



Laura Melkert 538031 Governance & Management in the Public Sector Erasmus University Supervisor: Asya Pisarevskaya Second Reader: Darren McCauley 26-06-20

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PREFACE

Before you lies the thesis "Public Trust & Citizen Participation in the Municipality of Rotterdam: Natural Gas-free in 2050?" It has been written to fulfill the graduation requirements of the master program Governance & Management in the Public Sector at Erasmus University. During the period of February to June, 2020, I was engaged in working on this thesis.

Together with my internship supervisor at the municipality of Rotterdam, Alexander van Steenderen, the research question was formulated. The thesis came with its challenges. Fortunately, the help of both my internship supervisor and my university supervisor, Asya Pisarevskaya, allowed me to answer the identified question. They were always available and willing to assist me along the way. Therefore, I would like to thank them for their guidance and support.

I want to thank all of the respondents as well. I would not have been able to conduct this research without them. I also wish to thank my friends and family, who were always willing to hear out my ideas, struggles, and progress.

I hope you enjoy your reading.

Laura Melkert

Zierikzee, June 26, 2020

ABSTRACT

The municipality of Rotterdam aims at being natural gas-free in 2050 in, among others, the built environment sector. As there is a general agreement among scholars that sustainability transitions cannot be addressed sufficiently through only top-down decision-making, citizen participation is crucial (Ju, Liu & Feng, 2019). In addition, the closer citizens are to their government, the higher the level of public trust often is (Moon, 2003). This public trust influences the acceptability of changes in energy policies (Steg et al., 2015). The relation between public trust and citizen participation is, however, not clear among scholars. There are two strains of thoughts on this. One is that *more* trust leads to more participation whereas the other believes *less* trust leads to more participation. This study, therefore, has identified the following research question:

How does trust in the municipality of Rotterdam influence citizen participation in the energy transition?

A multiple regression, carried out by SPSS Statistics version 26, was run using 397 filled out surveys by residents of Rotterdam to examine whether *citizen participation* can be predicted based on *public trust* (α = .766), and the auxiliary variables *education, income per capita, age, gender* and *dwelling. Citizen participation* has been divided into three subsets: (1, α = .722) the willingness to implement certain measures in their house (2, α = .863) the willingness to join particular participation mechanisms, and (3, α = .538) the citizens' role and influence in decision-making. Weighted descriptive statistics are provided for all three subsets, whereas unweighted inferential statistics are presented for the first two subsets.

It was found that more public trust leads to more citizen participation in the municipality of Rotterdam. In addition, higher educated residents and residents with a high income are predicted to participate more. Furthermore, contrary to what existing literature describes, this research concludes that younger (< 35) residents have more public trust than older (56+) residents and that voters for the party in power do not necessarily have to have a higher level of public trust than voters for other parties. Based on these results, it was recommended to improve the public trust among the residents of Rotterdam to stimulate citizen participation. This could be done by focusing on districts or on themes (e.g. political affiliation). Furthermore, the enabling and facilitating role of the municipality could be explored more. Conclusively, in order to be natural gas-free in 2050, a healthy relationship between the municipality and its residents should exist.

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1. INTRODUCTION

The Intergovernmental Panel on Climate Change (2007) stated that human activities have very likely caused an increase in temperature due to carbon dioxide and other greenhouse gas emissions. If the temperature keeps rising, human communities and ecosystems are threatened (Levin et al., 2012). Therefore, in December, 2015, the Paris Agreement was created by 195 countries and the European Union. In this global agreement, it was first agreed upon that the temperature should not rise more than 2°C compared to preindustrial levels. Later this changed into 1.5°C (The Lancet Planetary Health, 2018). The number of involved countries indicates that the transitioning towards more sustainable societies is a global happening (Ottens & Edelenbos, 2018). The Netherlands was one of these 195 countries. Consequently, the Dutch government presented in June, 2019, a National Climate Agreement (*"Nationaal Klimaatakkoord"*) to reach these goals. Its main objective is to reduce the emission of greenhouse gasses by 49% compared to 1990 in the Netherlands (Rijksoverheid, 2019).

One of the sectors with which agreements are made to tackle this challenge is the built environment. The aim of the built environment sector in the Netherlands is to insulate 7 million homes and 1 million buildings, heat those by using renewable heating, and to use clean electricity. That means there is a moving away from natural gas, i.e. an energy transition, in the Netherlands. This is not only because of the set agreements in Paris, but also to be able to stop as soon as possible with the natural gas extraction in Groningen which has caused several earthquakes (Rijksoverheid, 2019; Koster & Ommeren, 2015). So, the government has set the goals. The municipalities, however, can decide for themselves how to achieve these objectives. This research has focused on the energy transition within the built environment sector in the municipality of Rotterdam, since the researcher has done an internship at the municipality on this sector.

The municipality of Rotterdam is undergoing change. A sustainability department has recently been set up in which they focus on the goals presented in the National Climate Agreement. Similar to the National Climate Agreement, Rotterdam aims at reducing their greenhouse gas emissions by 49% in 2030. In addition, they want to be completely climate neutral in 2050. An important indicator for this is to have a downward trend regarding CO₂ emission in 2022 (Gemeente Rotterdam, 2019a). The Municipal Executive Committee *("Het Rotterdams College")*, consisting of Mayor Ahmed Aboutaleb and ten Vice Mayors, has given a budget of 68.2 million euros to initiate the road to sustainability (Gemeente Rotterdam, n.d.-a; Gemeente Rotterdam, 2019a).

Rotterdam has begun their journey with creating the Rotterdam Climate Agreement in 2019. This agreement presents 49 concrete measures as to how to cut the CO_2 -emission in half in the coming ten years (Energieswitch, 2019). These measures are designed by five so-called climate-tables: (1) harbor and industry, (2) built environment, (3) mobility, (4) clean energy, and (5) consumption (ibid.). For the built environment sector, the main goal is changing an average of 8.000 natural gas connections per year before 2050. This challenge can only be accomplished when the residents of Rotterdam participate. The Rotterdam Climate Agreement mentions the importance of involving the citizens as well (Energieswitch, 2019).

Among scholars, there is also a general agreement that sustainability transitions cannot be addressed sufficiently through only top-down decision-making (Loorbach, 2010; Ottens & Edelenbos, 2018). As a result, there is a shift in modernized European democracies from this top-down way of working towards a more bottom-up approach in which societal actors are involved (Loorbach, 2010). This is important, since sustainability transitions, or climate change adaption, require multiple actors (Klein et al., 2018). So, citizen participation is essential for transitioning towards a more sustainable society (Ju, Liu, & Feng, 2019). In fact, the support and acceptance of citizens is crucial when managing energy transition (Kalkbrenner & Roosen, 2016). Only informing the citizens and thus ignoring their perspectives on the energy system, results in a more costly and time-consuming energy transition (Lennon, Dunphy, & Sanvicente, 2019).

The closer citizens are to their government, the higher the level of public trust often is (Moon, 2003). A recent research by Ecorys (2020), commissioned by the municipality of Rotterdam, also mentions the importance of trust within the energy transition. Trust may even be an "important determinant of residential energy-related choices and behavior" (Stenner et al., 2017, p. 78). The relation between trust and citizen participation is, however, not clear among scholars. There are two strains of thoughts on this. One is that *more* trust leads to more participation whereas the other believes *less* trust leads to more participation. This paper, therefore, focuses on the following research question:

How does trust in the municipality of Rotterdam influence citizen participation in the energy transition?

First, the theory on citizen participation and public trust is explored in chapter 2. Chapter 3 elaborates on the case study of Rotterdam and the methodology of this research. Subsequently, the outcomes of the descriptive and inferential statistics are presented in the analysis chapter. The last chapter provides the conclusion and discussion.

2. THEORETICAL FRAMEWORK

In 2013, King Willem Alexander mentioned that the Netherlands slowly starts changing from a representative democracy into a participatory democracy (Rijksoverheid, 2013). In this participatory form of democracy, the government wants its citizens to have a more active role in the policy- and decision-making (Edelenbos, van Meerkerk & Koppenjan, 2017). As a result, elected politicians have a less prominent role (ibid.). One of the reasons for this change is that a representative democracy comes with its limitations. Before mentioning these, it is useful to describe what is meant with a representative democracy.

The Netherlands has a representative democracy, also known as a liberal electoral democracy (Wagenaar, 2016). This means citizens, i.e. the electorate, can vote for parties or individuals they would like as their representative (Edelenbos, van Meerkerk & Koppenjan, 2017; Sørensen, 2006). In turn, the citizens can hold the elected accountable for their actions taken by voting (Wagenaar, 2016). This refers to the primacy of politics (van Meerkerk, Edelenbos & Klijn, 2015; Wagenaar, 2016) meaning that the elected officials "hold the power to decide" (Edelenbos, van Meerkerk & Koppenjan, 2017, p. 57). When this form of democracy is working properly, further public participation might not be needed (Lowndes, Pratchett, & Stoker, 2006).

However, a representative democracy comes with its limitations and critiques. Van Meerkerk, Edelenbos & Klijn (2015, p. 750), for instance, argue that the institutional structure of representative democracy is less capable of handling boundary-crossing wicked problems. The energy transition in Rotterdam can be considered as such a problem. These complex issues cannot be tackled with the representative democracy way of working (Crosby, Hart & Torfing, 2017). Therefore, public participation is needed (Geczi, 2007). In addition, complex issues, like sustainability transitions, involve the collaboration of multiple interdependent actors (Ottens & Edelenbos, 2018). As a result, elected representatives cannot keep up with involving and informing them all (Bevir, 2010). A way of overcoming these limitations is citizen participation (Wagenaar, 2007). This participation might also improve trust in the government (Yang & Pandey, 2011). Therefore, this chapter focuses on the theory of citizen participation and public trust.

2.1. CITIZEN PARTICIPATION

Citizen participation can be considered "the cornerstone of democracy" which is something no one opposes (Arnstein, 2019, p. 24; Roberts, 2004). It is desirable and necessary (Kelley & Johnston, 2012) and occurs when both citizens and public officials feel the need for

participation and when participation mechanisms are present (Wang, 2001). Participation mechanisms include community, neighborhood or town hall meetings, citizen surveys, citizen advisory groups, citizen feedback via the web, and (in)direct contact (Wang, 2001; Yang & Pandey, 2011). These participation mechanisms were included in the examination of citizen participation within this research, as the residents of Rotterdam were asked how willing they are to join particular participation mechanisms to become natural gas-free.

An important side note to make before elaborating on the concept of citizen participation, is that there are several concepts that have similar meanings as citizen participation. Voorberg, Bekkers & Tummers (2015, p. 1335), for example, focus on the concept of co-creation as: *"the active involvement of end-users in various stages of the production process"*. This active involvement, with the end-users being citizens, is also researched. In other words, how willing are the residents of Rotterdam to implement certain measures in their house to become natural gas-free? Other likewise concepts include citizen involvement, self-help (Arnstein, 2019), co-production (Alford, 2002), and collaborative governance (Ansell & Gash, 2008). What these concepts all have in common is that a governmental institution involves a non-governmental actor, e.g. a private company or an organized group, in their processes. The difference with citizen participation, however, is that this involved non-governmental actor can solely be the citizen.

Arnstein has created the well-known ladder of citizen participation (see Figure 1). Levels of citizen power are deconstructed with the different rungs on the ladder (Botchwey et al., 2019). The lower rungs, 1 through 5, represent little to no citizen power, whereas the higher rungs, 6 through 8, indicate more citizen power (Gaber, 2019). In other words, the higher up on the ladder, the more influence citizens have in decision-making processes and so the more citizen participate. The desire of citizens to have such influence is the third and last part of citizen participation which is investigated in this research. Therefore, the focus lies more on participation. The other form is political participation which refers to voting. The main difference between these two forms of participation is the amount of time citizens are involved. In political participation, participation occurs in peaks during election seasons whereas participation in administration happens on a continual basis (Wang & Wart, 2007). In chapter 3, methodology, the specific actions or events that fall under citizen participation within this research are mentioned.



Figure 1. Eight rungs on a ladder of citizen participation (Arnstein, 2019, p. 26).

If citizen participation increases, the regulating and steering role of the government shifts towards more of a responsive and collaborative role. That means the government turns into being enabling and facilitating for non-state actors (Mees, Uittenbroek & Driessen, 2019). However, an understanding and empirical evidence of these enabling and facilitating role and the shift towards it are still lacking (ibid.).

A counterpart to the widely cited ladder of citizen participation is the ladder of government participation, created in 2012 by the Dutch Council for Public Administration (Mees, Uittenbroek & Driessen, 2019; see Table 1). Government participation requires that "governments act as a facilitator rather than as initiator, supervisor, or regulator (ROB, 2012). The premise of government participation is that governments restrain themselves to enabling or supporting the initiation and continuation of such initiatives with as little interference as possible" (Mees, Uittenbroek & Driessen, 2019, p. 200). In other words, governments are more active in helping citizens and initiatives rather than, which is the case for the ladder of citizen participation, being the ones initiating and structuring. The role of the government is, thus, the main difference between the two ladders.

Similar to the ladder of citizen participation, the government participation ladder's rungs are in practice not clear cut and overlap may exist. Furthermore, the goal of the participation ladder is to descend as much as possible, i.e. to reach the letting go rung, if space wants to be given to citizen initiatives to flourish (Mees, Uittenbroek & Driessen, 2019). However, this descending depends on the level of urgency: "The higher the urgency, the higher local governments climb on the ladder." (ibid, p. 204). In addition, the role of the local government depends on the kind of initiative, for example, needs more steering whereas another initiative requires the stimulating role more. In addition, this role can change over time (Mees, Uittenbroek & Driessen, 2019).

Rung	Roles for local governments	Who initiates, who coordinates, and who decides	Practices of local government roles
5	Regulating	Government regulates interventions by the community, so initiates, coordinates and decides (hierarchical government)	Policy making, 11rganizati traditional public participation such as hearings and citizen juries, checking, enforcing regulations, and sanctioning in case of noncompliance
4	Network steering	Government (co-) initiates and creates a network of public and private stakeholders; it coordinates the decision- making process. Decisions are co-decided in the network	Process coordination, fostering of dialogue and negotiation among stakeholders, mediation of interests, arbitrage of conflicts, trust building, creation of a level playing field through rules of the game
3	Stimulating	Government actively stimulates the initiation and continuation of community initiatives. Initiatives coordinate and decide independently from government	Provision of structural (financial) support during a longer period
2	Facilitating / enabling	Initiatives are self- initiated, and the government has an interest in making them happen. Initiatives coordinate and decide independently from government	Boundary spanning activities that facilitate free flows of ideas, people and resources, while maintaining a boundary between the initiative and its institutional environment; Process facilitation, helping the initiative to find its way in the municipal 11rganization, providing a (very) limited amount of resources and relevant information, schooling and other forms of capacity development
1	Letting go	Initiatives are self- initiated, self- coordinated and self- governed without the help of government	None, government is not participating in any direct way, but indirectly by becoming ambassadors for such initiatives ("hands-off meta- governance" cf. Sørensen, 2006)

Table 1. The ladder of government participation and corresponding roles

Note. Obtained from Mees, Uittenbroek & Driessen (2019, p. 200).

There are three concerns of local policy practioners when descending the ladder (Mees, Uittenbroek & Driessen, 2019). First of all, their own municipal organization might not be flexible and supportive enough for facilitating such initiatives. The second concern is the continuation of citizens' initiatives over a longer period of time, and the third worry when facilitating initiatives is the inequity that might arise between citizens and neighborhoods. This is because initiatives tend to be more common in better-off neighborhoods.

Government participation tends to lean more towards initiatives, whereas citizen participation is more about the individual. Innes & Booher (2004) found five purposes for justifying citizen participation. First of all, decision-makers can find out what the public would like and take this into consideration for their decision. Secondly, citizens have local knowledge which the decision-makers might not have. Therefore, decisions can be improved by incorporating this local knowledge. A third purpose is to advance justice and fairness. Fourth, public decisions can get more legitimacy when citizens have participated and lastly, the law states public officials have to let citizens participate. Other scholars have also pointed out other arguments for citizen participation. Yang & Pandey (2011, p. 880), for example, mention the following values: "fostering citizenship values, enhancing accountability, improving trust in government, maintaining legitimacy, achieving better decisions, and building consensus." In addition, citizen participation is a requirement for social innovation to happen in the public sector (Voorberg, Bekkers & Tummers, 2015). Other benefits of citizen participation include the personal growth of the involved citizen and the strengthening of the democratic process since citizens learn about the distinction of common interest and personal needs (Wagenaar, 2007). Furthermore, Wang (2001) argues that citizen participation reduces the influence of powerful groups with large financial leverages.

