Algorithmic decision making in the public sector; a perspective of local public administrators

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Abstract

The use of algorithmic decision making is a growing phenomenon. The public sector uses these systems to perform risks analysis, predictive policing or tracing tax fraud. Various literature is concerned with the attitude of citizens and not of public officials towards these algorithmic decision making (ADM) systems. This study is interested in the attitudes and perceived concerns of public officials towards these ADM systems and its use in the public administration. The aim of this research is to investigate to what extent do the public officials trust the use of ADM in the public administration and if this can be explained by the ADM concerns; fairness, accountability, privacy and transparency. It was assumed that having more concerns will lead to less intention to use ADM. An online questionnaire was distributed among the public officials from a local municipality to gather quantitative data and test the hypotheses. Regression analyses revealed that perceiving more fairness concerns with respect to the nature of the algorithmic decision, a public official is less likely to use ADM in the public administration. Additionally, the level of ADM experience of a participant had a positive effect on the use of ADM in the public administration.

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1. Background

The use of algorithms to make decisions is a growing phenomenon. The public and private sector are already familiar with the use of algorithms and the public sector, which lies behind the private sector on this matter (Ende, 2018), tries to integrate it more by using algorithmic decision making (ADM). An ADM system is a system that uses a set of instructions in order to calculate and solve specific problems (Adriaansz, 2019). These systems can be dived into three categories based on their objective. First, there are ADM systems which "generate new knowledge, generally through analysis of complex phenomena" (Castelluccia & Le Métayer, 2019, p. 4) and are used for analysing large datasets to make improved decisions which have a certain impact on society. Secondly, some systems are connected to cyber physical systems and "are used to provide autonomy to physical objects by limiting human supervision" (Castelluccia & Le Métayer, 2019, p. 5) as in autonomous robots or cars. Thirdly, ADM systems can be used to improve or develop new digital services. "Applications of this category are used to help make predictions, recommendations or decisions in various areas such as information, finance, planning, logistics, etc." (Castelluccia & Le Métayer, 2019, p. 5). These three categories are visible in the public sector and especially the category in which digital services are improved or created is often used. An example is the use of predictive policing in which an ADM system predicts criminal and non-standard behaviour by collecting and analysing a large amount of data (Gerards, Nehmelman, & Vet, 2018). Another example in which an ADM system performs data analyses is to trace tax fraud (Gerards et al., 2018). The system analyses particular risk scores of a citizen when he or she applies for an allowance in order to trace the incorrect and correct submitted forms (Gerards et al., 2018). Also in the social security domain these risk analyses are used to trace fraud with public funds. The algorithmic system combines a large amount of data files such as employment, health insurance and tax data to identify fraud and provide the potential hits to the relevant inspection bureau (Gerards et al., 2018).

The public sector is thus using ADM system for various objectives and also in the Netherlands different layers of government are familiar with its use. According to an research by the Dutch Central Bureau Statistics (CBS) (Doove & Otten, 2018) different layers of government use algorithms to make certain decisions. The report states that among the respondents, 5 out of 8 ministries, 12 out of 25 executive organizations, 11 out of 22 municipalities, and 4 out of 10 regional water authorities use algorithms within their organization (Doove & Otten, 2018). Furthermore, all organizations use rule-based and case-based algorithms to make decisions. Case-based algorithms make predictions based on previous cases and rule-bases algorithms drawn conclusions based on fixed rules (Doove & Otten, 2018). These two types of decisions-making algorithms can be linked to the previous mentioned third category of ADM systems in which it improves or develops new digital services by making predictions and recommendations.

ADM systems can be very efficient and lower costs when it is used for automating "standardized public sector services that deliver standardized decisions based on simple information provided by

citizens" (Hedström, Larsson, & Wihlborg, 2016, p. 2903). Nevertheless, there are also some concerns regarding to the use of ADM in the public sector. An algorithmic decision "may be perpetuating discriminatory practices and having unintended consequences, all while operating outside the scope of traditional oversight and public accountability mechanism" (Brown, Chouldechova, Putnam-Hornstein, Tobin, & Vaithianathan, 2019, p. 1). This raises questions about the fairness, accountability, and privacy of such a system since it is possible that the ADM system detects the wrong citizen when making a risk analysis. Moreover, it can be difficult to use the system at the governmental level since not every citizen has a 'standard' case which can be solved via an algorithmic decision and thus often is co-operation between a professional bureaucrat and an automated system required (Hedström et al., 2016).

