyle.	2.2	19.0	78.8
I would like to be seen with solar panels on my house.	22.3	28.8	48.9
I am willing to participate in a prosumer community.	9.8	22.8	67.4

Table 4: Environmental Attitudes

5 RESULTS

As a result of the data collection, 184 respondenses were obtained. A latent class model is used to analyse the data and rho-square is found to be 0.264. Table 5 shows the results of the latent class analysis. According to the goodness-of-fit rule, the two class model performs better than other altenatives. As can be seen for class 1, the constant coefficient for the own initiative alternative is 1.876 and the constant coefficient for the outsourcing alternative is 1.763. However, in class 2, the constant coefficient are both negative, in which the constant coefficient for the own initiative alternative is -2.181 and the constant coefficient for the outsourcing alternative is -1.856. This indicates that class 1 is composed by enthousiasts and class 2 is composed by conservatives with regard to willingness to participate in a prosumer community.

5.1 Results Class 1

The first attribute level of financial consequences is significant with a coefficient of 1.052. This means that people in class 1 are willing to invest in solar panels by participating in a prosumer community. The second level of the financial consequences attribute shows a slight negative coefficient, but is not significant. Furthermore, for the attribute levels of the attribute community involvement no significant differences can be identified, in which there is no preference for each of the levels. Moreover, in class 1, the coefficient of own control of appliances is 0.254 and is significant at the 5% level. In addition, the coefficient of the second level is slightly positive, but is not significant. Finally, looking at the organisational participation, all attribute levels are not significant, but the coefficients show that people do not prefer to be involved in organisational activities.

The coefficients for the alternative outsourcing of class 1 are also shown in Table 5. As can be seen, there are no significant attribute levels for the financial consequences and community involvement, which means that the respondents have no preference for a particular level. Furthermore, the coefficient for own control of appliances is 0.332 and is significant at the 10% level. There seems to be a pattern in which people prefer to control their appliances by their own instead of automatically. Finally, regarding the attribute organisational participations there is a slight preference for an active role in participating in a prosumer community, but this level is not significant. It can be concluded that people in class 1 do not prefer a passive role while outsourcing the activities.

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5.2 Results Class 2

The coefficient of the first level (solar panels) is 2.221 and is significant at the 1% level. Furthermore, the coefficients of the second level is slightly negative, but is not significant. However, the third level that represents the reference category has a negative coefficient of -1.603. This means that individuals in class 2 prefer the financial consequences of implementing solar panels instead of implementing solar panels, BTES system and an in-home battery. The 25 and 50 percent participation levels are not significant. For the third attribute that concerns the control of appliances, the coefficient for the first level is positive (0.487) and significant at the 5% level. This means people in class 2 prefer to control their appliances by their own instead of automatically by participating in a prosumer community. Finally, regarding the attribute own initiative, the coefficient of the minor participation level is 0.487 and significant at the 10% level. It can be concluded that people prefer to perform a minor participation role in participating in a prosumer community in the own initiative alternative.

Constant	**Coefficient - Class 1 (N= 109)**	**Coefficient - Class 2 (N= 75)**
Constant 1	1.876***	-2.181***
Constant 2	1.763***	-1.856***
		Alternative own initiative
Solar panels	1.052***	2.221***
Solar panels and BTES system	-0.129	-0.618
Solar panels, BTES system, battery	-0.923	-1.603
25 percent participation	-0.152	-0.358
50 percent participation	0.131	-0.214
75 percent participation	0.021	0.572
Own control	0.254**	0.486**
Semi-Automatic controlled	0.201	0.049
Automatic controlled	-0.455	-0.535
Active role (4 hours / month)	-0.164	-0.333
Minor participation (2 hours / month)	-0.005	0.487*
Passive role (0-1 hours / month)	0.169	-0.154
		Alternative outsourcing
Solar panels	0.007	1.137***
Solar panels and BTES system	-0.002	-0.195
Solar panels, BTES system, battery	-0.005	-0.942
25 percent participation	-0.231	-0.501**
50 percent participation	0.072	0.534*
75 percent participation	0.159	-0.033
Own control	0.332*	0.409*
Semi-Automatic controlled	0.043	-0.036
Automatic controlled	-0.375	-0.373
Active role (4 hours / month)	0.217	-0.483**
Minor participation (2 hours / month)	0.077	0.368*
Passive role (0-1 hours / month)	-0.294	0.115

Table 5: Results LCM classes. Note: ***, **, * ==> Significant at 1%, 5%, 10% level.