Citizen participation does, however, not only involve positive aspects. In fact, there is a deep ambivalence regarding direct citizen participation (Roberts, 2004). Yang & Pandey (2011, p. 880) have also stated some cons for citizen participation if it is not designed or implemented in a proper way. They state that "it may delay decisions, increase conflict, disappoint participants, and lead to more distrust." Furthermore, they mention that the normative value is usually considered to be good, but that the practical benefits are questioned. Also, citizens might not participate effectively because of administrative rules that do not serve their purpose anymore (Yang & Pandey, 2011). Wagenaar (2007) shares the argument of delay since citizen participation takes up a lot of time and energy. Another argument given by Wagenaar (2007) is that citizens are not always interested to contribute or are not qualified. However, Yang & Pandey (2011) have shown that educating the citizens is important for participation. This might in turn overcome the "not qualified" argument, but it does take time. In addition, citizens with a

higher level of education and income are more likely to participate, because of their available resources and knowledge (Goldfinch, Gauld, & Herbison, 2009; Paczynska, 2005). Education is, in fact, often seen as the most powerful in predicting whether or not citizens are willing to participate (Yang & Pandey, 2011). As a consequence, citizens with a lower income and education participate to a lesser extent, even though they might have relevant input. There are thus several arguments that can be made for (not) wanting citizen participation as a government. Everything taken together has led to the first two hypotheses of this research:

H1: Higher educated residents participate more than lower educated residents.H2: Residents with a higher income participate more than people with a lower income.

For the energy transition, participatory and inclusive governance structures are required. Using this approach, perceptions of trust can be improved (Lennon, Dunphy & Sanvincente, 2019). This is important, because acceptance mostly depends on trust in the responsible actors when one knows little about a technology (Steg et al., 2015; Huijts, Molin & Steg, 2012). Therefore, the following section examines public trust.

2.2. PUBLIC TRUST

Public trust, which will be called simply trust from hereon, can be described in various ways (Song & Lee, 2016; Edelenbos & Eshuis, 2012; Klijn, Edelenbos & Steijn, 2010). Miller & Listhaug (1990, p. 358), for instance, define trust as "It reflects evaluations of whether or not political authorities and institutions are performing in accordance with the normative expectations held by the public." This definition is used quite often (Gershtenson, Ladewig, & Plane, 2006). It is also similar to Bouckaert & van de Walle's (2003, p. 336) description: "Trust in government indicates congruence between citizens' preferences and the perceived actual functioning of government." Wang & Wart (2007, p. 266) see trust as "the general concept that the public trusts an agency (or government) to "do the right thing"". However, in their study they used the following definition: "public trust refers to the public's confidence in the integrity of public officials to be fair and to uphold the public interest, as well as confidence in the competence of government to carry out its assigned duties" (Wang & Wart, 2007, p. 266). In Miller & Listhaug's (1990) surveys, trust was researched by asking the respondents if they trusted government and political leaders to do the right thing and if the government and political leaders are honest, fair and competent. These trust aspects correspond with what McKnight, Choudhury & Kacmar (2002, p. 303) called trusting beliefs: perceptions of benevolence, competence, and integrity. They defined benevolence as the "trustee caring and motivation to act in the trustor's interests", competence as the "ability of the trustee to do what the trustor

needs", and integrity as "trustee honesty and promise keeping". Because of these different aspects, trust can be seen as a multi-faceted concept (Lee & Schachter, 2019).

Others describe trust with the generally agreed upon characteristics of vulnerability, risk, and expectations (Klijn, Edelenbos, & Steijn, 2010, p. 195; Edelenbos & Klijn, 2007, p. 29). Vulnerability refers to allowing oneself to be in an open and vulnerable position. Risk means that trust in another party is needed for undertaking any risky, unpredictable and/or ambiguous actions. Risk perception and acceptance of risk are actually strongly related to trust in public institutions (Bronfman et al., 2012). The expectation characteristic concerns the stable and positive anticipation of the intentions and motives of other actors (Edelenbos & Klijn, 2007). So, it can be confirmed that trust is multi-faceted. Despite these differences in conceptualization of trust, consensus exists among scholars on the importance of information, and so transparency, in clarifying how citizens build trust in the government (Song & Lee, 2016).

The American National Election Studies (ANES) has been researching and measuring trust using surveys since 1958 with the so-called ANES Political Trust scale (Poznyak et al., 2014). This scale actually merges the different aspects of trust into four items (See Table 2). The first item, *doing what is right*, focuses on the overall trustworthiness of the government. The second item, *interests*, deals with whether the respondents believe the government is running for special interests or for all people. Thirdly, the *waste* item, is related to the *interests* item and looks more at whether the respondents feel the government acts in an efficient manner. Lastly, the *crooked* item measures the respondent's perceptions on the integrity of the government officials (Poznyak et al., 2014, p. 744). This scale is partly used for the operationalization of public trust which is discussed in chapter 3.

Table 2. The ANES Trust in Government Scale

1. DO WHAT IS RIGHT: "How much of the time do you think you can trust the government in. Washington to do what is right? - (1) just about always, (2) most of the time or (3) only some of the time?" [(4) None of the time – is a volunteered response but is also recorded].

2. INTERESTS: "Would you say the government is (1) pretty much run by a few big interests looking out for themselves or that (2) it is run for the benefit of all the people?"

3. WASTE: "Do you think that people in the government (1) waste a lot of money we pay in taxes, (2) waste some of it, or (3) don't waste very much of it?"

4. CROOKED: "Do you think that (1) quite a few of the people running the government are (1958-1972: a little) crooked, (2) not very many are, or do you think (3) hardly any of them are crooked (1958-1972: at all)?"

2.2.1. TRUST BETWEEN THE GOVERNMENT AND THE GOVERNED

There has been a decreasing level of trust in the government over the past couple of decades (Yang, 2005; Moon, 2003; Torres, 2005; Song & Lee, 2016). In 2001, the Netherlands scored 63.87% on trust in the government which was one of the highest among other European countries (Hudson, 2006). The interesting part is that this level of trust can be completely unrelated to what the government is or does (Bouckaert & van de Walle, 2003). Also, what determines this level of trust may change over time and does not have to be the same for every political culture or country (ibid.; Goldfinch, Gauld, & Herbison, 2009; Hudson, 2006).

There are various sources of trust in government. Sources include the individuals' sociopsychological characteristics, social experiences and socialization, perceptions of government performance, and perceptions of government transparency (Song & Lee, 2016). Furthermore, trust of an individual with a better education, higher income, and of a higher age is stronger (Goldfinch, Gauld, & Herbison, 2009; Hudson, 2006). Unemployed citizens tend to have lower levels of trust in the government (Hudson, 2006). This actually makes sense, as people who are unemployed do not have a significant income. In addition, people that voted for the political party in power, have more trust in government (ibid.; Gershtenson, Ladewig, & Plane, 2006). This leads to the following hypotheses:

H3: Higher educated residents trust government more than lower educated people.H4: Residents with a higher income trust government more than residents with a lower income.

H5: Residents with a higher age trust government more than young residents.H6: Residents that voted for the party in power have more trust in government than residents that did not vote for the party in power.

2.2.2. MORE PUBLIC TRUST LEADS TO MORE PARTICIPATION

There does not exist a consensus among scholars about whether or not public trust leads to more participation (Mannarini, Fedi & Trippetti, 2010). As reasoned above, people with better education and more income usually have a higher level of trust and are more likely to participate. Another argument given is that trustworthy political systems usually results in more citizens participating in government processes (Lee & Schachter, 2019). In addition, citizens that think their government is not trustworthy, are not likely to participate because they believe their opinions do not have an influence on public officers (Lee & Schachter, 2019). In other words, more trust leads to more participation. Kalkbrenner & Roosen (2016), among others, support this statement. Some scholars argue the other way around: more participation results

in more trust (Wang, 2001; Wang & Wart, 2007). Others discuss how a lower level of trust of public administrators' in citizens negatively affects participation (Yang, 2005). Therefore, it is useful to clarify that this paper focuses on trust of citizens in government which may or may not influence citizen participation.

2.2.3. LESS PUBLIC TRUST LEADS TO MORE PARTICIPATION

Avery (2006) argues in the opposite direction. Less public trust might lead to more participation in forms of protests often as a result of wanting substantial change. Avery (2006) also goes one step further by stating that trust has no influence on participation at all. Another theory is that a lack of trust influences citizens in such a way that they raise their voices and start to participate (Lee & Schachter, 2019). Again, this is because of wanting a change in the status quo. Wang & Wart (2007) state that citizens do not trust the government in general which in turn causes more participation.

These differences in literature call for a clarification in the relation between public trust and participation. Since the literature tends to lean more towards the thought that **more** trust leads to participation, the last hypothesis is as follows:

H7: Residents with more trust in government participate more than residents with less trust.

The next chapter describes how this relationship has been researched within the municipality of Rotterdam.

3. METHODOLODY

As discussed in the theoretical framework, there are two strains of thoughts when it comes to public trust and citizen participation. Either more trust leads to participation or less trust leads to participation. This chapter discusses how this paper has researched which of those two thoughts is present in the municipality of Rotterdam. First of all, the context of Rotterdam is given. Subsequently, the data collection is described. Thirdly, the methods of data analysis are provided after which the resulting dataset is given. Lastly, limitations are examined.

3.1. CASE STUDY: THE MUNICIPALITY OF ROTTERDAM

In 2019, the topic of climate and environment took second place in the national problem awareness among Dutch people (Ridder, Miltenburg & Huijnk, 2019). The majority of the Dutch people, therefore, feels a sense of necessity of transitioning towards a more sustainable society. This is supported by the Dutch government, as the Netherlands has signed the Paris Climate Agreement in 2015 to reduce greenhouse gas emissions (Rijksoverheid, 2015). As a result of the Paris Climate Agreement, the National Climate Agreement has been created. Consequently, every municipality should work towards the goals of reducing the emission of greenhouse gasses. That includes the municipality of Rotterdam.

The municipality of Rotterdam is undergoing change. A sustainability department has recently been set up in which they focus on the goals presented in the National Climate Agreement. Especially Rotterdam can make a real difference, since 20% of the national CO₂-emission originates from here because of its harbor and industry (Gemeente Rotterdam, 2019a). The three main objectives of the municipality of Rotterdam are (Gemeente Rotterdam, 2019a, p. 13):

- The yearly CO₂-emission in Rotterdam has turned into a downward trend in 2022.
- The CO₂-emission in Rotterdam has reduced with 49% in 2030 compared to 1990.
- Rotterdam is climate neutral in 2050.

Reaching these goals obviously does not go without any costs. Therefore, the Municipal Executive Committee (*"Het Rotterdams College"*), consisting of Mayor Ahmed Aboutaleb and ten Vice Mayors, has given a budget of 68.2 million euros to initiate the road to sustainability (Gemeente Rotterdam, n.d.-a; Gemeente Rotterdam, 2019a). Rotterdam has begun their journey with creating the Rotterdam Climate Agreement in 2019. This Agreement presents 49 concrete measures as to how to cut the CO₂-emission in half in the coming ten years, i.e. the

second objective (Energieswitch, 2019). These measures are designed by five so-called climate-tables: (1) Harbor and industry, (2) built environment, (3) mobility, (4) clean energy, and (5) consumption (ibid.). This paves the way to reach the ultimate goal of becoming climate neutral in 2050. As this research focuses on the built environment, more specifics on solely this sector are given.

The main goal of the built environment sector is changing an average of 8.000 natural gas connections per year before 2050. This can either be done by joining the district heating or by replacing the boiler for an electric heat pump (Gemeente Rotterdam, n.d.-b). The Municipality of Rotterdam is approaching this challenge at district-level. They have created the "What-Map" (see Figure 2), produced in March, 2018. In this map, one can see for a specific district the current cheapest alternative for natural gas, i.e. district heating or an electric heat pump. Another map is the "When-Map" (see Figure 3) which shows for what districts the Municipality of Rotterdam is planning on making a district contract ("Gebiedsaanpak") to remove them from natural gas. There are five pilot districts for which such an approach is already made and 12 districts are being explored. These five pilot districts are: (1) Rozenburg, (2) Bospolder-Tussendijken, (3) Pendrecht, (4) Prinsenland – Het Lage Land, and (5) Heindijk & Reyeroord. They are colored blue in Figure 2. The 12 districts that are being explored are colored green in Figure 2. These are: (1) Zuidwijk, (2) West, (3) Ommoord, (4) Noord, (5) Zuid Midden, (6) Kop van Feijenoord, (7) Beverwaard, (8) Hoogvliet, (9) Kralingen, (10) Lombardijen, (11) Noordereiland, and (12) Hoek van Holland. At the end of 2021, a final planning will be presented.



*Figure 2. "*What-Map" of Rotterdam (Rotterdam energiebesparing, n.d.). Blue indicates the heat pump is cheaper and red shows that district heating is cheaper.



*Figure 3. "*When-Map" (Gemeente Rotterdam, n.d.-c). Square with number inside represents the amount of natural gas connections; red line indicates existing district heating.

The built environment needs to reach, compared to the other sectors, a relatively small reduction of CO₂-emission, namely 0,4 Mton (Energieswitch, 2019). To accomplish this reduction, the built environment climate table came up with 18 climate deals. These deals and their details are mentioned in the Rotterdams Climate Agreement (*Rotterdams Klimaatakkoord*). Even though the required reduction is relatively small, it does not make it an easy sector in reducing the CO₂-emission. In fact, the challenge in this sector is the variety and number of actors that are involved. Therefore, the president of the climate table also called this sector a complex task (Energieswitch, 2019, p. 17). Everyone is involved in the built environment, ranging from the municipality, real estate parties, entrepreneurs, to the residents of Rotterdam.

Looking at the number of residents, the municipality of Rotterdam is not a small city. At January 1st, 2020, the municipality of Rotterdam counted a little over 650.000 inhabitants (CBS, 2020a). The prediction is that this number will increase to 740.000 in 2050 (Gemeente Rotterdam, 2019a). As one can imagine, this number of people makes the energy transition within the built environment even more complex. Especially since becoming natural gas-free comes with financial demands which might not be available to everyone. For the residents of Rotterdam, these financial requirements might be even more difficult to conquer, since the average income is below the national average. The national average income was 31.700 in 2018, whereas for Rotterdam this was 29.500 in 2018 (CBS, 2019a). These 650.000 people in Rotterdam are spread among 14 districts (see Figure 4). The 14 districts, with the number corresponding to Figure 4, are:

1. Rotterdam Centrum	8. IJsselmonde
2. Delfshaven	9. Pernis
3. Overschie	10. Prins Alexander
4. Noord	11. Charlois
5. Hillegersberg-Schiebroek	12. Hoogvliet
6. Kralingen-Crooswijk	13. Hoek van Holland
7. Feijenoord	14. Rozenburg

Obviously, these 650.000 residents have to live in a house. Rotterdam had in total a little over 310.000 dwellings in 2019. Out of these, 209.000 were rental houses and 100.000 were owneroccupied houses (Onderzoek010, 2020). Furthermore, the unemployment rate in Rotterdam in 2018 was 6.2%, which was higher than the national unemployment rate of 3.8% (CBS, 2019c). Concerning the local politics, *Leefbaar Rotterdam* was the party that gained the most votes (21%) in the municipal elections in 2018 (Gemeente Rotterdam, 2018).



Figure 4. Municipality of Rotterdam (Gemeente Rotterdam, n.d.-d).

The municipality of Rotterdam has also conducted research in 2019 in which a little over 4000 residents of Rotterdam answered some questions about becoming natural gas-free (Gemeente Rotterdam, 2019b, p. 24-25). The results showed that 82% of the Rotterdam population has heard of or has read something about the goal of becoming natural gas-free. Residents who have an owner-occupied house are more aware of this (93%) than people who rent their house (74%). In addition, the older the people are, the more awareness of this topic. This also holds true for people with a higher education and who are more interested in the local politics. Furthermore, 50% agrees that Rotterdam should become natural gas-free, 17% does not agree and 33% does not know or does not have an opinion. Again, residents who occupy their house agree with this more often (53%) than residents who rent their house (46%). It also increases slightly when the resident's income is higher.

These numbers are compared to this research's results. To be able to do this, a data set should first be created. The following section explains how this research has obtained its data to make this comparison and, most importantly, to answer the research question.

3.2. DATA COLLECTION

There are various variables in this research. The main variables are *public trust* (independent), and *citizen participation* (dependent). There are also auxiliary variables, i.e. sociodemographic variables. These include *gender, age, education, income, political affiliation in the municipal election of 2018, residence,* and *dwelling.* Using an online survey in Microsoft Forms, residents of Rotterdam were asked to answer questions related to these variables (see Appendix 1). This survey was distributed using the researcher's own network and Facebook groups with inhabitants of Rotterdam. The Facebook groups in which the survey was posted are presented in Table 3. All of the groups required an approval by (one of the) administrators before being able to join the group. Since these groups were established with a particular purpose, permission to post the survey was asked to one of the administrators. Almost all approved.