1.1 Perceptions about ADM among public servants

Because of the possible disadvantages of ADM systems, the use of such a system can raise certain concerns and attitudes towards it. Not only citizens who are affected by the decision of an ADM system but also the public officials who are involved in the ADM process have an opinion about the usage of the system. These attitudes of public officials are not really known but they are important. Public officials have a sort of client-relationships with citizens and an ADM system "can be seen as not just another actor in the network; rather it reframes relationships, responsibility and competences" (Hedström et al., 2016, p. 2903) which means that public officials have to co-operate with the system. Professional competences, such as being ethical and connecting with citizens, of the public officials are still needed and play "a key role in the formation of a network of humans and non-humans in public administration" (Hedström et al., 2016, p. 2906). This co-operation shows that the public official is still an important actor which makes their opinions about ADM systems also valuable.

Even if their opinions are not really known, there are some general understandings about the use of ADM in the public sector. For instance, that the ADM system is clear in how and which data is used and what the intention of the system is (Copeland, 2018). Additionally, a staff member should be accountable for the decisions of the algorithm and there might be a sort of insurance policy available for citizens who are negatively affected by wrongful decisions of the system (Copeland, 2018). These understandings reflect how a public official might think about ADM systems and its use.

The use of ADM systems in the public administration is not the first technological change in the public sector and there are some studies about public officials' attitudes towards these earlier technological challenges such as the use of internet and e-government. A Dutch study investigated the e-awareness and e-skills among public officials and analysed questionnaire data in which, among other things, the usefulness of internet within the government and their own organization and the level of trust of internet application from their own organization were asked (Van Deursen & Van Dijk, 2009). The study shows that public officials score quite high on these aspects with an average of a 4 on a 5-point Likert scale which indicates that they 'agree' with the usefulness of the internet and have a high level of

trust in the internet applications (Van Deursen & Van Dijk, 2009). Furthermore, the study states that this could be explained by a higher level of personal knowledge regarding to internet applications (Van Deursen & Van Dijk, 2009). Another study from New Zeeland, asked public servants across different government departments about their view of e-government (Baldwin, Gauld, & Goldfinsch, 2012). The main results show that in general the public officials expect a form of transformation within the government because of new technologies and they were "supportive of the benefits that e-government could bring in terms of access to information, some efficiency gains and some government co-ordination" (Baldwin et al., 2012, p. 118).

1.2 Relevance

The perceptions among public servants about earlier technological changes in the public sector seem rather positive. However, ADM can be seen as a different type technology since it is not just an additional tech-application which is used but it also reframes relationships between the public official and the citizens. Furthermore, an ADM system can act independently as well, compared to previous technologies, since it is able to learn to make decisions based on precious decisions or cases and not only based on certain rules. So to say, these algorithms use "administrative data to build models with the purpose of helping make day-to-day operational decisions in the management and delivery of public services, rather than providing general evidence to improve strategy or government-citizen interaction" (Brass & Veale, 2019, p. 2). ADM systems are in that way different compared to previous technologies and therefore it can raise different or new concerns (Brass & Veale, 2019) which makes it interesting to research the attitudes towards it.

When looking at the literature there is, besides the general thoughts, advantages and disadvantages of ADM in the public administration, not much known about the opinions of the public officials themselves towards these types of systems and its use in the public administration. For instance, the recent research by the CBS (Doove & Otten, 2018) does also not mention the opinions of the public officials working at those governmental levels. After all, given the rise of using ADM systems, these are the individuals who work or will have to work with the systems which makes their options quite relevant when it is introduced in a part of the public sector. When for example a new ADM system will be implemented at a municipality, it is useful for them to consider the opinions and concerns of the employees so that the implementation of the system can be more smoothly. Also, if there is a better understanding of the employee's attitudes in relation to the system, the systems can be more tailormade for certain departments and functions within the public sector or on a smaller scale as for a municipality.

So by investigating these opinions about ADM systems, an insight of the social aspect from a work-related angle of the ADM technology will be created. This helps to further understand the social dimension of the ADM systems in the public sector. In this way, this research has a societal relevance. As mentioned earlier, most literature about ADM systems in the public sector is about the system itself

and its advantages and disadvantages. The opinions of public officials are not quite known and if there are differences between the opinions and how these can be explained. This research has scientific relevance since it adds to that literature gap.