For the alternative outsourcing, multiple attribute levels are significant, starting with the attribute financial consequences. It is worthwhile to note that compared to the results of class 1, people in class 2 strongly prefer the outsourcing alternative by implementing solar panels; the coefficient is equal to 1.137 and significant at the 1% level. The second level is slightly negative, but not significant. In the second attribute that contributes the community involvement, the 25 percent and 50 percent participation level are significant.

The coefficient of the attribute level 25% participation is negative (-0.502) and for 50% participation it is positive (0.534). Remarkable is that the coefficient of 75 percent participation level is negative (-0.033). It was expected that when people strongly prefer 50 percent participation also prefer the 75 percent participation level. Subsequently, the coefficients of the attribute control of appliances correspond to the outcomes in class 1. It can therefore be concluded that people in class 2 prefer to control their appliances by their own instead of automatically by participating in a prosumer community. Finally, people in class 2 prefer to adopt a minor participation role by outsourcing the activities by participating in a prosumer community. The coefficient for this level is positive (0.368) and is significant at the 10% level. Furthermore, the coefficient of the active role level is negative (-0.483) and significant at the 5% level. It can be concluded that performing an active role by outsourcing the activities is not preferred by people in class 2.

Socio-demographics		**Frequency sample**	**Frequency Class 1**	**Frequency Class 2**	**Chi-square**
Gender	Male	109	69	40	0.176
	Female	75	40	35	
Age	21 to 30 years	60	42	18	0.037**
	31 to 40 years	37	25	12	
	41 to 50 years	35	18	17	
	> 50 years	52	24	28	
Education	Secondary vocational education	63	30	33	0.046**
	Higher professional education	73	50	23	
	Scientific education	48	29	19	
Income	0 to 25000 euro	35	18	17	0.246
	25001 to 45000 euro	92	60	32	
	> 45000 euro	57	31	26	
Children	No children	107	66	41	0.427
	Children	77	43	34	
Type of neighborhood	City center	38	24	14	0.576
	Outside center	54	34	20	
	Village	92	51	41	
Property ownership	Property owner	135	75	60	0.091*
	Property renter	49	34	15	
Innovation adaptation	Innovators / early adopters	37	27	10	0.020**
	Early majority	86	54	32	
	Late majority / laggards	61	28	33	
Household composition	1-person household	19	12	7	0.942
	2-person household	81	49	32	
	3-person household	34	20	14	
	4-person household	50	28	22	

Table 6: The differences between two classes regarding their socio-demographic characteristics of the respondents

5.3 Descriptive analysis of two classes

According to latent class analysis, two classes can be identified in showing similar choice behaviour. For each respondent, latent class model analysis provides the probability the respondent belongs to class 1 or class 2. The respondent can be assigned to the class with the highest probability. Subsequently, the class membership can be added to the database including the socio-demographic characteristics and environmental consciousness. As a result, 109 respondents are assigned to class 1 and 75 respondents are assigned to class 2. The next step is to gain more information of these classes based on their socio-demographic characteristics and environmental consciousness. The objective is to find out whether there is a relation between the

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variables and the cluster membership. To test whether these variables of the classes are independent of each other, the chi-square test is conducted. As a result, Table 6 and Table 7 presents the output of the cross tabs.

Table 6 shows the differences between two classes regarding their socio-demographic characteristics of the respondents in each class. As a result, the variables age, education, property ownership and innovation adaptation are significantly different. Based on the significant variables, differences between the socio-demographic characteristics of the two classes can be considered and described as follows.

In class 1 (enthusiasts), the age category consists of most people that are between 21 and 40 years and are higher educated compared to class 2. Furthermore, people in class 1 on average own their dwelling, but the share of renters is higher compared to class 2. Finally, people in class 1 assign tthemselves on average more as innovators, early adopters or early majority.

In class 2 (conservatives), the age category consists of most people that are older than 40 years compared to the averages of the levels and are lower educated than class 1. Moreover, people in class 2 on average own their dwelling and the share of renters is lower compared to class 2. Finally, people assign themselves on average more as late majority or laggards in terms of technology adoption.