Table 3. Facebook groups

Facebook groups in which the survey was posted

- Rotterdam nu
 Berenjacht in Rotterdam
- 3. Marktplaats Rotterdam
- 4. Wat Is Er Aan De Hand in Hoogvliet !!!!
- 5. Werk aangeboden en gezocht in Rotterdam
- 6. Plantenasiel Rotterdam
- 7. 010web Rotterdam en nostalgie Doe ook mee
- 8. Overschie Leeft
- 9. Wat is er aan de hand in Pernis
- 10. Berenjacht en andere evenementen rdam Charlois / Carnisse (officiële groep)
- 11. Hoek van Holland
- 12. Vrienden (en familie) van (en uit) Rotterdam-Ijsselmonde
- 13. Gratis Barendrecht en Rotterdam Ijsselmonde ©
- 14. Hillegersberg-Schiebroek hoek. E.O.
- 15. Wijk oud-Feijenoord
- 16. Mijn Charlois
- 17. Corona Crisis Rotterdam. Deel uw boodschappen
- 18. Wijkraad Agniesebuurt
- 19. Wijkraad Blijdorp en Blijdorpse Poler

The aim while collecting data was to get representative data for Rotterdam as a whole. Representative in the way that all kinds of people filled it in (e.g. young/old, high/low education level, high/low income), but also that not only one or two districts were represented. Therefore, more general kinds of Facebook groups were approached to reach the "average" resident of Rotterdam. This means that groups aimed at sustainability in Rotterdam, for instance, were not approached as these most likely have more knowledge on this topic than the average resident of Rotterdam. In addition, some specific neighborhood and district Facebook groups, if existent/found, were addressed. This was especially the case if no responses from that district were received yet. This resulted in having at least 10 respondents for each district. Another result was that one districts. The distribution of the survey into all these Facebook groups resulted in a final sample size of 404. It is not possible to calculate the response rate, since the reach of the survey is unknown. This sample is compared to Rotterdam's population,

i.e. the census, to check its representativeness. The data on the actual Rotterdam population is retrieved from Onderzoek010 (2020) under "Data", except for the data on *political affiliation* which is retrieved from Gemeente Rotterdam (2018). Table 4 presents the representativeness together with the distribution of the auxiliary variables.

Table 4 shows that the income options were (1) less than 26.000 per year, (2) 26.000-29.500, (3) 29.500-33.000, (4) 33.000-36.5000, and (5) 36.5000 or more. These were developed based on the Central Bureau of Statistics' (CBS) division of income (CBS, 2019b). Option 1 is considered a low income, option 2, 3, and 4 are middle income, and option 5 is seen as high income. This is also done for the education question. Based on CBS (2019c), low education is elementary school, vmbo, and mbo-1. Middle education is considered havo/vwo, mbo-2, mbo-3, and mbo-4. Lastly, a high education level is either HBO or WO.

As can be noticed, the gender distribution is not quite similar as the Rotterdam population. Females are overrepresented in this research. A reason for this could be that women tend to be more active on Facebook than men. The age distribution is more or less the same as the Rotterdam population, with the exception of the <18 group. This is most likely the case, because younger people are not members of the approached Facebook groups. These groups are aimed more at older people. In addition, younger people <18 still live with their parents, making this survey irrelevant for them. They do not have to make these energy transition kinds of decisions yet. Therefore, the one respondent within this category is excluded in this research. The education distribution, especially the low and high education, is not representative. This research has much less low educated respondents compared to the population of Rotterdam. The reason for this is unknown. The distribution of income is also underrepresented with the lower income category. However, there is also a high percentage (26%) that rather did not want to say their income. The middle- and high-income categories are quite representative. The *political affiliation* distribution has some parties that are either underrepresented or overrepresented. DENK, Leefbaar Rotterdam, and PvdA are the parties which are underrepresented in this research. The PVV is the only party which is a little overrepresented in the sample. Again, there is quite a high percentage (20%) of the respondents that preferred to not tell who they voted for. 12% did not vote. There was also a comment of a respondent which said that he/she forgot who he/she voted for. So, there is actually an option within this question missing. However, he/she was the only one who explicitly mentioned it.

Variables	Survey Sample*	Actual Rotterdam Population (census)
Number of respondents	404	650.597
<i>Gender</i> Male Female Rather not say Other	125 (31%) 276 (68%) 3 (1%) -	01-01-20 321.036 (49%) 329.558 (51%) Unknown: 3 (0%) -
Age <18 18-24 25-35 36-45 46-55 56-70 >70	1 (0%) 40 (10%) 67 (17%) 71 (18%) 93 (23%) 112 (28%) 20 (5%)	01-01-20** 139.041 (21%) [0-19 y/o] 51.159 (8%) [20-24 y/o] 114.236 (18%) [25-34 y/o] 86.256 (13%) [35-44 y/o] 83.627 (13%) [45-54 y/o] 105.312 (16%) [55-69 y/o] 70.966 (11%)
Education Elementary school vmbo MBC-1	1 (0%) Low: 8% 23 (6%) 8 (2%)	Age 15-75, 2018 Low: 163.340 (33%)
havo/vwo MBO-2 MBO-3 MBO-4	55 (14%) Middle: 43% 15 (4%) 27 (7%) 78 (19%)	Middle: 193.040 (39%)
HBO WO	127 (31%) High: 49% 70 (17%)	High:138.590 (28%)
Income <26.000 26.000-29.500 29.500-33.000 33.000-36.500 >36.500 Rather not say	93 (23%) Low: 23% 29 (7%). Middle: 30% 47 (12%) 46 (11%) 85 (21%) High: 21% 104 (26%)	2017 Low: 158.383 (53%) Middle: 95.209 (32%) High: 45.808 (15%)
Political Affiliation 50PLUS Beweging Armoedebestrijding CDA ChristenUnie-SGP D66 De Broederschapspartij De Nieuwe Rotterdamsche Partij DENK GroenLinks JEZUS LEEFT Jong Rotterdam Leefbaar Rotterdam NIDA Rotterdam PvdA PvdD PVV SP Stadsinitiatief Rotterdam UCF VVD Did not vote Rather not say	$\begin{array}{c} 10 \ (2\%) \\ 0 \ (0\%) \\ 17 \ (4\%) \\ 5 \ (1\%) \\ 31 \ (8\%) \\ 0 \ (0\%) \\ 2 \ (0\%) \\ 0 \ (0\%) \\ 2 \ (0\%) \\ 0 \ (0\%) \\ 38 \ (9\%) \\ 0 \ (0\%) \\ 0 \ (0\%) \\ 41 \ (10\%) \\ 0 \ (0\%) \\ 14 \ (3\%) \\ 19 \ (5\%) \\ 31 \ (8\%) \\ 23 \ (6\%) \\ 0 \ (0\%) \\ 0 \ (0\%) \\ 47 \ (12\%) \\ 46 \ (12\%) \\ 80 \ (20\%) \end{array}$	3% 1% 5% 3% 10% 0% 1% 7% 10% 0% 1% 21% 5% 10% 4% 4% 5% 2% 0% 11% -

Table 4. Representativeness of collected data compared to census

Table 4 Continued.

Variables	Survey Sample*	Actual Rotterdam Population (census)
Residence		01-01-20
Charlois	24 (6%)	69.377 (11%)
Delfshaven	15 (4%)	76.774 (12%)
Feijenoord	24 (6%)	76.539 (12%)
Hillegersberg-Schiebroek	36 (9%)	44.730 (7%)
Hoek van Holland	15 (4%)	10.378 (2%)
Hoogvliet	78 (19%)	35.181 (5%)
ljsselmonde	10 (2%)	61.340 (9%)
Kralingen-Crooswijk	11 (3%)	54.466 (8%)
Noord	28 (7%)	52.479 (8%)
Overschie	48 (12%)	19.201 (3%)
Pernis	39 (10%)	4.886 (1%)
Prins Alexander	21 (5%)	95.926 (15%)
Rotterdam Centrum	18 (4%)	36.039 (6%)
Rozenburg	36 (9%)	12.511 (2%)
Dwelling		2019
Rental	138 (34%)	208.899 (68%)
Owner-Occupied	266 (66%)́	99.952 (32%) [´]

Note. Because of rounding the percentages, the survey sample scores is not always perfectly 100% in total. Also, the total number from the Rotterdam population is based on the age groups between these brackets: [-]. This division of age was found after conducting the surveys, and so could not be adjusted anymore.

The *residence* category is actually not that well represented. There are only three districts, Hillegersberg-Schiebroek, Hoek van Holland, and Noord, which are similar as the census. Fortunately, every district is represented by at least 10 respondents. There was one respondent who did not fill in the residence question. This person is excluded, as the assumption can be made that he/she does not live in Rotterdam. The *dwelling* distribution is also not very representative. There are way more owner-occupied replies in the sample than there are in Rotterdam. The probable main reason for this is that people with a rental house felt this survey was not relevant to them and so did not fill it in. Those comments were regularly made in the Facebook groups. There were also five respondents with a rental house who did fill in the survey, but explicitly mentioned this feeling of irrelevance at the end of the survey. These five respondents were excluded from the data, as their answers might not be completely reliable. Consequently, together with the exclusion of the <18 respondent and of the respondent who did not fill in the residence, seven respondents were excluded. So, the total number of respondents changed into 397.

The representativeness of any research can be improved by weighting. Therefore, this research has applied weights. How this has been done, is explained in the following section.

3.3. WEIGHTING

To overcome under- and overrepresentation within surveys, weights are applied. Without weighting the sociodemographic auxiliary variables, bias can exist resulting in less accurate results (Royal, 2019; Lavallée & Beaumont, 2015; Little, 1993; Valliant, Dever & Kreuter, 2013). Weighting can be done in various ways, including post-stratification. Post-stratification weighting "involves taking sample data and aligning the representation of various subpopulation groups to match that of the known population." (Royal, 2019, p. 49). Lavallée & Beaumont (2015) refer to this as calibration. As the name suggests, weights are applied after the data has been collected (Lu & Gelman, 2003; Royal, 2019). Post-stratification requires that data about the total population, i.e. the census, is known for every researched variable. This research, for example, has gender as a variable. In order to be able to do post-stratification, the distribution of gender within the total population of Rotterdam, i.e. this research's census, should be known. It is also possible that more than one variable is used for post-stratification, for instance gender and age. If gender has two categories (male & female) and age three categories (young, middle, old), it means data of the census should be available for six (2 * 3 categories) subgroups: young male, middle male, old male, young female, middle female, and old female. The more variables used for weighting, the more subgroups arise. Therefore, poststratification becomes increasingly more difficult with multiple variables. In addition, data of the census for all the subgroups might not be available.

If the data is not available, raking can be applied as an alternative for weighting with more than two categorical auxiliary variables (Lavallée & Beaumont, 2015). Raking "is a poststratification method that can be used when poststrata are formed using more than one variable, but only the marginal population totals are known." (Lu & Gelman, 2003, p. 135). The raking method is also known as rim weighting, iterative proportional fitting, multiplicative weighting, multivariate weighting, or raking ratio estimation (Kulas et al., 2018; SAGE Publications, 2008; Lavallée & Beaumont, 2015; Suesse et al., 2017). Hill (2018) clearly explains the raking approach: "Raking weighting incorporates the known characteristics of the population into the sample. This is done in an iterative process, with each demographic factor introduced in a sequence." In other words, raking uses the auxiliary variables separately and multiplies them with each other for the weighting, whereas post-stratification creates weights for all the possible subgroups.

3.3.1. WEIGHTING IN THIS RESEARCH

This research has applied the raking method to calculate weights for three reasons. First, there is under- and over representation as illustrated in section 3.2. Secondly, there is no data available for the subgroups in the census, Rotterdam in this case, when more than two variables are crossed, with the exception of gender and age. Data for the separate variables, however, does exist as previously shown in Table 4. Lastly, it is recommended to use as many auxiliary variables as possible for weighting ("Weighting Adjustments", n.d.) which is relatively easier with raking compared to post-stratification (Dal Grande et al., 2015).

When looking at the literature on weighting, in particular raking, complex formulas are almost always used to explain the weighting process (see e.g. Lavallée & Beaumont, 2015; Lu & Gelman, 2003; Suesse et al., 2017; Deville, Särndal & Sautory, 1993). Fortunately, SPSS has a special command, *rake weights (SPSSINC_RAKE)*, to apply weights using the raking method on up to 10 variables. This research has executed the *rake weight* command on five variables: *gender, age, education, residence, and dwelling*. These are the sociodemographic variables for which data on the census is also available. Income has also been considered. However, the available data for this variable relies on household income, whereas this research focused on the income of the individual. *Political affiliation* has not been included in the raking process, as data in the census for the category "rather not say" is not available. Furthermore, *political affiliation* has too many small cell sizes. Dal Grande et al. (2015), for instance, excluded categories with less than 5%. This would imply more than half of the *political affiliation* as well. However, *political affiliation* cannot be collapsed as votes for different parties cannot be put together. A vote for VVD, for example, is not the same as a vote for D66.

The input for the five sociodemographic variables used in this *rake weight* command is given, so one could replicate it if desired (see Table 5). No other research using the rake weight command has done this, making this command more difficult to comprehend for someone new in this topic. The first number represents the value of the category, so in this case 1 within the gender variable stands for male. The number behind the dot indicates the fractions of the census, so 1 .49 means that 49% of the actual population in the Rotterdam is male. 2 .51, therefore, indicates that 51% of the census is female, etc.

Table 5. Input in Rake Weights in SPSS

Control Total Variable	Categories and Control Totals or Fractions
1.Gender	1 .49 2 .51 3 .01
2. Age	1 .08 2 .18 3 .13 4 .13 5 .16 6 .11
3. Education	1 .33 2 .39 3 .28
4. Residence	1 .11 2 .12 3 .12 4 .07 5 .02 6 .05 7 .09 8 .08 9 .08 10 .03 11 .01 12 .15 13 .06 14 .02
5. Dwelling	1. 68 2 .32

The maximum iteration, convergence, and Delta under options remained on their default settings, 20, .0001, and .5, respectively. Applying the *rake weight* command resulted into the values shown in Table 6. Table 6 also deals with the descriptive statistics of the sociodemographic variables as it includes the percentages, frequency, mean, and standard deviation of all variables. The means and standard deviations given under the sociodemographic variables column are derived from the weighted data.

To provide transparency for the reader (Royal, 2019), both the unweighted and weighted values are given. Within *political affiliation*, there were several parties that did not have any responses at all. The concerned parties are – with their assigned value in SPSS between brackets – Beweging Armoedebestrijding (2), De Broederschapspartij (6), DENK (8), JEZUS LEEFT (10), Jong Rotterdam (11), NIDA Rotterdam (13), Stadsinitiatief Rotterdam (18), and UCF (19). These were left out of the table. The "other" category within gender is excluded from the table for the same reason.

The resulting dataset has been used to answer the research question. How this has been done, is described in the next section.

Socio-demographic variables (value used in SPSS)	Census	Sample (N = 3	e Unweighted 97)	Sample (N = 39	Weighted 7)
	%	%	Freq.	%	Freq.
Gender: $M = 1.52$, $SD = .519$	40	31	101	40	103
Female (2)	49 51	69	273	49 51	200
Rather not say / unknown (3)	1	1	3	1	4
			C C		•
<i>Age: M</i> = 3.56, <i>SD</i> = 1.599		4.0		4.0	10
18-24 (1)	8	10	39	10	40
25-35 (2) 26.45 (2)	18	17	66 71	23	90 65
30-43 (3) 46-55 (4)	13	10	7 I 03	17	65
56-70 (5)	16	28	110	20	80
>70 (6)	11	5	20	14	55
Education: $M = 1.95$, $SD = .78$	22	o	21	22	101
Low (1) Middle (2)	30	0 13	31 172	30	151
High (3)	28	43	194	28	111
	20	10	101	20	
Income: M = 2.35, SD = 1.024					
Low (1)	53	22	89	24	93
Middle (2)	32	31	121	35	140
Rather not say (4)	15	21	00 102	24 17	94 69
Rather not say (+)		20	102	17	05
Political Affiliation: $M = 14.33$, $SD = 6.345$					
50PLUS (1)	3	3	10	2	7
CDA (3)	5	4	16	4	14
ChristenUnie-SGP (4)	3	1	5	2	/
Dob (5) De Nicura Potterdomecho Portii (7)	10	8	30	12	48
Groent inks (9)	10	a I	2 37	2	7 36
Leefbaar Rotterdam (12)	21	10	40	5	19
PvdA (14)	10	4	14	8	31
PvdD (15)	4	5	19	3	13
PVV (16)	4	8	31	15	58
SP (17)	5	6	22	8	32
VVD (20)	11	12	47	5	18
Did not vote (21)	-	11	44	15	60
Rather not say (22)	-	20	80	12	48
Residence: <i>M</i> = 6.58. <i>SD</i> = 4.13					
Charlois (1)	11	6	23	11	43
Delfshaven (2)	12	4	15	12	47
Feijenoord (3)	12	6	24	12	47
Hillegersberg-Schiebroek (4)	7	9	36	7	28
Hoek van Holland (5)	2	4	15	2	8
Hoogvliet (6)	5	20	78	5	20
Ijsseimonde (7)	9	3	10	9	35
Kralingen-Crooswijk (8)	8	3	10	8	31
Overschie (10)	о 3	12	20 48	0 3	12
Pernis (11)	1	10	38	1	4
Prins Alexander (12)	15	5	20	15	59
Rotterdam Centrum (13)	6	5	18	6	24
Rozenburg (14)	2	9	34	2	8
Dwolling M 4 22 CD 427					
Dweiling: $IVI = 1.32$, $SD = .467$ Rental (1)	68	33	132	68	270
Owner (2)	32	69	265	32	127

Table 6. Weighted versus unweighted percentages and frequency of socio-demographic variables

Note. Age and *income* do not match the census percentages perfectly, because the age group <18 is not included and because there is the extra category of "rather not say" with *income.*

METHODS OF DATA ANALYSIS 3.4.