1.3 Research question

This research aims to explain the attitudes from public officials towards the use of ADM systems in the public administration. Furthermore, it wants to investigate if differences in opinions can be explained by possible concerns the public officials might perceive from ADM systems and their experience with such a system. To narrow this research down it focuses on the municipality level and in particular a municipality in the Netherlands. The mentioned CBS study stated that 11 of the 22 questioned municipalities use, often case-based, ADM systems which gives an impression that already some municipalities in the Netherlands are familiar with working with ADM systems. The chosen municipality is the municipality of Enschede which is located at the eastern part of the Netherlands. This municipality is very future-oriented and keeps developing itself in entrepreneurial, educational, and cultural aspects (GemeenteEnschede, 2010) which makes it an interesting municipality to research in this study. Moreover, it has the highest number of inhabitants compared to the other municipalities from the same province which makes it a fair representative for the province of Overijssel. The public officials who are researched in this study are all employees at the municipality of Enschede. To research their attitudes the following research question has been established: "*To what extent do public officials from the municipality of Enschede trust the use of ADM in the public administration, and to what extent can this trust be explained by ADM concerns?"*

2. Theory

In this section a theoretical framework will be established to explain the attitudes from public officials towards and use of ADM systems in the public administration. Hereafter, the relevant concepts are conceptualized and hypotheses are formulated.

2.1 Theoretical background

At the moment, there is not a precise theoretical model for public officials formulated yet. Therefore, an existing model from a more general but related context will be used and put into the context of this research. This model is created by Aysolmaz, Muller, and Meacham (2019) and is about the intentions of ordinary citizens to use ADM services. This intention to use is linked to perceived concerns, benefits, and trust towards the system. Furthermore, the perceived concerns are influenced by the amount of

knowledge the citizen already have about ADM systems. The perceived concerns in this model are the four concepts; fairness, accountability, privacy, and transparency.

Their theoretical model is based on the overarching APCO (Antecedents Privacy Concern Outcome) framework (Smith, Dinev, & Xu, 2011) which explains that "the construct of privacy concerns will likely mediate the relationship between a set of antecedents and behavioural outcomes" (Alashoor, Han, & Joseph, 2017, p. 66). This means that certain antecedents (personal factors) of the individual such as the privacy experience and awareness influences the privacy concerns of the individual which in turn influence a certain behavioural outcome, for example the willingness to provide their personal information (Smith et al., 2011). This APCO framework is mainly used in the literature with respect to privacy concerns and consumer experiences but it can be applicable and "prove useful across disciplines and contexts" (Smith et al., 2011, p. 1008). The associations between the antecedents, the concern and the behavioural outcome in the APCO framework can be either positive or negative and depends on the context in which this framework is used (Alashoor et al., 2017). Aysolmaz et al. argued that the APCO framework "can be used a valid model for also ADM systems by considering other concerns caused by such systems" (Aysolmaz, Muller, & Meacham, 2019, p. 38). These additional concerns; fairness, accountability, and transparency are chosen because, according to various literature, these are the main concerns people have and are central in relation to ADM systems.

2.2 Theoretical model and ADM concerns

This theoretical model can also be used to investigate the reason why public officials do or do not trust the use of ADM in the public administration. Since the public officials are willing to provide their services as good as possible to the citizens, it can be said that their concerns are quite similar to the concerns which a citizens would have when receiving ADM services from the municipality. However, it possible that the public officials encounter also other concerns towards ADM systems as for example that it would be a threat to their job. Nevertheless, according to a recent report by Indeed, which has been executed by Panelwizard, almost 60% of the Dutch employees are not afraid that AI will take over their job and rather think that it makes their work more efficient (Indeed, 2018). Furthermore, there are many studies, with contradicting conclusions, about to what extent a job will disappear or transform because of these types of AI technologies (Castelluccia & Le Métayer, 2019). Therefore, that issue can be an extensive study of its own and since this research is mainly interested in the municipality and citizen relationship when it comes to the use of ADM systems it will not include the concern of possible job loss because of ADM systems.

When applying the model in the context of the public officials from the municipality, they have, like the citizens, a certain amount of knowledge about ADM systems since they have already worked with it or not. This knowledge and thus their experience, according to the model influences the perceived concerns and the concerns influence how they think about the use of ADM system in the public

administration. It is possible that the public official is not aware of working with an ADM system but this does not mean that they do not have any concerns or opinions about its use in the municipality. Their type of experience, however, is also different from the citizens because the citizens are receiving a service from the system and a public official is providing a service via the system. Both type of experience influence the perceived concerns but this relationship can be different since the experience itself is also different. The experience of the public official is rather work-related and from the citizen more consumer-related and therefore also more personal.