Statement		**Frequency sample**	**Frequency Class 1**	**Frequency Class 2**	**Chi-square**
Statement 1 I am worried about global warming	Agree	141	82	59	0.753
	Neutral	29	19	10	
	Disagree	14	8	6	
Statement 2 The majority of the population is not acting environmental conscious	Agree	151	89	62	0.504
	Neutral	24	16	8	
	Disagree	9	4	5	
Statement 3 I am prepared to pay more for environmental friendly measures	Agree	96	65	31	0.019**
	Neutral	60	33	27	
	Disagree	28	11	17	
Statement 4 The government should take more action against the climate problem	Agree	156	94	62	0.636
	Neutral	23	13	10	
	Disagree	5	2	3	
Statement 5 I would like to be more independent of large energy providers	Agree	101	72	29	0.000***
	Neutral	51	26	25	
	Disagree	32	11	21	
Statement 6 I am willing to adopt a more environmental friendly lifestyle	Agree	145	97	48	0.000***
	Neutral	35	11	24	
	Disagree	4	1	3	
Statement 7 I would like to be seen with solar panels on my dwelling	Agree	90	68	22	0.000***
	Neutral	53	33	20	
	Disagree	41	8	33	
Statement 8 I would participate in a prosumer community	Agree	124	86	38	0.000***
	Neutral	42	21	21	
	Disagree	18	2	16	

Table 7: The differences between two classes regarding the environmental statements

6 CONCLUSIONS

This paper conceptualises a prosumer community as a potential development in the changing energy landscape and pertains to the integration and community engagement of local citizens to participate in a prosumer community. The research focusses on the individual and collective decisive motivations of

individuals given their socio-demographic characteristics and environmental attitudes. Therefore, a data collection took place in May 2018. After two weeks of data collection, 184 respondents finished the questionnaire completely. As a result of latent class analysis on stated choice experiment, two groups are identified as enhousiasts and conservatives respectively. Both groups prefer the smaller financial consequences and they prefer to have the full control of devices if it is their own initiative to become a prosumer. Moreover, conservatives are less likely to join a prosumer community as an outsourced initiative when there is little participation in the community and they have an active role in the management. In terms of socio-demographics and attitudes, there are statistically significant differences between the groups. Enthousiasts are younger and moer highly educated than conservatives. Furthermore, enthousiasts on average own their dwelling, but the share of renters is higher compared to conservatives. Enthousiasts assign themselves on average more as innovators and early adopters of technology. Moreover, enthousiasts have more environmental friendly attitudes than conservatives. Finally, both groups think that the government should take more action against climate change. All in all, the extent of Dutch citizens to participate in a prosumer community is dependent on people's importance regarding level of decisive motivational factors, socio-demographic characteristics and environmental conscious attitude.

By focusing on the current policy regarding the encouragement of energy efficient measures by individuals by the Dutch government, energy transition is becoming a more urgent issue. The Dutch government is aware that a change is essential to achieve the set goals of reducing the greenhouse gases and increase the share of renewable energy sources. As can be concluded, the integration of decentralised generation in the built environment like prosumer communities can be a potential solution for Dutch cities to become energy neutral. According to the results, there is support from individuals to participate in a prosumer community. With this background, it can be concluded that the energy transition in the Netherlands can be speeded up. However, in this encouragement, it is important that the main decisive motivational factors based on socio-demographic characteristics are considered. Especially, in deciding to develop a prosumer community, identifying and attracting the right target group is essential. According to the results of this research, enthusiasts and conservatives can be divided according on their socio-demographic characteristics and attitudes. To conclude, for the realisation of a prosumer community, enthusiasts need to be identified and encouraged as initiators in setting-up or participating in a prosumer community. These results are useful to promote bottom-up initiatives and to suggest policies in order to form prosumer communities in local territories.

Finally, recommendations can be provided according to the limitations of the stated choice experiment. The sample does not represent the Dutch population. Therefore, it is recommended that a larger and more representative sample should be obtained. Furthermore, according to the results, the attribute levels that contains a borehole thermal energy storage system and in-home battery have a negative influence on people's choice behaviour. This negative influence might not only be attributed to the financial consequences, but can arise from a lack of knowledge of potential benefits. Therefore, the research is limited on the question if lack of knowledge is a decisive motivational factor in people's decision. Moreover, further research on decisive motivational factors that focuses on people that already live in collective energy initiative is necessary. These results can be compared to the conclusions of this research in which it can be examined if the choice behaviour outcomes and the socio-demographic characteristics correspond. Finally, a more in-depth research can be conducted on how conservatives can be persuaded to participate in a prosumer community.

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