A multiple regression, carried out by SPSS Statistics version 26, was used to analyze the obtained data. Using this statistical test, it is possible to analyze "the effect of an independent variable on a dependent variable, controlling for the effect of other predictors, i.e. other independent variables included in the analysis." (Sposato & Hampl, 2018, p. 241). Translated to this research, it was investigated whether *citizen participation* can be predicted based on public trust, and the auxiliary variables gender, age, education, income per capita, and dwelling (see Figure 5). Descriptive statistics on these variables are examined in chapter 4. This section describes how citizen participation and public trust were analyzed and operationalized with various statements.



H1: Higher educated residents participate more than lower educated residents. H2: Residents with a higher income participate more than people with a lower income. H3: Higher educated residents trust government more than lower educated people. H4: Residents with a higher income trust government more than residents with a lower income. H5: Residents with a higher age trust government more than young residents. H6: Residents that voted for the party in power have more trust in government than residents that did not vote for the party in power.

Figure 5. Conceptual framework (H = hypotheses, IV = independent variable, DV = dependent variable).

3.4.1. CITIZEN PARTICIPATION

Citizen participation was divided into three subsets. Based on the outcome of the Cronbach's alpha, a regression was done with a subset or only its descriptive statistics were given. This regression was run with the average of the subset. The first subset related to the willingness of the residents of Rotterdam to participate in becoming natural gas-free in such a way that they actually implement measures in their own home. For this subset, respondents could indicate on a 5-point Likert scale whether they strongly agreed, disagreed, were neutral, agreed, or strongly agreed with four statements. There was also an extra option, "already done this", when the respondent had already done a particular action to become natural gas-free. The statements were:

- 1. I am willing to insulate my house.
- 2. I am willing to cook with electricity rather than with gas.
- 3. I am willing to install a heat pump instead of my boiler.
- 4. I am willing to join the district heating network.

The second subset related to the willingness of citizens to join particular participation mechanisms. Similar to the first subset, the respondents could indicate on a 5-point Likert scale whether they (dis)agreed with the following six statements. Again, the option "already done this" was available.

- 1. I am willing to join a neighborhood meeting in which the energy transition will be discussed.
- 2. I am willing to start or join an energy initiative (e.g. solar panels in the neighborhood with the *Rotterdamse Energiecoöperatie (REC)*).
- 3. I am willing to visit the website of the municipality to gather information about the energy transition.
- 4. I am willing to visit physical sites to gather information about the energy transition (the *Duurzaamheidswinkel* in Ijsselmonde or the *Huiskamer aardgasvrij* in Pendrecht).
- 5. I am willing to contact the municipality online/by calling to gather information about the energy transition.
- 6. I am willing to have physical meetings with people from the municipality to talk about the energy transition.

The third and last subset was about the citizen's role and their influence in the decision-making in becoming natural gas-free. This is derived from the ladder of citizen participation. There were three statements for this subset. The respondents had the same 5-point Likert scale, but without the "already done this" option.

- 1. I want the municipality of Rotterdam to be the leader in the energy transition.
- 2. I want to participate in the energy transition independently and on my own terms.
- 3. I want to have a say in the decision-making process within the energy transition.

3.4.2. PUBLIC TRUST

There have been various studies that examined public trust using only one, or a couple of questions. Hudson (2006, p. 51), for example, asked *"I would like to ask you a question about how much trust you have in certain institutions. For each of the following institutions would you please tell me if you tend to trust it or not to trust it?*". Lee & Schachter (2019, p. 408) used the

same method by asking the same question for trust within different institutions. Goldfinch, Gauld & Herbison (2009, p. 339) asked only one direct question: *"Government in Australia/New Zealand is generally trustworthy*" with a four-point Likert scale ranging from strongly agree to strongly disagree." Avery (2006, p. 661) asked two questions to measure trust: *"How much of the time do you think you can trust the government in Washington to do what is right?"* and *"Would you say the government is pretty much run by a few big interests looking out for themselves or that it is run for the benefit of all the people?"*

These questions all relate to the definitions, aspects and the ANES scale of trust discussed in the theoretical framework. Public trust in this research was measured using the average of four statements derived from that literature. Individuals were asked to indicate on a 5-point Likert scale how strongly they (dis)agreed with the following statements:

- 1. The municipality of Rotterdam is generally trustworthy.
- 2. I believe the municipality of Rotterdam to do what is right.
- 3. The municipality of Rotterdam is not performing the way I expected.
- 4. I believe the municipality of Rotterdam has personal interests in mind rather than the public's interest.

3.4.3. STEPS IN SPSS

A step-by-step guide on what has been done in SPSS for the multiple regression is provided for replicability reasons. The main idea was that first the regression is done between the dependent variable, *citizen participation*, and the independent variable, *public trust*. Then, the auxiliary variables – *education, income, age, gender,* and *dwelling* – were added one by one to investigate any differences in outcome.

STEP 1. Conduct the reliability analysis of Cronbach's alpha on the subsets of *citizen participation* and on *public trust* with reversed statements. What this entails, is described in section 4.1

STEP 2. If Cronbach's alpha is acceptable, compute variables with the averages of the subsets of *citizen participation* and of *public trust.*

STEP 3: Create dummy variables for the auxiliary variables (explained more in section 4.5.1.) **STEP 4:** Check the assumptions of the multiple regression.

STEP 4: Run standard multiple regression.

3.5. LIMITATIONS

Every research has its limitations. The ones this study encountered are discussed in this section. First of all, "only" 404 responses were obtained from the survey among people living in Rotterdam, whereas the municipality counts a little over 650.00 residents. As a result, not all categories within the auxiliary variables are represented that well. In fact, within the *political affiliation* variable some parties are not represented at all. Therefore, if the outcomes were based on *political affiliation*, it becomes less reliable when they are generalized to the Rotterdam population as a whole. Even though political affiliation does not have a significant impact on sustainable behavior (Heeren et al., 2016), it might still have an influence on either public trust or citizen participation. Unfortunately, because of the underrepresentation of some parties, this research was unable to provide an answer on this.

In addition, mostly Facebook has been used to gather respondents. However, not everyone has or is active on this platform. Therefore, not all residents of Rotterdam have had the opportunity to fill out the survey. Consequently, it might be difficult to generalize the outcome of this research.

Furthermore, people who are not interested in this topic are less likely to participate in this research even though their input is still relevant. There was, for example, one instance in which someone on Facebook explicitly mentioned that he did not fill out the survey, because he believed it is all a hoax. This might also have influenced the outcome in such a way that it does not represent how the residents of Rotterdam actually feel concerning this subject.

Moreover, the number of renters was quite high. This could be considered a limitation, as their influence in becoming natural gas-free in their own home is limited. They are partly dependent on the housing corporation. Nevertheless, it was decided to keep their responses, because they might be renters now, but this may change in the future. It is thus presumed that they keep this position.

Another limitation is that no weights were applied to the sociodemographic variables for the inferential statistics to overcome the under- and overrepresentation. As a result, less accurate outcomes can occur. Why the regressions have been done without weights and their outcomes, are described in the next chapter.

4. ANALYSIS

This chapter first examines the Cronbach's alpha of *citizen participation* and *public trust* to test their reliability. Subsequently, the descriptive statistics are explored of *citizen participation*, *public trust*, and the additional questions in the survey which did not belong to any variable but still worthwhile researching. These include awareness of the goal of Rotterdam to become natural gas-free, what this means for the residents personally, whether they feel it is necessary, and their biggest obstacle in becoming natural gas-free. In addition, the results of the regression analysis are given. An important side note is that the regression analysis is done without weights, because only descriptive statistics can be done with raked weights. This is explicitly mentioned in the "theory and practice" file from IBM Corporation (2011) and on the IBM Support (n.d.) website which explains the raking method.

4.1. RELIABILITY ANALYSES

The Cronbach's alpha (α) was measured for the three subsets of *citizen participation* and for *public trust.* Cronbach's alpha is "a commonly used test of internal reliability" (Bryman, 2012, p. 170). In other words, it checks whether or not different items when put together measure the same thing (Bland & Altman, 1997). So in this case, the Cronbach's alpha tests if the statements that make up a subset for *citizen participation* and the statements of *public trust* are correlated. The alpha score can range from 0 to 1, 0 meaning no internal reliability and 1 denoting perfect internal reliability. Values of 0.7 or higher are regarded as acceptable (Bland & Altman, 1997; Lavrakas, 2008).

Table 7, 8, and 9 show the alpha scores of the subsets of *citizen participation*. The first and second subset both had an acceptable score. The third subset, however, initially had a negative Cronbach's alpha score. Therefore, the first statement was reversed. This entails that the strongly disagree answers were reversed into strongly agree, and disagree to agree, because then the statements would all be formulated positively. Thus, the direction of the question was changed. This resulted in an alpha of .538. If one of the statements were deleted, the alpha would not increase and so this subset was not that reliable. As a consequence, only descriptive statistics were performed on this subset and a regression was not run.

Statements $(N = 4)$	Cronbach's Alpha
1. I am willing to insulate my house.	
I am willing to cook with electricity rather than with gas.	.722
3. I am willing to install a heat pump instead of my boiler.	
I am willing to join the district heating network.	

Table 7. Reliability of subset 1: implementation of specific measures

Table 8. Reliability of subset 2: the willingness of residents to join particular participation mechanisms

Statements $(N = 6)$	Cronbach's Alpha
 I am willing to join a neighborhood meeting in which the energy transition will be discussed. am willing to start or join an energy initiative (e.g. solar panels in the neighborhood with the <i>Rotterdamse Energiecoöperatie (REC))</i>. I am willing to visit the website of the municipality to gather information about the energy transition. I am willing to visit physical sites to gather information about the energy transition (the <i>Duurzaamheidswinkel</i> in Ijsselmonde or the <i>Huiskamer</i> <i>aardgasvrij</i> in Pendrecht). I am willing to contact the municipality online/by calling to gather information about the energy transition. I am willing to have physical meetings with people from the municipality to talk about the energy transition. 	.863

Table 9. Reliability of subset 3: citizen's role and their influence in the decision-making

Statements ($N = 3$)	Cronbach's Alpha
 I want the municipality of Rotterdam to be the leader in the in the energy transition. * I want to participate in the energy transition independently and on my own terms. I want to have a say in the decision-making process within the energy transition. 	.538
*Reversed	

Concerning *public trust,* the third and four statement were negative. So, these first had to be reversed in order to find out the reliability of *public trust.* With these four statements, the Cronbach's alpha was .611. This is not an adequate level of inter-item reliability. However, with the fourth item deleted, $\alpha = .766$ which means *public trust* becomes reliable (see Table 10) Therefore, the fourth item was left out of the analysis. Consequently, only the first three statements were used to measure the average of *public trust.* This average was used for the regression.

Statement ($N = 3$)	Cronbach's Alpha
 The municipality of Rotterdam is generally trustworthy. I believe the municipality of Rotterdam to do what is right. The municipality of Rotterdam is not performing the way I expected. * 	.766

*Reversed

4.2. DESCRIPTIVE STATISTICS CITIZEN PARTICIPATION

This section investigates the descriptive statistics, with weights, of *citizen participation*. This is done separately for the three subsets. The mean of the subsets is compared across the means of the auxiliary variables using *Compare Means* in SPSS. In other words, the mean of subset 1 is compared to the means of the categories of an auxiliary variable. For example, it can be examined whether either males or females appear to have a higher or lower mean when it comes to subset 1. These mean differences are checked in the regression section. A one-way ANOVA was not possible, because the test of homogeneity of variances showed significance scores that were too low. In addition, cross tabulations were run with *education* and *income* in combination with one of the subsets of *citizen participation*, as these belong to two of the hypotheses.

4.2.1. SUBSET 1: WILLINGNESS TO IMPLEMENT MEASURES

The first subset, as mentioned before, is about how willing the residents of Rotterdam are to implement certain measures to become natural gas-free in their own home. The answers of the 397 respondents for the four particular measures are shown in Table 11.

Measure	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Already done
Insulate house	3.7%	5.5%	18.5%	32.7%	13.0%	26.5%
Cook with electricity	3.9%	13.2%	7.8%	22.7%	20.0%	32.3%
Install a heat pump	7.4%	18.5%	38.9%	23.4%	9.0%	2.9%
Join the district heating network	7.6%	11.5%	26.2%	39.4%	4.1%	11.1%

Table 11. Outcome of subset 1

What especially strikes the eye is that the strongly disagree percentages are relatively low. Overall, the residents of Rotterdam are thus willing to implement measures. There are, of course, differences between the measures. Insulating one's house and cooking with electricity are the two measures that people most strongly agree to. This might be, because these measures may be easier to comprehend and require less impactful decisions compared to the heat pump and joining the district heating network. Insulating and cooking with electricity are also already being done quite frequently, probably because of the same reasons. Installing a heat pump, on the other hand, has been done by only 2.9% of the respondents. There is a high percentage of neutral regarding the heat pump. The assumption is that most people simply do not know enough about the heat pump.
The average of this subset, so the four measures together, is 3.838. This mean is based on the Likert scale in which 1 is strongly disagree and 6 already done. So, 3.838 means that the residents of Rotterdam lean more toward agree than neutral regarding implementing measures. Table 12 presents the difference of the mean of this subset with the means of the categories from the auxiliary variables.