To simplify the original model and make it more applicable for this research, it will only look at the four perceived concerns and its connection to the experiences and intention to use of the public officials (see figure 1). The linkage of the benefits and trust towards the system are thus left out. The aforementioned concerns from the model are applicable for public officials since they "should be accountable for their actions to be fair and efficient, that informational privacy rights should be respected and that individuals have a right to know the reasons when decisions adversely affect them" (De Laat, 2018, p. 527).

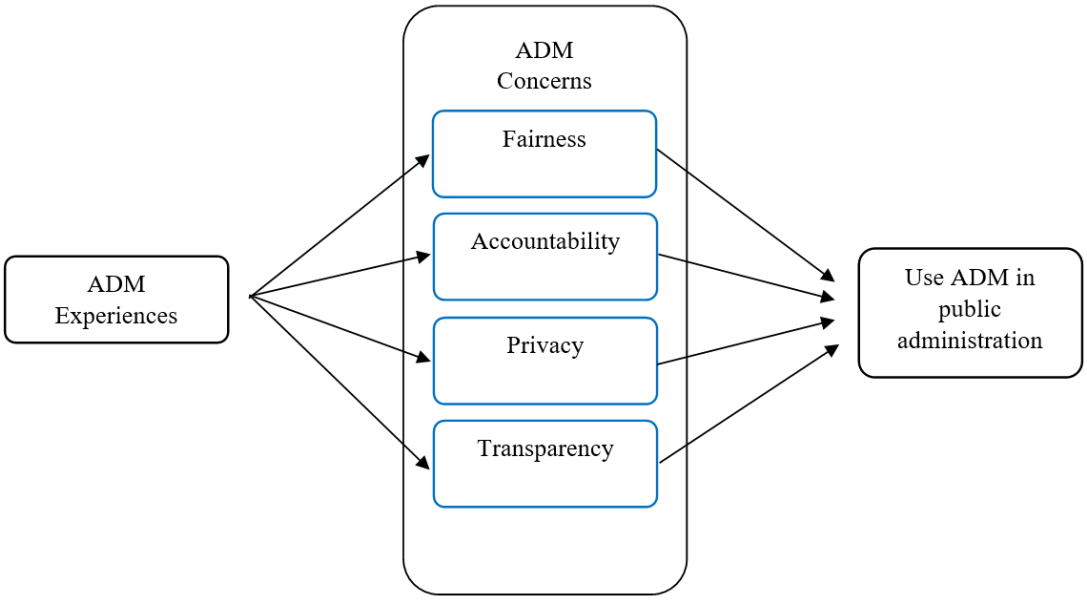

Figure 1: Theoretical model

2.2.1 Experience

One can obtain a technological experience by doing a particular activity for a long time and as a consequence gaining better knowledge and skills related to that activity (Van Deursen & Van Dijk, 2011). In this context, a public official that has been working with an ADM system before has as a result a certain amount of knowledge and skills regarding to ADM systems. The experience consist thus of the frequency of working with the systems and the related ADM knowledge and skills one then

acquires. This means that the more often a public official works with an ADM system, the higher the level of experience, the knowledge and skills about ADM systems will be. These knowledge and skills are here the operational skills related to the ADM system of the public official and their ability to interpret and explain the decisions made by the system (Van Deursen & Van Dijk, 2011). The public sector has some experience with ADM since it is sometimes used to identity tax fraud or assist in predicting possible criminal activities. The experience itself and the type of knowledge and skills it exists of, is for the public officials work-related.

2.2.2 Fairness

The concept fairness related to the ADM system entails how well the algorithm can make a decision and will not discriminate as a result of wrongly input data or historical patterns of bias by biases (MacCarthy, 2019). This input data can be provided by the organizations who uses the ADM system as well as individuals who receive a service from it. The decisions which an ADM system makes are often related to the services which the government provides, like applications for licences and permits. However, there remains a certain difficulty in the public administration since some decisions are way more complex and do not "have the luxury of the settled consensus on ends and means some engineers are used to (Binns, Kleek, & Veale, 2018, p. 2). Sometimes, this can create grey zones in problem-solving since "equitable and effective public services require judgements that cannot be quantified, reduced or encoded in fully automated systems" and are only "effective in some highly specific, syntactically complex but semantically un-troubling domain" (Brass & Veale, 2019, p. 5). Because of this, it can be questioned if an ADM can make fair decisions. Nevertheless, some scholars argue that ADM systems are improving and are becoming more accurate and better in avoiding human bias and might provide "insights that public professionals alone would miss" (Brass & Veale, 2019, p. 7).