Subset 1 * Auxiliary Variables	М	SD	Difference in M
(AV)			AV – Subset
Subset 1	3.838	1.025	-
Gender			
Male	4.021	1.049	0.183
Female	3.662	.980	- 0.176
Rather not say / unknown	3.805	.525	- 0.033
Age			
18-24	3 845	810	0.007
25-35	4 083	764	0.245
36-45	3 107	834	- 0 731
46-55	3.735	.662	- 0.103
56-70	4.108	1.087	0.270
>70	4.022	1.502	0.184
Education			
Low	4.234	.906	0.396
Middle	3.331	1.076	- 0.507
High	4.076	.765	0.238
Income			
Low	3.593	.730	- 0.245
Middle	3.972	1.016	0.134
High Dath an act a su	4.091	1.144	0.253
Rather not say	3.550	1.092	- 0.288
Political Affiliation			
50PLUS	3 106	1 035	- 0 732
CDA	3 094	780	- 0 744
ChristenUnie-SGP	3 595	305	- 0 243
D66	4.750	.799	0.912
De Nieuwe Rotterdamsche Partij	4.571	.617	0.733
GroenLinks	3.920	.784	0.082
Leefbaar Rotterdam	3.782	1.358	- 0.056
PvdA	3.569	1.454	- 0.269
PvdD	3.867	.340	0.029
PVV	2.978	.856	- 0.860
SP	3.981	.744	0.143
VVD	4.405	.886	0.567
Did not vote	3.674	.421	- 0.164
Rather not say	4.235	1.047	0.397
Dasidanaa			
Charlois	2 621	820	0.207
Delfshaven	3.031	.020	0.092
Feijenoord	3.600	1 260	- 0 238
Hillegersberg-Schiebroek	3 536	629	- 0.302
Hoek van Holland	3.347	.501	- 0.491
Hooavliet	3.332	.924	- 0.506
ljsselmonde	3.388	1.086	- 0.450
Kralingen-Crooswijk	4.417	.687	0.579

Table 12. Subset 1 means compared

Noord	3.709	.817	- 0.129
Overschie	3.189	.788	- 0.649
Pernis	3.334	.688	- 0.504
Prins Alexander	4.822	.852	0.984
Rotterdam Centrum	3.495	1.236	- 0.343
Rozenburg	3.742	.789	- 0.096
Dwelling			
Rental	3.671	1.014	- 0.167
Owner	4.192	.959	0.354

Gender appears to not have a great influence on subset 1, as the differences are not that great. This means that it does not really matter whether someone is a male or female when it comes to participating in implementing certain measures. However, as the male difference is positive, men tend to more willing to do this implementation. Within the age variable, the 36-45 group stands out with their difference in means. Since the difference is negative, this age group tends to lean more toward neutral than agree concerning subset 1. In other words, out of all age groups, the residents aged 36-45 are the least willing to implement measures. On the other hand, the age group 57-70 is the most willing. It does not seem to be the case that the older someone is, the more willing they are to participate. This is because the 25-35 aged residents have, on average, indicated agree on the four statements as well and so their willingness is similar to the 56-70 group. Education also seems to not have this relation of the higher educated, the more they are willing to participate. In fact, residents with a low education are most prone to participate. Middle educated residents tend to be more neutral regarding implementing measures. *Income*, however, does appear to have this relation, because the higher the income, the more residents are willing to participate. One reason for this could be that they have the financial resources to actually implement measures. The political affiliation variable shows a couple of parties with big differences. The parties with a negative difference are 50PLUS, CDA, and PVV. So, this means they are neutral when it comes to this subset. This result for 50PLUS is surprising, as the majority of the 50PLUS voters is 65+ (NOS, 2019), even though the age variable indicated that the 56+ residents are actually quite willing to participate. The D66 shows such a positive difference, that this party leans toward strongly agree. The residence variable indicates this for Prins Alexander as well. The three districts with residents that seem to be less willing to participate are Hoogvliet, Overschie, and Pernis. Lastly, dwelling shows that residents who own their house are more willing to implement measures. This might be explained by that owners could see these measurements as an investment, whereas the renters may believe this implementation to be the responsibility of the housing corporation.

Performing cross tabulations for this subset with *education* and *income* resulted in the bar charts shown in Figure 6 and Figure 7. Unfortunately, it was not possible to change the count

into percentages. Therefore, the interpretation of the bar charts includes percentages. The hypothesis for *education* was that higher educated residents participate more than lower educated residents. Regarding *income*, it was hypothesized that residents with a higher income participate more than residents with a lower income. These hypotheses are the same for all the three subsets of *citizen participation*.

What immediately stands out in the cross tabulation with *education* (Figure 6), is the count for low education at 5.25 for participation. This corresponds to 36.2%. This means that there are residents with a low education that have already done some of the implementation, as the score is above 5.00. Therefore, it appears that lowly educated residents are actually very willing to implement measures. The middle education residents are more spread out and are represented in every participation value, except for 1.50 and 5.50. The biggest group, 14.9%, has a participation level of 3.50. Thus, the majority of the residents with a middle education tend to be in between neutral and willing when it comes to implementing measures. Nevertheless, they are not as willing as lowly educated residents. As for the highly educated residents, less than 11% has a score lower than 3.50. This indicates that they are very willing to implement measures. There is even 1.8% that has already implemented all four measures. All in all, the lower and higher educated residents both tend to be very willing to implement certain measures to become natural gas-free in their own home.



Bar Chart

Figure 6. Cross Tabulation Subset 1 and Education.

Figure 7 presents the bar chart resulting from the crosstabulation with subset 1 and *income*. It shows that for the low-income residents, there is 0% with a score lower than 2.00. Therefore, there is no one with a low income that is not willing at all to implement measures. The highest percentage is found at 4.00 with 23.3%. So, the majority of the residents with a low income is willing to participate. Among the residents with a middle income, the most occurring level of participation is 3.50 with 21.1%. Consequently, 21.1% of the residents with a middle income are in between neutral and agree. However, the runner up is the score of 5.25 with 18.3%. Some have thus already implemented measures, as this score is higher than 5.00. That also implies that a big group of middle-income residents are very willing to implement measures. This same value, 5.25, is actually the biggest with 27.7% within the group of residents with a high income. What is interesting is that there seems to be a contrast within the high-income category. The second largest group, with 19.1%, namely has a score of 2.50. So, residents with a high income are either very willing or not that willing at all. The next section examines the same descriptive statistics for subset 2.



Figure 7. Cross Tabulation Subset 1 and Income.

4.2.2. SUBSET 2: WILLINGNESS TO JOIN PARTICIPATION MECHANISMS

The second subset is about how willing the residents of Rotterdam are to join certain participation mechanisms regarding becoming natural gas-free in their own home. The answers of the 397 respondents for the six particular mechanisms are shown in Table 13.

Participation mechanism	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Already done
Join neighborhood meetings	2.8%	18%	24.5%	39.2%	13.8%	1.7%
Join/start energy initiative	7.7%	20.1%	31.1%	18.9%	20.4%	1.8%
Visit website	3.7%	13.9%	17.3%	53%	8.2%	4%
Visit physical sites	6.6%	34.6%	27%	23.4%	5%	3.3%
Contact online/by calling	7.3%	31.8%	21%	35.7%	2.8%	1.5%
Physical meetings	6.6%	27.7%	27.1%	32.5%	4.1%	2%

Table 13. Outcome of subset 2

The residents have indicated agree quite often with all of the mechanisms, with the exception of joining and/or starting an energy initiative and visiting physical sites. The reason for this could be that it takes more effort than the other mechanisms. The physical sites, for example, might not be close to their own home and so they would have to take the time to go and visit. That might also explain why nearly 35% disagreed, the highest among the mechanisms. Another numbers that stands out, is the 53% under agree about willing to visit the website of the municipality. This is relatively high. Also worthwhile mentioning is that the "already done" percentages are low. This indicates that the residents of Rotterdam have not joined these particular mechanisms very often (yet).

Similar to what has been done in subset 1, the mean of subset 2 is compared to the means across the auxiliary variables (see Table 14). Subset 2 has a mean of 3.231. This indicates that the residents of Rotterdam do not really have a strong opinion on joining particular participation mechanisms, as the 3 corresponds to neutral from the Likert scale.

Table 14.	Subset 2	means	compared
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Subset 2 * Auxiliary Variables	М	SD	Difference in M
(AV)			AV – Subset
0 / / / 0	0.004	070	
Subset 2	3.231	.878	-
Gender			
Male	3.422	.845	0.191
Female	3.036	.872	- 0.195
Rather not say / unknown	3.842	.506	0.611
_			
Age	0.444	002	0.400
25 25	3.111	.903	- 0.120
36-45	2 889	637	- 0.342
46-55	3.487	.807	0.256
56-70	3.414	1.054	0.183
>70	3.293	1.091	0.062
Education	0.070	700	0.117
Low	3.678	.763	0.447
Middle	2.795	.888	- 0.436
Tign	5.515	.000	0.082
Income			
Low	3.110	.750	- 0.121
Middle	3.286	.791	0.055
High	3.544	.997	0.313
Rather not say	2.860	.882	- 0.371
Political Attiliation	2.044	070	0.297
	2.944	.979	- 0.207
Christenl Inie-SGP	3 055	.499	- 0.176
D66	3.687	.697	0.456
De Nieuwe Rotterdamsche Partij	4.199	.463	0.968
GroenLinks	3.573	.435	0.342
Leefbaar Rotterdam	3.315	1.401	0.084
PvdA	3.084	1.158	- 0.147
	3.645	.990	0.414
SP	2.000	.050 461	- 0.023
VVD	3.128	.890	- 0.103
Did not vote	3.221	.814	- 0.010
Rather not say	3.412	.902	0.181
Residence			
Charlois	2.871	.569	- 0.360
Delfsnaven	3.268	.708	0.037
Hillegersberg-Schiebroek	3.091	541	- 0.140
Hoek van Holland	2.727	.442	- 0.504
Hoogvliet	2.836	.968	- 0.395
ljsselmonde	3.027	.621	- 0.204
Kralingen-Crooswijk	3.428	1.013	0.197
Noord	3.688	.830	0.457
Overschie	3.134	.608	- 0.097
rellis Prins Alexander	3.U04 3.862	.45∠ 704	- 0.177
Rotterdam Centrum	2 699	754	- 0 532
Rozenburg	3.454	.621	0.223
č			
Dwelling	0.075		0.450
Rental	3.075	.789	- 0.156
Owner	3.304	.904	0.333

Table 14 shows that for *gender*, males appear to lean more toward agree than females with joining particular participation mechanisms. The unknown within gender has even a greater difference than males. Therefore, males and the unknown gender are more willing to participate and females tend to be more neutral. Within the age variable, the three youngest categories all have a negative mean difference whereas this is positive for the three oldest age groups. So, it seems that the older people are, the more willing they are to join participation mechanisms. As for education, the main contrast is between low and middle education. Residents of Rotterdam with a lower education are more willing than residents with a middle education. There also appears to be a difference in citizens with a low and high income, in which a low income is negative and high positive. Residents with a high income are thus more prone to join participation mechanisms. Political affiliation is the variable which seems to have the greatest differences, especially CDA and PVV (negative) and De Nieuwe Rotterdamsche Partij (positive). Residence looks as if it does not play a role in joining participation mechanisms, except for the districts Hoek van Holland, Prins Alexander, and Rotterdam Centrum. Concerning the dwelling variable, residents who own their house tend to lean more toward agree than renters. This is similar as subset 1.

Running cross tabulations for this subset with *education* and *income* resulted in the bar charts shown in Figure 8 and Figure 9. Both cross tabulations have no score higher than 5.17. That indicates that no resident has already joined all of the six mechanisms. The *education* cross tabulation (Figure 8) shows that only 5.5% among the residents with a low education have a level of participation lower than 2.83. On the other hand, the biggest group with 20% has a score of 4.17. Therefore, it seems that the lowly educated residents are willing to join the participation mechanisms. The residents with a middle education are more spread out, but the score of 2.33 is represented most often by far with 22.2%. Thus, this group of residents is actually not that willing. There is even 5.2% that are not willing at all to join any of the mechanisms, which does not occur among the lowly and highly educated residents. As for the highly educated residents, their scores are quite evenly distributed in the range of 2.17 - 4.17. However, the score of 3.67 stands out with 22.9%. This means these residents are more prone to agree and are thus willing to join participation mechanisms. Overall, residents with a low education seem to be most willing to join participation mechanisms.

One look at Figure 9 and one will notice the high blue bar at 2.33, red bar at 2.83, and green bar at 4.17. This means that 27.2% of the residents with a low income has a score of 2.33, 16.5% of middle-income residents has a level of 2.83, and 27.7% among the residents with a high income is represented with a score of 4.17. This indicates that residents with a low income are reluctant to join participation mechanisms, whereas residents with a middle income are

more neutral, and residents with a high income are very willing. However, there is also a considerate number of residents with a high income that are not very willing as 13.8% has a score of 2.33. The next section elaborates on the same statistics for subset 3.



Figure 8. Cross Tabulation Subset 2 and Education.



Figure 9. Cross Tabulation Subset 2 and Income.

4.2.3. SUBSET 3: CITIZEN'S ROLE AND INFLUENCE IN DECISION-MAKING

The third subset measured the role of the residents in Rotterdam and their influence in the decision-making process in becoming natural gas-free. Table 15 shows the distribution of the 397 responses for the three statements that made up this subset.

Role	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Municipality leader	5.2%	9.1%	21.9%	32.4%	31.3%
Independently and on own terms	18.9%	31.5%	32.4%	13.5%	3.8%
Say in the decision- making process	5.9%	10.2%	43.1%	30.2%	10.5%

Table 15. Outcome of subset 3

Table 15 indicates that almost one third of the residents (strongly) wants the municipality to be the leader in becoming natural gas-free. This statement has been reversed for the regression. The results for the first statement correspond quite nicely with the responses on statement 2 in which 31.5% says that they do not want to tackle the energy transition by themselves. So, it appears as if the majority of the residents of Rotterdam do not want to have a significant role when it comes to becoming natural gas-free. However, the third statement shows that the residents prefer to have influence in the decision-making process. Nevertheless, 43.1% also mentioned to be neutral in this. The majority thus does not really have an opinion regarding this specific statement. Overall, the residents do want the municipality to take the lead, but they wish to be able to give some input as well as to how Rotterdam becomes natural gas-free.

The mean of subset 3, with the reversed first statement, is 2.686. This means that the residents are in between disagree and neutral when translating it to the Likert scale. In other words, it seems that, on average, the residents of Rotterdam do not want to be high up in the ladder of citizen participation as that would indicate they have more power. However, they also do not want to be somewhere on the bottom-levels of the ladder.

Unlike the first and second subset, this mean is based on a 5-point Likert scale. Therefore, it is a lower number. Table 16 shows that there appears to be a difference in means. As the Cronbach's alpha of .538 is too low, no regression has been run with this subset.

Table 16.	Subset 3	means	compared
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Subset 3 * Auxiliary Variables	М	SD	Difference in M	
(AV)			AV – Subset	
Cubest 2	2.000	770		
Subset 3	2.686	.770	-	
Gender				
Male	2.893	.788	0.207	
Female	2.495	.704	- 0.191	
Rather not say / unknown	2.686	.457	0.000	
Age				
18-24	2.434	.530	- 0.252	
25-35	2.375	.460	- 0.311	
30-40 46 55	2.979	./8/	0.293	
40-55 56-70	2.339	929	0.296	
>70	2.746	.498	0.060	
Education				
Low	2.636	.803	- 0.050	
Middle	2.828	.863	0.142	
High	2.546	.527	- 0.140	
Income		540		
	2.522	.518	- 0.164	
Middle	2.590	.//0	- 0.096	
⊓igii Rather not sav	2.904	.773	0.276	
Ration not say	2.120	.001	0.007	
Political Affiliation				
50PLUS	3.134	.788	0.448	
CDA	2.425	.965	- 0.261	
ChristenUnie-SGP	2.039	.217	- 0.647	
D66	2.635	.328	- 0.051	
De Nieuwe Rotterdamsche Partij	2.696	.103	- 0.172	
GroenLinks	2.651	.500	- 0.035	
	3.069	.907	0.303	
PvdD	2.470	.530	- 0.289	
PVV	3.212	.871	0.526	
SP	2.256	.820	- 0.430	
VVD	2.882	.454	0.196	
Did not vote	2.289	.895	- 0.397	
Rather not say	3.007	.540	0.321	
Residence	0.475	000	0.544	
Charlois	2.175	.982	- 0.511	
Eeijenoord	2.441	.000	- 0.245	
Hillegersberg-Schiebroek	2.333	503	- 0.312	
Hoek van Holland	2.557	.428	- 0.129	
Hoogvliet	2.960	.756	0.274	
ljsselmonde	2.582	.967	- 0.104	
Kralingen-Crooswijk	2.346	.294	- 0.340	
Noord	2.804	.400	0.118	
Overschie	3.050	.755	0.364	
Pernis Prins Alexander	3.009	.729	0.323	
Rotterdam Centrum	3.109	.302 985	0.423	
Rozenbura	3.298	.830	0.612	
	0.200			
Dwelling				
Rental	2.607	.824	- 0.079	
Owner	2.852	.611	0.166	

Concerning gender, it appears that males want more influence in becoming natural gas-free than females. The age groups 36-45 and 57-70 also want to be higher up the ladder of citizen participation, whereas the two youngest age groups tend to disagree more regarding this topic and so are happier with a lower rung on the ladder. However, there appears to be no linear relation with age. In other words, it is not the case that the older the residents, the more influence they want. This is also the case for education, as the lowly and highly educated residents seem to want to have less influence than the residents with a middle education. With income, this linear relationship does appear to exist. Residents with a high income disagree less often and so seemingly want to have an influence more than residents with a low and middle income. Within *political affiliation* there are greater differences. Voters for 50PLUS, Leefbaar Rotterdam, and the PVV have a positive difference, meaning they want more influence compared to the other parties. The parties with a great negative difference are ChristenUnie-SGP, and the SP. It looks as if residence also plays a bigger role with this subset. Residents of Charlois, Hillegersberg-Schieborke, and Noord tend to disagree more often, whereas residents of Overschie, Pernis, Prins Alexander, Rotterdam Centrum, and Rozenburg are more neutral. People living in Rotterdam Centrum actually lean more toward agree than neutral. Dwelling once again shows that residents that bought their house, want to participate more compared to residents who rent their house.

Performing cross tabulations for this subset with *education* and *income* resulted in the bar charts shown in Figure 10 and Figure 11. When it comes to *education* (see Figure 10), noticeable is that 8.4% of the lowly educated residents have indicated strongly disagree for all the three statements and so have a score of 1.00. This means they want the municipality to have total control and that they themselves do not have any influence at all. Only 0.6% of the middle-educated people and none of the highly educated residents have indicated this. The biggest group, however, has the level of 2.67 with 36.6%. Therefore, the majority of the residents with a low income are more prone to be neutral regarding this subset. Among the middle and highly educated people, the level of participation is pretty similar distributed. For both, the score of 2.33 has occurred most often with 22.6% and 36.9%, respectively. Thus, they tend to lean more toward disagree than neutral. In other words, they do want some influence, but they rather have the municipality to take the lead. The main difference is that the residents with a middle education stand out at the score of 4.33 with 12.3%, meaning they really want to have a say and influence in the decision-making process of becoming natural gas-free in Rotterdam.



Figure 10. Cross Tabulation Subset 3 and Education.

The *income* variable displays a similar picture as *education*. The majority of the residents are below 3.00, indicating that they do not necessarily want influence in the decision-making process. Among the low-income residents, for instance, there is only 10.7% with a level higher than 3.00. The biggest group with 35.1% has a score of 2.67. Thus, the majority appear to be neutral. For the residents with a middle income, the most frequent value is 2.33 with 38.6%. In addition, 7.9% of the middle-income residents have the lowest score possible. This has not occurred for both the low- and high-income residents. They have thus mainly disagreed with the statements, meaning residents with a middle income seem to not want to be on the upper-levels of the participation ladder. Among the high-income residents, there are three scores that stand out. These are 2.00, 2.67, and 4.33, with 14%, 46.2%, and 18.3%, respectively. Especially the high score of 4.33 is worthwhile mentioning, as this is truly different than the low- and middle-income residents. This means that among the high-income residents, there are a few that really want to have a say and to take control in becoming natural gas-free. However, the majority seems to be neutral.

This section was the last of three for *citizen participation*. The following section elaborates on the descriptive statistics of the main independent variable of this research: *public trust*.



Figure 11. Cross Tabulation Subset 3 and Income.

4.3. DESCRIPTIVE STATISTICS PUBLIC TRUST

Public trust is, as mentioned in section 3.4.2., made up of three statements. How the residents of Rotterdam responded on these statements is shown in Table 17. What is noticeable, is that the percentages for neutral are high, and for the strongly options low. Therefore, it appears that the residents of Rotterdam trust the municipality to some extent rather than fully or not at all. However, the majority of the people agree that the municipality is generally trustworthy and that the municipality does what is right. The outcome of the third statement shows that the residents do not really have an opinion on whether or not the municipality is performing as expected. A reason for this could be that the residents do not have expectations and so they cannot agree or disagree. This statement has been reversed in the regression. Nevertheless, the residents of Rotterdam are more prone to trust the municipality, rather than distrust.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Generally trustworthy	3.3%	7.8%	38.9%	45.9%	4%
Do what is right	2.1%	12.2%	29.3%	53.8%	2.6%
Not performing as I excepted	1%	21.7%	60%	13.6%	3.8%

Table 17. Outcome of Public Trust statements

The mean of *public trust*, with the third statement reversed, is 3.282. This is based on a 5-point Likert scale. Similar to *citizen participation*, the mean of *public trust* is compared with the means across the auxiliary variables using *Compare Means* in SPSS. A one-way ANOVA was again not possible, because the test of homogeneity of variances showed significance scores that were too low. Table 18 shows the differences in means. These are checked in the regression section.

Public trust * Auxiliary Variables	М	SD	Difference in M	
_(AV)			AV – Public trust	
Public trust	3.282	.696	-	
Gender				
Male	3.113	.735	- 0.169	
Female	3.428	.613	0.146	
Rather not say / unknown	4.136	.353	0.854	
Age				
18-24	3.355	.948	0.073	
25-35	3.552	.541	0.270	
36-45	2.987	.644	- 0.295	
46-55	3.510	.587	0.228	
56-70	3.210	.623	- 0.072	
>70	2.973	.730	- 0.309	
Education				
Low	3.387	.476	0.105	
Middle	3.023	.785	- 0.259	
High	3.520	.669	0.238	
Income				
Low	3.390	.740	0.108	
Middle	3.316	.597	0.034	
High	3.041	.801	- 0.241	
Rather not say	3.340	.593	0.058	
Political Affiliation				
50PLUS	2.102	1.060	- 1.180	
CDA	2.323	.826	- 0.959	
ChristenUnie-SGP	3.362	.174	0.080	
D66	3.283	.410	0.001	
De Nieuwe Rotterdamsche Partij	3.667	.000	0.385	
GroenLinks	3.207	.670	- 0.075	
Leefbaar Rotterdam	2.775	.709	- 0.507	
PvdA	3.837	.224	0.555	
PvdD	3.171	.681	- 0.111	
PVV	2.844	.701	- 0.438	
SP	3.327	.540	0.045	
VVD	3.555	.550	0.273	
Did not vote	3.789	.396	0.507	
Rather not say	3.349	.630	0.067	
Desidence				
Kesidence	0.000	000	0.000	
Charlois	3.30Z	.020	0.080	
	3.145	.826	- 0.137	
Feijenoora Hillagaraharg Schishrash	3.0∠1 2.244	./30	0.009	
Hoek van Holland	3.241 3.043	.000 272	- 0.041	
	3.043	.3/3	- 0.239	

Table 18. Public Trust means compared

Hoogvliet	3.011	.835	- 0.271	
ljsselmonde	3.395	.363	0.113	
Kralingen-Crooswijk	3.630	.453	0.348	
Noord	3.088	.997	- 0.194	
Overschie	3.064	.337	- 0.218	
Pernis	2.875	.441	- 0.407	
Prins Alexander	3.315	.385	0.033	
Rotterdam Centrum	2.731	.902	- 0.551	
Rozenburg	3.502	.760	0.220	
Dwelling				
Rental	3.308	.669	0.026	
Owner	3.227	.749	- 0.055	

The gender means indicate that seemingly males trust the municipality less than females. The rather not say category stands out and appears to trust the municipality way more than males and females. When it comes to age, the residents older than 70 trust the municipality the least, followed up closely by the 35-46 age group. The residents aging from 25-35 trust the municipality the most. There seems to be no linear relation within the age variable. This is also the case for education, because the residents with a middle education have less public trust than lowly or highly educated residents. The highly educated residents trust the municipality the most. As for *income*, it appears that the lower the income, the more public trust a resident has. Political affiliation is the variable with the most significant mean differences. Especially 50PLUS and CDA voters have little public trust on average. Leefbaar Rotterdam and PVV voters also have a negative mean difference, meaning they have less public trust on average, but to a lesser extent. De Nieuwsche Rotterdamsche Partij and PvdA have more public trust than others. Interesting is that residents who did not vote have more public trust as well. The residence does not seem to play a big role in the level of public trust. Feijenoord and Kralingen-Crooswijk are the two districts with the highest level, whereas Pernis and Rotterdam Centrum are the two districts with the least public trust. Lastly, people who rent their house are more prone to trust the municipality compared to residents with an owner-occupied house. However, this difference is very small.

Three cross tabulations were run with *public trust*. The first one is with *education*, as the hypothesis was that higher educated residents trust government more than lower educated people (see Figure 12). The second cross tabulation is with *income*, since it was hypothesized that residents with a higher income trust government more than residents with a lower income (see Figure 13). Lastly, *age* is crossed with *public trust*, with the hypothesis that residents with a higher age trust government more than young residents (see Figure 14). The resulting bar charts of the cross tabulations are briefly discussed below.



Figure 12. Cross Tabulation Public Trust and Education.

Figure 12 shows that most residents with a low education tend to lean toward agree when it comes to their public trust, as 44.3% has a score of 3.67. In addition, more than one third of the lowly educated residents are completely neutral. Therefore, it appears as if this group of residents are more prone to trust rather than distrust the municipality. Residents with a middle education appear have a more evenly distributed level of trust. The three highest score are 2.67, 3.00, and 3.67, with 10.3%, 21.3%, and 25.2%, respectively. In other words, these residents seem to be neutral and do not have a strong level of (dis)trust. The higher educated residents, on the other hand, seem to have a higher level of public trust, as 32.4% has a score of 3.67 and 25.2% a score of 4.00. Thus, the lowly and highly educated residents are more prone to trust the municipality than the residents with a middle education.

The cross tabulation with *income* (see Figure 13) has one bar specifically that stands out: the middle income at the score of 3.67 with 50%. This represents that half of the residents that earn a middle income, are more prone to trusting the municipality than distrusting. The score with the second highest percentage is 3.00 with 12.9%. So, the majority of the residents with a middle income have filled in agree with a combination of neutral for these three statements. Most of the low-income residents also have a score higher than or equal to 3.00. To illustrate, 24.5% has a score of 3.00, 23.4% a score of 3.67, and 21.3% a score of 4.00. So, their level of trust would more likely be high than low. Therefore, it appears that residents with a low income trust the municipality of Rotterdam. The majority of the residents with a high income, 39.4%, is completely neutral with their score of 3.00. In other words, they do not trust, but also

do not distrust the municipality. There is also 13.8% who has a level of 2.00 for their public trust, meaning they tend to distrust the municipality. However, there is also 10.6% with a score of 4.00, indicating they do have public trust.



Figure 13. Cross Tabulation Public Trust and Income.

Figure 14 presents the cross tabulation with *public trust* and *age*. It shows that the youngest age group either has a low level of trust of 1.67 with 19.5%, or quite high since 22% has a score of 4.00. The biggest group, however, is 24.4% with a score of 3.67. In other words, the residents aged 18-24 either quite strongly distrusts or trusts the municipality. However, the majority tends to lean more toward trust. The residents with the age of 25-35 are almost all in the range of 3.33 – 4.00 with their public trust score. This indicates that their level of trust appears to be relatively high, especially compared to age group 36-45. Within this group, there is 20.6% that has a score of 2.00, meaning they do not trust the municipality. However, the majority tends to be neutral. As for the age group 46-55, their level of trust seems rather high. The most occurring level of trust is 3.67 with 44.6%. There is even 18.5% that has a score of 4.33, indicating they filled in strongly agree to at least one statement. Therefore, this age group has quite some residents that really trust the municipality. Almost half of the next age group, 56-70 years old residents, lean toward trusting the municipality. Nevertheless, 24.7% of these residents appear to be neutral. The oldest residents are pretty neutral as well, since 50.9% has a score of 3.00. There is, however, 10.9% which has a very low level of trust of 1.33. Nevertheless, there is also 18.2% which counteracts this low level with the score of 4.00. Therefore, the oldest residents either really distrust, really trust or are neutral regarding their public trust.



Figure 14. Cross Tabulation with Public Trust and Age.

Whether the hypotheses regarding both *public trust* and *citizen participation* can be rejected or not, is examined in the regression section. In addition, the differences in means are checked with the regressions. The following section, however, investigates the descriptive statistics for the additional survey questions.

4.4. DESCRIPTIVE STATISTICS ADDITIONAL QUESTIONS

The residents have also been asked four questions that do not directly relate to either *citizen participation* or *public trust*. Nevertheless, these are still relevant and valuable for this research. These are, however, not investigated in depth, as that is not the main objective of this research. In other words, only the cases that stand out are mentioned. For more details, please contact the researcher.

The first question was whether or not the residents were even aware of the plan of the municipality of Rotterdam to become natural gas-free in 2050. 65% answered yes on this question, leaving 35% of the residents who did not know. As mentioned in section 3.1., this number is lower than earlier research conducted by the municipality who ended up with the score of 82% for residents who did know. Nevertheless, similar to that survey, this research

also found that older people are more aware than younger residents. Within the two youngest age groups, 38% and 31%, respectively, were aware, whereas the older age groups all had higher than 55%. The oldest residents even reached 98%. This might also explain why voters for 50PLUS were all aware. The ChristenUnie-SGP was by far the party with the lowest awareness with 14.3%. In addition, the percentage increases from low to high when it comes to income. So, residents with a low income are less aware than residents with a high income. On the contrary, it decreases with education. Thus, the higher educated, the less aware residents are. As for residence, only Rotterdam Centrum, Kraling-Crooswijk, and Delfshaven are below 50%.

The second question examined whether the residents knew what becoming natural gas-free means for them personally. 4% strongly disagreed, 19% disagreed, 22% was neutral, 40% agreed, and 15% strongly agreed. The distribution of this question with the different auxiliary variables is quite similar as the first question. This actually makes sense, as someone who is not aware of something, most likely does not know what it entails. In other words, older residents realize what it means for them personally more than younger people. In addition, residents with a high education or income agree more often with the second question compared to residents with a low level. The cross tabulation with this question and the *political affiliation* variable shows two interesting results. The first thing is that all of the voters for ChristenUnie-SGP indicated agree. Secondly, the CDA voters disagreed the most by far with 92% whereas the majority of the other parties agreed.

Another question was whether the residents felt like becoming natural gas-free is necessary for the municipality of Rotterdam. 7% strongly disagreed, 16% disagreed, 24% was neutral, 35% agreed, and 19% strongly agreed. For all age groups, the majority can be found in either the agree or neutral option. Interesting is the oldest group, since a contrast can be found. 20% namely strongly disagrees, whereas 47% strongly agrees. Thus, it appears that the oldest residents either believe it is really necessary to become natural gas-free, or do not believe this at all. This contrast is also the case for the cross tabulation with *income*. 29% of the residents with a high income indicated disagree, and 40% strongly agreed. The residents with a low- or middle-income mostly agreed or were neutral. With the *education* variable, there is not really a difference between low, middle and high. Thus, the education level appears to not really show any differences regarding this specific question. Lastly, concerning *political affiliation*, there were few particular scores that stood out. The first one was that 57% of the voters for 50PLUS strongly disagreed. Secondly, 92% from the CDA disagreed. In addition, 92% of the PvdD and 86% of the Nieuwe Rotterdamsche Partij agreed. Lastly, 86% of the ChristenUnie-

SGP strongly agreed. Some parties, therefore, appear to have voters that are really pro-energy transition versus parties with voters that do not believe becoming natural gas-free is necessary.

The residents were also given an open question in which they could mention their biggest obstacle in becoming natural gas-free. With their responses, a word cloud in the shape of the flag of Rotterdam has been created (see Figure 15). There are a couple obstacles that immediately grasp one's attention. One of them is the costs. This has been mentioned 154 times and is complemented by 10 residents using the word expensive. The second most mentioned obstacle with 27 times is that when one lives in a rental house, they depend on others to be able to become natural gas-free. To clarify, the cases in which a respondent said rental house were only deleted from the dataset when they explicitly mentioned that they felt this survey was irrelevant to them in the final "any comments" question. Thirdly, not having enough knowledge has been mentioned 19 times and there have also been 10 residents that said they lack information from the municipality. Other obstacles were, for instance, the coercion of becoming natural gas-free and that in the future better and/or cheaper alternative solutions might arise. Furthermore, not everyone believes the energy transition is necessary and so does not feel the urgency.



Figure 15. Word Cloud for Biggest Obstacle Question.

This was the final part of the weighted descriptive statistics. The following section examines the unweighted inferential statistics.

4.5. REGRESSION ANALYSES

This chapter addresses the assumption of a multiple regression analysis. Subsequently, the results of two regression analyses are examined. The first regression was with subset 1 of *citizen participation* and *public trust*, and the second one was with subset 2 and *public trust*. Both also included the auxiliary variables *gender, age, income, education* and *dwelling*. However, nominal and ordinal independent variables with more than two categories cannot be entered in a multiple regression analysis (Laerd Statistics, n.d.-a). Therefore, dummy variables, also called dummies, were created.

4.5.1. CREATED DUMMY VARIABLES

A dummy variable is "basically a dichotomous variable constructed form an originally qualitative variable" (Hardy, 1993, p. v). The number of dummies is simply the number of categories (*k*) minus 1 (Alkharusi, 2012; Starkweather, 2010). These dummies are coded with either 0 or 1 in which 1 means a specific case belongs to that category and 0 to another category of that variable. For example, *education* has two dummies: middle and high. If a respondent is highly educated, a 0 zero would show in the low education dummy, but a 1 would appear in the high education dummy. This is also why *political affiliation* and *residence* were left out of the analysis, as their number of dummies would be very high.

Not every independent variable has dummies within this research. *Public trust, age,* and *income* are measured as a scale in SPSS. *Dwelling* only has two categories and so dummies were not necessary. That leaves the two variables mentioned in Table 20. These all have a so-called reference category, meaning that the outcome is compared to that specific category. To make this comparison easier, the reference categories were based on their means mentioned in the descriptive statistics. In other words, the categories with the highest positive difference in mean were chosen. The next section examines the outcomes of the regressions with these dummies together with the scale independent variables.