2.2.3 Accountability

As a public official serving the citizens you are accountable for your actions and decisions. This accountability is important since the decisions have often more a direct impact on the lives of the citizens than for example the decision of a company will have (Mulgan, 2000). "The range of activities for which private sector managers are held publicly accountable is considerable narrower than that which applies to politicians or senior public servants" (Mulgan, 2000, p. 95).

The introduction of new technologies in the public sector "will not only take over tasks previously done by humans but can also redistribute tasks, responsibilities, and accountabilities" (Noorman, Martin, & Smith, 2010, p. 3). When an ADM system is implemented it is sometimes not clear who is accountable for the algorithmic decision. This can happen since there is a possible "gap between merely priding reasons and explanations for an algorithmic decision-making system's output, and providing adequate justification for them that will be acceptable to affected decision subject" (Binns,

2018, p. 548). Furthermore, a possible effect is that "increasingly complex automation can obscure the lines of responsibility, compromising accountability processes" (Noorman et al., 2010, p. 4). There can be a displacement of accountabilities when the technologies are used as a scapegoat and this shows "how the shift in accountability from the frontline bureaucrat to the software engineer, whose role does not include the responsibility to answer to the citizen, leaves an accountability void" (Noorman et al., 2010, p. 5). Because of this, accountability can be seen as a concern which the public officials might encounter.

2.2.4 Privacy

The involvement of personal data often create concerns about privacy. Public officials are frequently in contact with the personal data of citizens. If it appears that the algorithmic system is not careful enough with this personal data, the public official related to the decision of the system will be held accountable for it. "In the public sector context, where individuals may have fewer choices about whether and when the government will collect personal information, the obligations on government to protect this data tend to be more onerous" (Scassa, 2014, p. 402). Therefore is it possible that the public officials also have concerns regarding to privacy. However, lately the European Union introduced the General Data Protection Regulations (GDPR) in order to handle the data protection as a result of the rapid technological changes (Aloisi & Gramano, 2019). This GDPR, which entered into force, May 25th 2018, "aims to guarantee a 'consistent' level of data protection to each and every European citizen ('natural persons'), regardless of their nationality or place of residence (Art. 3.1)" (Aloisi & Gramano, 2019, p. 108). So this applies to "any company processing the data of EU citizens" (Aloisi & Gramano, 2019, p. 108) and can be a reason that the public officials might have less privacy concerns since the use of ADM systems have to comply with this regulation.

2.2.5 Transparency

Transparency is related to how and why decisions are made by an ADM system. It is important for public officials, and citizens, to have a clear understanding about how the decisions are made and that if necessary, the decisions can be explained to the citizens (Fink, 2018). However, being transparent is not always easy. Some information can cause potential harms or invades someone's privacy and thus has transparency its limits (Fink, 2018). Additionally, "government officials may worry that publicly disclosed algorithm will be gamed or circumvented, making predictions less reliable and thwarting their purpose" (Brauneis & Goodman, 2018, p. 160). Nevertheless, transparency is also important to gain the trust of the public and "many privacy, data protection and freedom of information laws contain various measures to compel organisation to reveal the systems they deploy, what data they collect, the models they infer and how they are used" (Binns, 2018, p. 547). So, the demand for transparency is related to the data that an ADM system uses but also the working of the algorithm itself and its goals and outcomes (Clifton et al., 2019). Although, "The complexity of the algorithmic processing, combined with the scale

and variety of data involved in the computations, makes transparency in the sense of 'explaining the steps of the algorithm' unlikely to lead directly to an informative outcome" (Clifton et al., 2019, p. 76). Being transparent and providing explanations about the ADM system might be possible but it can be still very complex and therefore "should it be applied differently to different systems depending upon the nature of the algorithmic system, the complex circumstances that lead to the need for governance, and the goals of that governance" (Clifton et al., 2019, p. 6).

2.3 Hypotheses

When looking at the literature and the working of the APCO model, the ADM concerns are together a possible explanation for why public officials at the municipality, given a certain experience with the system, trust the use of ADM systems in the public administration.

Since the theoretical APCO model has not been used in the context of public officials before it is difficult to predict what the exact possible relationship between the experience and the ADM concerns are. When looking at the APCO model, which is mostly used in the context of user experience with regards to privacy concerns, diverse literature suggest that if an individual is aware of the meaning and the benefits of their data which is used, they tend to have less concerns (Alashoor et al., 2017). Furthermore, if an individual thinks he or she can cope with the possible 'privacy' threats they also tend to be less concerned (Alashoor et al., 2017). However, if this awareness and acquired experience is rather negative because of reported threats by the media or personal events, an individual perceives more concerns (Benamati, Ozdemir, & Smith, 2017). Nevertheless, this experience can also be 'positive' and lead to less concerns and that is thus the case when an individual is more aware of the used data, its value, and know what to do with a possible threat.

A public official, as an employee, might not have the exact same experience as a normal user because their experience in this context is related to someone's else data rather than their own and is therefore more work-related. However, the way of gaining the experience, by doing an activity multiple times, is similar. An employee can also be aware of the data, its benefits and coping with its threats even if it is not their own data but the data of others, in this case of the citizens, which they will treat with the same respects since it is part of their job. Furthermore, when an employee has to work with an ADM system, he or she may receive training and education on how the system functions and creates a better understanding with respect to the system (Vanderheyden, 2020). Via this, the employee is gaining, rather positive, experience related to the ADM system and gains the awareness of the data, its value and learns how to cope with possible threats. As a consequence, one can say that the employee with more experience will therefore have less concerns.

With regards to the link between the concerns and the behavioural outcome, in this case the intention to use ADM systems, it is logically to assume that when an individual has more concerns, he or she is then less likely to use the system. Moreover, Aysolmaz et al. (2019) also found this assumption

proven in their model. However, if this 'intention to use' is less, it does not mean that the public official will or can stop using the ADM system when it is already implemented at their workforce. This intention indicates which public official, given a certain level of ADM concerns, thinks that the use of ADM in the public administration is useful or not. These opinions can then be helpful for future implementation of ADM systems or revision of a system that is in use. When applying this reasoning to this research one can assume the following hypotheses;

H1: Public officials who have experiences with ADM systems are more likely to have less (a) fairness, (b) accountability, (c) privacy and (d) transparency concerns.

H2: Public officials with less (a) fairness, (b) accountability, (c) privacy and (d) transparency concerns are more confident to use ADM in the public administration.

3. Methods

The following section will discuss the chosen research design, case selection and data collection of this research. Furthermore, the variables are operationalized based on the established theoretical framework.

3.1 Research design

This research is testing several hypotheses to investigate a possible causal relationship between the variables. Since there is no time dimension and there is only a focus on the different opinions among the public officials, the research design can be defined as cross-sectional. The reason that there is no time dimension is that the differences in opinions between the public officials were measured at one point in time and not if there is a change in opinions overtime. Additionally, due to time the constraint of this research, it does not focus on possible changes overtime which makes this design the best approach for answering the research question and the corresponding hypotheses. The opinions of the public officials were gathered via an online questionnaire. The strengths and weaknesses of this design will be discussed later on in the discussion and conclusion section.

3.2 Case selection and sampling

This research is in the context of the municipality of Enschede which makes all the public officials who currently work at the municipality the target population. This municipality was chosen because, as mentioned earlier, it is keeps developing itself at various aspects in the society and it is a fair representative for the province of Overijssel. Furthermore, according to the municipality they use already some ADM systems which makes them an interesting public organization to study. For instance,

citizens or companies can apply for products and services via the website of the municipally who uses an algorithm to notify them if they are qualified to obtain a particular product or service. Also, they are developing an analysis model together with KennisPuntTwente, who possess large datasets from the region, to analyse potential risks within the municipality's districts. Additionally, the municipality is cooperating with other municipalities from the Netherlands to create an algorithmic model which makes it possible for citizens to gain direct insight, which they had not before, in amount of social assistance benefits when they start a new job (S. Rodenburg, personal communication, May 31, 2020).

In consultation with the municipality, the online questionnaire and corresponding link was posted on their internal site so that every public official who works for the municipality could access the questionnaire. The questionnaire was available for almost two weeks in the period 15 May till 27 May 2020. This means that the precise amount of cases did depend on the how many employees filled in the questionnaire and every public official had an equal chance to fill it in. Therefore, the sampling method 'self-selection' was used and 123 individuals responded. The municipality has around 1300 employees which makes the respondents rate approximately 9.5%. Generally, the participants were men and women between 46-55 years old with a type of advisory position within the municipality.