	Categorical	Type of	Number of	Number of	Number of
	variable	variable	categories	dummies with RF	dummies with RF
			-	for subset 1	for subset 2
1	Gender	Nominal	Three	Two	Two
			(Female, Male,	"Male" is the RF	"Rather not say" is
			Rather not say)		the RF
0			T 1	-	T
2	Education	Ordinal,	Ihree	Iwo	Iwo
		but treated as nominal	(Low, middle & high)	"Low" is the RF	"Low" is the RF

Table 19. Created Dummy Variables with their Reference Category (RF)

4.5.2. ASSUMPTIONS MULTIPLE REGRESSION ANALYSIS

There are eight assumptions that need to be considered before running a multiple regression analysis (Laerd Statistics, n.d.-b; Dhakal, 2018). These are for both regressions, so with subset 1 and subset 2 of *citizen participation*, examined. The assumptions are:

- 1. The dependent variable should be continuous, i.e. a scale variable in SPSS.
- 2. There are two or more independent variables that are either continuous or categorical.
- 3. There should be independence of residuals.
- 4. There has to be a linear relationship between the dependent variable and every single one of the independent variables. There also has to be a linear relationship with all the independent variables taken together.
- 5. There needs to be homoscedasticity of residuals.
- 6. There should not be multicollinearity.
- 7. There should not be any unusual observations, i.e. outliers.
- 8. The residuals need to be normally distributed.

The very first step, however, was to stop weighting the data. After that, the assumptions of the multiple regressions were checked. Obviously, both subset 1 and subset 2 have a continuous dependent variable and more than two independent variables that are either continuous or categorical, as their variables are exactly the same. Whether both subsets also pass the other six assumptions, is examined here.

The third assumptions can be checked with the Durban-Watson statistic. This statistics ranges from 0 to 4 in which 2 means there is no serial correlation (Nerlove & Wallis, 1966). This means that if the value is approximately 2, there is no correlation between residuals. Residuals are "discrepancies between observed and estimated values" (Foldnes, Foss, & Olsson, 2012, p. 367). In other words, "when you fit a set of data to a particular model, the residuals are what are left after the model has been subtracted." (Farnsworth, 2009, p. 83). The Durban-Watson for subset 1 was 1.657. This is close to 2 and so there was independence of residuals. This is also the case for subset 2, as the Durban-Watson value was 1.845.

The fourth assumption consists of two parts. The linearity between the dependent variable and the independent variables collectively can be tested by looking at the scatterplot of the studentized residuals against the predicted values. For both subset 1 and subset 2, the residuals in the scatterplot form a horizontal band, meaning the relationship is likely linear. The scale variables, i.e. *public trust, age,* and *income,* were also separately linearly related for both regressions, which was inspected by looking at the partial regression plots.

The test for homoscedasticity can be assessed by using the same scatterplot which was built to check the linearity. As the residuals in this scatterplot are spread evenly and do not differ in height, meaning they do not form a funnel shape, there is homoscedasticity. This is the case for both subsets. If this assumption were to be violated, there would be heteroscedasticity. That is not desirable, as heteroscedasticity might lead to decreased statistical power and more type 1 error rates (Rosopa, Schaffer & Schroeder, 2012). A type 1 error is "the rejection of a true null hypothesis." (Mullie & Autier, 2019, p. 467). In other words, findings are said to be significant when they actually are not. This is a result from the confidence level one tests with. This research, for example, tests with a 95% confidence level, meaning there is a 5% chance to get a type 1 error.

Assumption 6 deals with multicollinearity, which is "a situation where the regressors are nearly linear dependent." (Jurczyk, 2012, p. 262). Independent variables are also known as regressors, and so multicollinearity occurs when there is a linear relationship among two or more of these variables. If multicollinearity is present, the coefficients are less reliable. It might also negatively influence the "hypothesis testing, estimation, and forecasting." (Alin, 2010, p. 370). The coefficients tables with the collinearity statistics, for both subsets, show no value less than 0.1 in the tolerance column. Therefore, there is no multicollinearity present in the two regressions.

The studentized deleted residual variable, assumption 7, indicated that there was one case for subset 1 that had a standard deviation greater than +-3. This means that this particular observation's value is far removed from their predicted score. However, after inspection, it was decided this outlier was not deleted, because this respondent had a serious answer for the open question on the biggest obstacle. They would otherwise not have put in any effort for this question. There were no outliers present in the second regression.

The last assumption, normality, was checked as well. This examines whether or not "the populations from which the samples are taken are normally distributed." (Ghasemi & Zahediasl, 2012, p. 486). Both regressions have residuals that were normally distributed. All eight assumptions were thus considered and passed the tests. Consequently, the regressions got the green light to be run. Their outcomes are separately presented in the next sections, starting with subset 1.

4.5.3. RESULTS REGRESSION SUBSET 1

As described in the previous section, the data meets all the criteria for running a multiple regression. It can also be examined to what extent the multiple regression is a good fit for the data using the R². This score indicates the percentage of the variation of the dependent variable that can be explained by the independent variables (Kahane, 2008; Dhakal, 2018). The R² for the model with all the independent variables, i.e. model 6, of subset 1 was .132 (see Table 20). This corresponds to 13.2%. Thus, 13.2% of the variation of the level of citizen participation can be explained by *public trust, education, income, age, gender, and dwelling.* The remaining 86.8% of variation is caused by other factors which were not added in the model. However, a low percentage of R² does not necessarily mean that the model is poor. As *citizen participation* relates to human behavior, it is guite difficult to predict. Therefore, a high R² is almost impossible (Dhakal, 2018). The adjusted R² was 11.4%. This score represents the R², but it is adjusted to the number of independent variables (Kahane, 2008; UCLA, n.d.). According to Cohen (1988) and Sawilowsky (2009), this is a small size effect. Another difference between R² and the adjusted R² is that R² always increases when a variable is added in the model, whereas the adjusted R² only increases when a useful variable is added (Dhakal, 2018).

Another test that can be used for determining how well the model fits, is the F-ratio. The F-ratio "tests whether the overall regression model is a good fit for the data". (Dhakal, 2018, p. 1450). As it is a test for the overall model, the values of model 6 are used. The outcome of this test was that *public trust, education, income, age, gender,* and *dwelling,* statistically significantly predicted subset 1 of *citizen participation, F* (8, 388) = 7.367, p < 0.001.

Besides the (adjusted) R² score, Table 20 also shows, from left to right, the unstandardized regression coefficient, the confidence interval, the standard error of the coefficient; and the standardized coefficient. The unstandardized regression coefficient, also known as the slope coefficient, indicates "the average change in Y with a unit change in Xk, *when the other independent variables are held constant.*" (Lewis-Back, 1980, p. 49). The Y represents the dependent variable, and the Xk would be one of the independent variables. For example, *public trust* in model 6, which is the full model, has a slope coefficient of .372. This indicates that if *public trust* increases one unit, *citizen participation* positively changes with 0.372. In other words, this model predicts that the more public trust someone has, the higher the participation level for subset 1. The slope for *income* is .01, meaning that if *income* changes with one unit, the level of citizen participation increases with 0.01. Thus, the higher the income per capita a resident has, the higher the level of participation. The slope coefficient can also

be negative, which is the case for *age*. *Age* has a slope coefficient score of - .03. This indicates that if *age* increases with a unit, the participation level decreases with 0.03. Therefore, the older someone is, the lower their level of participation. This interpretation of the slope coefficient is the case when one deals with scale variables. The categorical independent variables with dummies, however, are dichotomous. Therefore, they have to be interpreted differently.

The slope coefficients for dichotomous variables represent the difference in the predicted levels of *citizen participation* of the examined category compared to the reference category. *Education* in this research, for example, compared the results of middle and high education to low education. The full model in Table 20 shows that the predicted level of *citizen participation* for residents with a middle education is 0.18 smaller than that predicted for residents with a low education. The residents that are highly educated are predicted to have a lower level as well, with 0.29, compared to the low education category. In other words, residents with a lower educated residents. *Gender* in this subset used male as the reference category. Thus, as model 6 presents, it is estimated that the participation level of females is 0.07 greater than that predicted for males. The rather not say category's level of participation is anticipated to be 0.44 smaller than that of males. *Dwelling*, unlike *education* and *gender*, did not need any dummies since it only had two categories. Therefore, the rental category acted as the reference as the reference category. Consequently, model 6 predicts that residents with an owner-occupied house have a participation level which is 0.22 greater compared to residents who rent their house.

With all these slope coefficients, and with the constant, a regression equation can be made. The constant is the predicted score of the dependent variable if all the independent variables have a value of 0 (Dkahal, 2018). In other words, the level of citizen participation would be 2.23 if the auxiliary variables have a score of 0. For the full model of subset 1, the equation with which predicted values for *citizen participation* for a given set of values for *public trust, education, income, age,* and *dwelling* can be calculated, is:

Predicted citizen participation = $2.23 + (0.43 \times public trust) - (0.04 \times middle education) - (0.03 \times high education) + (0.01 \times income) - (0.03 \times age) + (0.07 \times female gender) - (0.44 \times rather not say gender) + (0.22 \times dwelling)$

The column next to the slope coefficients in Table 20 is the confidence interval. The confidence interval indicates that one can be 95% confident that the value of the slope coefficient is in between the lower and upper bounds. For instance, Table 20 shows that one can be 95%

confident that the slope coefficient score of *public trust* in model 6 is in between 0.30 and .056. The standard error of the coefficient is the fourth column in Table 20. This value "shows you how wrong the estimated coefficient could be if you use it to make predictions." (GraduateTutor.com, n.d.). Therefore, it is best to have a relatively small standard error of coefficients (Dhakal, 2018). *Public trust* in the full model, for example, has with a slope coefficient of .43 and a standard error of .07, a relatively small value. The last column with scores for the independent variables in Table 20 shows the standardized coefficient, also known as beta weights (Lewis-Beck, 1980; Dhakal, 2018). These measure "how much the outcome variable increases (in standard deviations) when the predictor variable is increased by one standard deviation assuming other variables in the model are held constant." (Dhakal, 2018, p. 1451). In other words, beta weights are similar as slope coefficients in that they indicate the change in the dependent variable when there is an increase of one unit, or in the case of beta weights, one standard deviation.

These beta weights, together with the slope coefficient, may have an asterisk (or two) behind their scores in Table 20. This represents their probability (p) value, i.e. their level of statistical significance. This is "the level of risk that you are prepared to take that you are inferring that there is relationship between two variables in the population from which the sample was taken when in fact no such relationship exists." (Bryman, 2012, p. 348). As this research used a 95% interval, coefficients are statistically significant if p < .05. In other words, up to 5 out of 100 drawn samples might indicate that a relationship is present, when there actually is not a relationship in the population, i.e. a type 1 error. The F-ratio test also indicated significance, but the main difference is that the significance of the *F* score applies to the full model whereas the *P* value only applies to the coefficients separately (GraduateTutor.com, n.d.).

To return to the asterisks in Table 20, it is noticeable that all models only have *public trust* with p < 0.001. Thus, only *public trust* is statistically significant. This means that the other auxiliary variables are not useful in the model when *public trust* is already in the model (Dhakal, 2018). In other words, once *public trust* is in the model, the other independent variables do not significantly change the level of citizen participation. The only exception is in model 6 in which *dwelling* is also statistically significant. Consequently, *public trust* and *dwelling* are the only independent variables that add a significant contribution to explaining the level of citizen participation for subset 1. The adjusted R² value also shows this, as it decreases with every model, except in the last model where *dwelling* was added. What variables are statistically significant in subset 2, is investigated in the next section.

Citizen participation	В	95% CI for B		SE B	β	R ²	ΔR^2
		LL	UL	_			
Model 1						.116	.113**
Constant	2.28**	1.87	2.68	.21			
Public Trust	.45**	.32	.57	.06	.34**		
Model 2						.116	.109**
Constant	2.29**	1.78	2.80	.26			
Public Trust	.44**	.32	.57	.06	.34**		
<i>Education – Low is RF</i> Middle (D) High (D)	01 .03	35 31	.32 .36	.17 .17	008 .02		
Model 3						.117	.108**
Constant	2.20**	1.63	2.77	.29			
Public Trust	.45**	.32	.57	.06	.34**		
<i>Education – Low is RF</i> Middle (D) High (D)	02 .03	35 31	.32 .36	.17 .17	008 .02		
Income	.03	05	.11	.04	.03		
Model 4						.118	.107**
Constant	2.32**	1.66	2.98	.34			
Public Trust	.44**	.31	.57	.07	.33**		
<i>Education – Low is RF</i> Middle (D) High (D)	03 .003	37 34	.31 .35	.17 .18	02 .001		
Income	.04	05	.12	.04	.04		
Age	02	09	.05	.04	04		
Model 5						.120	.104**
Constant	2.27**	1.60	2.94	.34			
Public Trust	.43**	.30	.57	.07	.33**		
<i>Education – Low is RF</i> Middle (D) High (D)	02 .01	37 33	.32 .36	.17 .18	01 .007		
Income	.04	05	.12	.04	.04		
Age	02	09	.05	.04	03		
<i>Gender – Male is RF</i> Female (D) Rather not say (D)	.06 38	14 - 1.40	.26 .64	.10 .52	.03 04		

Table 20. Multiple regression results for subset 1 of citizen participation

Model 6						.132	.114**
Constant	2.23**	1.56	2.90	.34			
Public Trust	.43**	.30	.56	.07	.33**		
<i>Education – Low is RF</i> Middle (D) High (D)	04 03	38 37	.30 .32	.17 .18	02 01		
Income	.01	07	.10	04	.02		
Age	03	10	.04	.04	05		
<i>Gender – Male is RF</i> Female (D) Rather not say (D)	.07 44	13 - 1.46	.27 .58	.10 .52	.04 04		
Dwelling	.22*	.03	.42	.10	.11*		

Note. Model = "Enter" method using blocks in SPSS Statistics; RF = Reference Category; (D) = Dummy; *B* = unstandardized regression coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; *SE B* = standard error of the coefficient; β = standardized coefficient; R² = coefficient of determination; $\Delta R^2 = adjusted R^2$. **p* < .05. ***p* < 0.001.

4.5.4. RESULTS REGRESSION SUBSET 2

This section examines the regression outcome for subset 2 of *citizen participation*. It is less elaborated, however, because the explanations of what these tests entail and how to interpret the values are already provided in the previous section.

The R² for the full model of subset 2, i.e. model 6, was 10.8% with an adjusted R² of 8.9% (see Table 21). This is again a small size effect, as it is below .20 (Cohen, 1988; Sawilowsky, 2009). Furthermore, *public* trust and the auxiliary statistically significantly predicted *citizen participation*, *F* (8, 388) = 5.852, *p* < 0.001. Therefore, the overall regression model is a good fit for the data of this subset of *citizen participation*.

Table 21 also presents the constant and slope coefficients of the full model. The constant for subset 2 is 2.64. The slope coefficient of *public trust* is 0.32. Thus, if *public trust* increases with one unit, the level of *citizen participation* also becomes 0.32 greater. Similar to the first regression, it means that this model predicts that the more someone trusts the municipality, the higher their level of participation is. The slope coefficient of *income* is - 0.27, indicating that if this variable were to increase, the participation level decreases or vice versa. This is also the case for *age*, as its slope coefficient is - 0.01.

The slope coefficients for the dichotomous variable *education* is again compared to the low education category. The coefficients of both *middle* and *high education* are negative. This means that residents with either a middle or a high education are predicted to have a lower level of participation compared to lowly educated residents, with 0.39 and 0.27, respectively. Unlike the first regression with the male category, this regression used the rather not say category within *gender* as the reference category. Table 21, therefore, indicates that males and females are estimated to have a lower participation level, with 0.19 and 0.46 respectively, compared to the rather not say category. The last variable, *dwelling*, has a positive coefficient of 0.17. In other words, similar to subset 1, the participation level of residents who have bought their house is predicted to be 0.17 higher than renters. All these slope coefficients resulted in the following equation to predict the level of *citizen participation* for subset 2:

Predicted citizen participation = $2.64 + (0.32 \times public trust) - (0.39 \times middle education) - (0.27 \times high education) - (0.02 \times income) - (0.01 \times age) - (0.19 \times male gender) - (0.46 \times female gender) + (0.17 \times dwelling)$

The second regression also considered the *p*-value of the slope coefficients as indicated with asterisks in Table 21. Again, all models show that *public trust* is the only variable with p < 0.001. Therefore, the other independent variables do not add a substantial contribution when it comes to explaining the level of citizen participation for subset 2 if the effect of *public trust* is already taken into account. However, this is not entirely true as the middle education has a *p* value of < 0.05, meaning it is statistically significant as well. However, since this is a dichotomous variable, the interpretation is slightly different. In this specific case, the acceptable *p* score indicates that the difference between the middle education and the reference category, i.e. low education, is statistically significant. Consequently, it can be considered to be a real effect, rather than being different by chance.