3.3 Data collection

An online questionnaire was created to gather the data for this study. This questionnaire is based on the existing theoretical model (Aysolmaz et al., 2019) about the opinions of citizens towards the use of ADM services and has been put into the context of public officials. The survey questions were derived from the questions which Aysolmaz et al. (2019) used to test their model and were reformulated and explained in a way so that it fits with this research context. The questionnaire contained questions about the ADM concerns of the theoretical model, how much experience public officials have with ADM systems and their thoughts about using it in the public administration. Furthermore, there were some questions related to the control variables as for example the participant's gender, age and level of education. The questionnaire was online available via the internal website of the municipality and had close-ended questions which means that quantitative data was gathered. Before the participant could start the questionnaire, a small introduction text was shown in which the purpose of this research was explained along with the definition and examples of the use of algorithms in the public administration. This study uses original data only since all the used data was collected via the questionnaires. The data is appropriate because it is original and has therefore more chance of matching the true thoughts from the public officials about ADM systems.

3.4 Operationalization

This section describes the operationalization of the variables. The original Dutch survey questions and translations can be found in the Appendix (A). The following variables were constructed and measured

for this research; ADM experiences, fairness, accountability, privacy, transparency, and use ADM in public administration. Furthermore, the questionnaire also gathered data on the subsequent control variables; gender, age, education, technical direction education, function, managerial position, and contact with citizens.

3.4.1 Main variables

3.4.1.1 ADM experiences

The variable "ADM experiences" refers to the level of experience the public official have with ADM systems. This level of experience, as explained earlier consists of their work experience in general, knowledge, and skills with regards to ADM systems. Furthermore, when a participant had ADM work experience, he or she had thus already some ADM knowledge and skills because of that. Moreover, when a participant had no ADM work experience, he or she could still have some knowledge about ADM systems by hearing about its use in municipalities. The online questionnaire had several questions which measured these aspects of the level of experience of the public official. The work experience was measured by asking the participants if they have worked with an ADM system before and they could choose between the answers "Never", "Rarely", "Every now and then", "Often", "Always" or "I don't know". The "I don't know" was reported as a missing value. When a participant had some work experience, they could answer a follow up question about to what extent they use an ADM for risk analysis, decision making and controlling purposes. Also here they could choose either "Never", "Rarely", "Every now and then", "Often" or "Always". Furthermore, all participants were asked to what extend they thought the use of ADM was suitable for those three purposes by answering "Completely disagree", "Disagree", "Neutral", "Agree" and "Completely agree". These last two questions had the purpose of gaining some more insight, given it is new and quite unknown data, about the use of ADM with respect to those three purposes and how the participants thought it is appropriate for those purposes.

To measure the knowledge and skills regarding to ADM system, a few statements were presented for which the possible answers were "Completely disagree", "Disagree", "Neutral", "Agree" and "Completely agree".

Statements	Applicable to
I have heard about the use of algorithms by municipalities before	Participants who had never worked with ADM or did not knew
I think it is important to keep up with developments regarding the use of algorithms by municipalities	All participants

I am willing to invest extra time in learning new skills to work with algorithms	All participants
I understand how the algorithms I use work	Participants who have worked with ADM before
I can explain to colleagues how the algorithms I use work	Participants who have worked with ADM before
I can explain to citizens how the algorithms I use work	Participants who have worked with ADM before
I can interpret the decision of the algorithms well	Participants who have worked with ADM before

Table 1: Questionnaire statements for ADM knowledge and skills

The last four statements in table 1 measure more in depth how the participants with ADM work experience think about their own level of ADM knowledge and skills. The two questions which were applicable for every participant were asked with the purpose of gaining more insight about interest of the participants of keeping up with developments and learning new skills which was in particular interesting for the municipality given their own current ADM developments. Participants who had no ADM work experience had to answer the question *'I have heard about the use of algorithms by municipalities before'* to measure their level of ADM knowledge.

So to say, there are two interesting aspects within the "ADM experience" variable namely the one who measures the ADM work experience and the one who measured the knowledge of the people who did not have ADM work experience. Since the latter does not display the answers of the participants who do have ADM work experience, a new variable has been made in which these participants are included as well. In this new variable, all the participants who indicate having some level of ADM work experience form together one group on the scale of the *'I have heard about the use of algorithms by municipalities before'* question. They received the number 6 ("Use ADM") on the scale meaning that they have the highest level of knowledge since they have the ADM work experience. This means that the "ADM experience" can be measured via the two variables "ADM work experience" and "ADM knowledge" who both include all participants.