The regression outcome for both subsets of *citizen participation* can be used to either accept or reject the 7th hypothesis of this research, which was that residents with more trust in government participate more than residents with less public trust. As the slope coefficients are positive and have a *p*-value lower than .05, it can be predicted that the more *public trust* someone has, the higher their level of participation. Therefore, this hypothesis can be supported. How the decision has been made for the other six hypotheses, is described in the following section.

Citizen participation	В	95% CI for B		SE B	SEB β		ΔR^2
		LL	UL				
Model 1						.062	.060**
Constant	2.08**	1.70	2.46	.19			
Public Trust	.30**	.18	.41	.06	.25**		
Model 2						.076	.069**
Constant	2.40**	1.93	2.86	.24			
Public Trust	.28**	.17	.40	.06	.24**		
<i>Education – Low is RF</i> Middle (D) High (D)	36* 23	67 54	05 .08	.16 .16	21* 14		
Model 3						.076	.067**
Constant	2.38**	1.85	2.91	.27			
Public Trust	.28**	.17	.40	.06	.24**		
<i>Education – Low is RF</i> Middle (D) High (D)	36* 23	67 54	05 .08	.16 .16	21* 14		
Income	.005	07	.08	.04	.006		
Model 4						.077	.065**
Constant	2.31**	1.70	2.92	.31			
Public Trust	.29**	.17	.41	.06	.24**		
<i>Education – Low is RF</i> Middle (D) High (D)	35* 21	67 53	03 .11	.16 .16	21* 13		
Income	002	08	.08	.04	002		
Age	.02	05	.08	.03	.03		
Model 5						.099	.083**
Constant	2.72**	1.58	3.86	.58			
Public Trust	.32**	.20	.44	.06	.27**		
<i>Education – Low is RF</i> Middle (D) High (D)	37* 24	69 55	06 .08	.16 .16	22* 14		
Income	004	08	.08	.04	005		
Age	002	07	.06	.03	003		
<i>Gender – Rather not</i> say is RF Male (D) Female (D)	24 51	- 1.17 - 1.44	.70 .41	.48 .47	13 28		

Table 21. Multiple regression results for subset 2 of citizen participation

Model 6						.108	.089**
Constant	2.64**	1.51	3.78	58			
Public Trust	.32**	.20	.44	.06	.27**		
<i>Education – Low is RF</i> Middle (D) High (D)	39* 27	70 58	07 .05	.16 .16	23* 16		
Income	02	10	.06	.04	03		
Age	01	07	.06	.03	02		
Gender – Rather not say is RF Male (D) Female (D)	19 46	- 1.12 - 1.38	.74 .47	.47 .47	10 25		
Dwelling	.17	01	.35	.16	16		

Note. Model = "Enter" method using blocks in SPSS Statistics; RF = Reference Category; (D) = Dummy; *B* = unstandardized regression coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; *SE B* = standard error of the coefficient; β = standardized coefficient; R² = coefficient of determination; $\Delta R^2 = adjusted R^2$. **p* < .05. ***p* < 0.001.

4.5.5. TESTING OF THE HYPOTHESES

There were seven hypotheses in total in this research. These were basically statements that this research wanted to test based on theoretical expectation. Therefore, they can be considered to be the null hypotheses. There is also a usually more exciting alternative hypothesis which states that things are different than expected from a theoretical point of view (McDonald, 2009).

The (weighted) difference in means, examined before in the descriptive statistics section, are first checked with the hypothesis, with an overview in Table 22. Subsequently, their (unweighted) probability (*p*-value) is considered for the binary regression and for the entire multiple regression with *public trust, education, income, age, gender,* and *dwelling.* An overview is provided in Table 23. The binary regression is between the two variables of the hypothesis, e.g. *education* and *citizen participation* or *income* and *public trust.* If this *p*-value is lower than .05, the null hypothesis can be rejected. This probability testing is only done for the first and second subset, as the third subset of *citizen participation* did not have an acceptable Cronbach's alpha score. So, "the goal of statistical hypothesis (McDonald, 2009, p. 15). This section goes through the null hypotheses one by one to test whether or not they can be accepted or should be rejected and what this means.

	CP Subset 1	CP Subset 2	CP Subset 3	Public Trust
	<i>M</i> = 3.838	<i>M</i> = 3.231	M = 2.686	<i>M</i> = 3.282
Education				
Low	0.396	0.447	- 0.050	0.105
Middle	- 0.507	- 0.436	0.142	- 0.259
High	0.238	0.082	- 0.140	0.238
Income				
Low	- 0.245	- 0.121	- 0.164	0.108
Middle	0.134	0.055	- 0.096	0.034
High	0.253	0.313	0.278	- 0.241
Rather not say	- 0.288	- 0.371	0.037	0.058
Age	N/A	N/A	N/A	
18-24				0.073
25-35				0.270
36-45				- 0.295
46-55				0.228
56-70				- 0.072
>70				- 0.309

Table 22. Hypotheses testing: Difference in Means

Note. CP = Citizen participation; M = Mean; N/A = Not Applicable, because no hypothesis with age and CP.

Table 23.	Hypotheses	testing: Slope	e Coefficients	& P-value
	21	<u> </u>		

	CP Subset 1		CP	CP Subset 2		Public Trust	
	BR	Entire MR	BR	Entire MR	BR	Entire MR	
<i>Education</i> Low Middle High	N/A 07 .10	N/A 04 03	N/A 39 * 18	N/A 39 * 27	16 27 * N/A	03 19 * N/A	
Income	02	.01	03	02	10 *	03	
Public Trust	.45 *	.43 *	.30 *	.32 *	N/A	N/A	
Age	N/A	N/A	N/A	N/A	14 *	10 *	

Note. CP = Citizen Participation; BR = Binary Regression; MR = Multiple Regression; RF = Reference Category; N/A = Not Applicable

*P < .05

The first null hypothesis was that higher educated residents participate more than lower educated residents. Looking at the weighted descriptive statistics in which the means were compared across the three education categories (low, middle, and high) with the mean of the subsets of *citizen participation*, this hypothesis should be rejected. The reason for this is that in none of the subsets, the highly educated residents have the highest mean (see Table 22). In other words, it seems that resident with a higher education do not participate more. However, Table 23 shows that the probability value of the slope coefficients of the high category in *education* is too low, indicating that the difference between the highly educated residents and the lowly educated residents cannot be considered to be a real effect. Rather, it might have happened by chance. Therefore, the null hypothesis cannot be rejected.

The second null hypothesis was that residents with a higher income participate more than people with a low income. The difference in means indicate that this appears to be true. And even though the slope coefficients are almost all negative for *income*, they do not have an acceptable *p*-value. In other words, this null hypothesis can also not be rejected.

The third null hypothesis related to *public trust* rather than *citizen participation*. It was tested whether or not higher educated residents trust government more than lower educated residents. Unlike the first and second hypothesis, the entire multiple regression had *public trust* as dependent variable, and *education, income, age, gender,* and *dwelling* as independent variables. Furthermore, the high category in *education* was used as reference category, as this category had the most positive difference in means compared to the low and middle education (Table 22). This also implies that, according to the difference in means, higher educated residents seem to have more public trust than lower and middle educated residents. The slope coefficients tell the same story. Nevertheless, only the difference of the residents with a middle education and the highly educated residents is statistically significant. Technically, however, these middle-educated residents are also lower educated than the residents in the high category. In other words, this hypothesis cannot be rejected.

The fourth null hypothesis was that residents with a higher income trust government more than residents with a lower income. Table 22 contradicts this. Table 23 also differs from this statement, as the slope coefficient is negative. Thus, the more income someone has, the less public trust. This can be predicted with an acceptable *p*-value when running a binary regression. Thus, the null hypothesis should then be rejected. However, if the auxiliary variables were added, this relation was not significant anymore. This is a more realistic picture, as not having the other variables is quite difficult in real life. In other words, the fourth hypothesis can only be rejected when it concerns a binary regression.

The fifth null hypothesis, that older residents have more public trust than younger residents, appears to be true in Table 22. Table 23, however, indicates that the hypothesis should be rejected, because the negative slope coefficients in the binary as well as in the multiple regression are statistically significant. Therefore, this research shows that the older someone, the less they trust government, which contradicts the theory.

The sixth null hypothesis said that residents that voted for the party in power have more trust in government than residents that did not vote for that party. Out of the 2018 municipal elections, Leefbaar Rotterdam gained the most votes, and so is considered to be the party in power. However, when looking at the difference in means across other political parties concerning *public trust*, Leefbaar Rotterdam does not appear to be the party with the most trust. The regression was run with the PvdA as dummy variable, as that was the party with the greatest positive difference in means. As it turns out, Leefbaar Rotterdam is predicted to have a level of *public trust* that is lower than that of the PvdA, p < 0.001. This is the case for the binary regression as well as for the entire multiple regression. Consequently, this hypothesis can be rejected, indicating that it does not correspond to the existing literature.

5. CONCLUSION & DISCUSSION

This research has examined, based on the responses of 397 residents of Rotterdam, the question: *How does trust in the municipality of Rotterdam influence citizen participation in the energy transition?* The theory gave arguments for both sides, but also indicated that it is context-dependent. This research showed, by running two multiple regressions, that the residents of Rotterdam who have **more** public trust, are predicted to have a higher level of citizen participation in becoming natural gas-free. The regression for subset 1 – implementing specific measures – as well as the regression for subset 2 – joining particular participation mechanisms – indicated this relation with *public trust* using the control variables *education, income, age, gender,* and *dwelling.* Therefore, this research supports the "more public trust leads to more citizen participation" strain of thought.

This research predicted that highly educated residents and residents with a high income have a higher level of participation. This corresponds to the literature discussed in the theoretical framework. However, the case of Rotterdam does not always correspond to existing theory. For instance, this study estimated that younger residents of Rotterdam have more public trust than older people, whereas the literature states that older citizens trust the government more. Another contradiction is that voters for the party in power do not necessarily have to have a higher level of public trust than voters for other parties.

As the municipality of Rotterdam strives to be natural gas-free in 2050, this research is helpful in understanding what type of citizens and what districts might need extra assistance to improve the citizen participation level. After all, the residents of Rotterdam are crucial in reaching this goal. The main finding is that more public trust leads to more citizen participation. Therefore, further research specifically on how to improve public trust among the residents of Rotterdam is recommended. The differences in districts can also be taken into account for this future research. Especially in Rotterdam Centrum and Pernis the level of public trust appears to be low. When there is an understanding as to why this it, it may also be easier to improve.

Thus, one way to improve public trust in order to stimulate citizen participation is by targeting specific districts with low levels of public trust. However, the reader should bear in mind that the responses for the districts were rather low, because there were various categories for the *residence* variable. Therefore, further research might only focus on the districts with low levels, to examine whether this is actually low. Another way could be to focus on themes rather than places. In other words, the focus may be on residents who voted for a political party that tends to have a lower level of public trust (e.g. 50PLUS, CDA, and the PVV according to the descriptive statistics on public trust in this research). Another theme could be age, as this research showed that older (56+ y/o) residents of Rotterdam are predicted to have less public trust than younger (< 35 y/o) residents.

In addition, future research might include focusing more on the ladder of citizen participation. The reason for this is that this research did not have a reliable set of statements for this theoretical concept. Residents, for example, could be asked to place themselves on a specific rung of the ladder to investigate to what extent the residents actually want more influence in the decision-making process. The literature may say that it would be beneficial for sustainable transitions to have more citizen participation, but what if the residents themselves do not want to have more power? Therefore, it might also be interesting to research the role of the government with the energy transition. Especially researching (the shift toward) the enabling and facilitating role would be adding value to the literature, as an understanding and empirical evidence are still lacking.

Furthermore, Rotterdam is not the only municipality with the goal of becoming natural gas-free. It may, thus, also be worthwhile to research main ideas that would work for all municipalities regarding this goal and citizen participation. This could include to what extent and in what manners it would be most beneficial to let citizen participate or what ways would be discouraged. In other words, what specific ways would be, or not be, effective when citizens actually participate in the energy transition context?

In addition, one third of the 397 respondents indicated that they were not aware that Rotterdam strives at being natural gas-free in 2050. This is a rather high score, especially considering the fact that this should be 100% in 2050. Therefore, it is recommended to inform the residents in other ways than is being done now. This lack of information is also frequently mentioned as an obstacle to become natural gas-free in one's own home. Another obstacle is that it is coerced and so it might be beneficial for policy makers to educate the residents or to let them become natural gas-free willingly, instead of simply stating that all residents should be without natural gas in their home in 2050. In other words, it is recommended to shift the narrative.

In conclusion, this research provides valuable information which the municipality of Rotterdam can use when it comes to its residents and becoming natural gas-free in 2050. Its main finding is that the residents with more public trust have a higher level of citizen participation. It can also provide policy makers an indication as to how willing residents are to become natural gas-free in their house. This, in turn, is also positive for the society in Rotterdam, because their opinion is heard in a relatively early stage of this whole energy transition. No matter what happens, though, the municipality and its residents should always be on good terms to reach the goal of being natural gas-free in 2050. Or, as Feyenoord supporters would sing: "Hand in hand, comrades."
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APPENDIX 1 | SURVEY

The survey (actual one in Dutch) consisted of several sections. These all used the 5-point Likert scale, unless indicated differently.

Section 1 – Additional questions

- 1. I am aware that the municipality of Rotterdam wants to be natural gas free in 2050. Yes - No
- 2. I know what becoming natural gas free means for me personally.
- 3. Becoming natural gas free is necessary for the municipality of Rotterdam.
- 4. The main obstacle for me to become natural gas free is: open question

Section 2 - Willingness to participate (also had the option "already done this")

- 1. I am willing to insulate my house.
- 2. I am willing to cook with electricity rather than gas.
- 3. I am willing to install a heat pump instead of my boiler.
- 4. I am willing to join the district heating network.
- 5. I am willing to join a neighborhood meeting in which the energy transition will be discussed.
- 6. I am willing to start or join an energy initiative (e.g. solar panels in the neighborhood with the *Rotterdamse Energiecoöperatie (REC)*).
- 7. I am willing to visit the website of the municipality to gather information about the energy transition.
- 8. I am willing to visit physical sites to gather information about the energy transition (the *Duurzaamheidswinkel* in IJsselmonde or the *Huiskamer aardgasvrij* in Pendrecht).
- 9. I am willing to contact the municipality online/by calling for information gathering about the energy transition.
- 10. I am willing to have physical meetings with people from the municipality to talk about the energy transition.

Section 3 – Participation

- 1. I want the municipality of Rotterdam to be the leader in the energy transition.
- 2. I want to participate in the energy transition independently and on my own terms.
- 3. I want to have a say in the decision-making process within the energy transition.

Section 5 – Trust in the municipality of Rotterdam

- 1. The municipality of Rotterdam is generally trustworthy.
- 2. I believe the municipality of Rotterdam to do what is right.
- 3. The municipality of Rotterdam is not performing the way I expected.
- 4. I believe the municipality of Rotterdam has personal interests in mind rather than the public's interest.

Section 6 – Personal Information

- What is your gender? Male – Female – Other – Rather not say
- 1. How old are you? <18 / 18-24 / 25-35 / 36-45 / 46-55 / 56-70 / >70
- What is your highest obtained education? Elementary school / vmbo / havo-vwo / MBO-1 / MBO-2 / MBO-3 / MBO-4 / HBO / WO
- 3. What is your net income per year? Less than 26.000 – 26.000-29.500 – 29.500-33.000 – 33.000-36.500 – 36.500 or more – prefer not to answer
- 4. Where do you live in Rotterdam?

Charlois / Delfshaven / Feijenoord / Hillegersberg-Schiebroek / Hoek van Holland / Hoogvliet / IJsselmonde / Kralingen-Crooswijk / Noord / Overschie / Pernis / Prins Alexander / Rotterdam Centrum / Rozenburg

- 5. Do you have a rental or owner-occupied house? Rental / Owner-occupied
- Are you planning on leaving Rotterdam? Yes, I am planning on leaving to another city/country. Yes, I am planning to leave my neighborhood, but not Rotterdam. No
- 7. What political party did you vote for during the municipal elections in 2018? 50PLUS / Beweging Armoedebestrijding Rotterdam / CDA / ChristenUnie-SGP / D66 / De Broederschapspartij / De Nieuwe Rotterdamsche Partij / DENK / GroenLinks / JEZUS LEEFT / Jong Rotterdam / Leefbaar Rotterdam / NIDA Rotterdam / Partij van de Arbeid / Partij voor de Dieren / PVV / SP / Stadsinitiatief Rotterdam / UCF / VVD / Ik heb niet gestemd / Rather not say