3.4.1.2 ADM concerns

As mentioned in the theory section there are four ADM concerns which makes each concern a variable named "Fairness", "Accountability", "Privacy", and "Transparency". These concerns are measured by a few statement questions at which the participants could choose between the answers "No confidence at all", "No confidence", "Neutral", "Some confidence", "A lot of confidence", and "I don't know".

These options indicate how much a participant thinks that an ADM system is fair, accountable, safeguards privacy and transparent when making decisions. The statements which together measure one ADM concern were combined by taking the mean of the statements and compute a new variable. The following statements shown in table 2 were asked to measure each concern and were randomized beneath the questionnaire question.

ADM concern	Statements
Fairness	That citizens are generally treated fairly by algorithms. That citizens are generally treated equally by algorithms. That citizens believe that algorithm decisions are unbiased.
Accountability	That the municipality is accountable for decisions made by algorithms. That there are clear policies and regulations in the area of algorithms. That the municipality takes measures if a citizen experiences problems due to algorithm decisions.
Privacy	That the privacy of citizens is guaranteed by algorithms. That the citizens' personal data is handled carefully by algorithms.
Transparency	That it is clear to citizens how a certain algorithmic decision was made. That algorithmic decisions are interpreted by individuals. That algorithm decisions are explained to the citizens. That citizens have the opportunity to respond to an algorithm's decision.

Table 2: Questionnaire statements per ADM concern

Before taking the mean of the statements and performing a reliability analysis to test the coherence between them, the choice "I don't know" was reported as a missing value.

The Cronbach's alpha of the variable "Fairness" was 0.65. which is acceptable given this small data set. The Cronbach's alpha of the variable "Accountability" was 0.61 which is not that high either but also acceptable given this small data set. For the variable "Privacy" the Cronbach's alpha was 0.83 which is quite high meaning that statements for the variable "Privacy" have a sufficient degree of internal consistency. The "Transparency" concern had the lowest alpha of 0.55 and a factor analysis was performed to investigate possible underlying dimensions within that variable. No clear second dimension was found, however by removing the statement *'That citizens have the opportunity to respond to an algorithm's decision'* the alpha improved to 0.58. It was chosen to remove that statement when creating the "Transparency" variable for further analysis.

This means that there are four ADM concerns; "Fairness", "Accountability", "Privacy" and "Transparency" which are used for further analysis.

3.4.1.3 Use ADM in public administration

To measure the willingness to "Use ADM in public administration" variable the participants had to answer six statements (see table 3) at which they could choose between "Completely disagree", "Disagree", "Neutral", "Agree", "Completely agree", and "I don't know". Also the means of these statements were merged together to one variable and the choice "I don't know" was reported as a missing value. With a Cronbach's alpha of 0.69 the statements for the variable "use ADM in public administration" had an acceptable degree of internal consistency.

Variable	Statements
Use ADM in public administration	The municipality should make more use of algorithms than it is doing now. The use of algorithms increases the distance between government and citizen. The use of algorithms contributed to a more efficient municipality. I personally would like to make more use of algorithms in my work. The use of algorithms in the municipality is beneficial for the citizens. Using algorithms makes my job easier.

Table 3: Questionnaire statements for "Use ADM in public administration" variable

3.4.2 Control variables

With respect to the control variables, the participants could answer the question for the variable "Gender" by choosing between "Male", "Female", and "Other". To measure the age, the variable "Age" has been divided into six categories and they could choose either "Younger than 25 years", "26-35 years", "36-45 years", "46-55 years", 56-65 years", or "Older than 65 years". The "Education" variable was measured by asking the participants what their highest level of education was and they could choose between different levels which are used in the Netherlands. Additionally, the participants could indicate if they followed any education which was technically oriented by filling in "Yes" or "No" to measure the "Technical direction education" variable. The variable "Function" appeared to be too broad to let the participant choose between a list with possible functions and therefore this question was open-ended[1]. The next variable, "Managerial position", was measured by the question if the participant has a managerial position within their function or not which means that they could fill in the answer "Yes" or

[1] The variable appeared to be rather unequally distributed.

"No". The last control variable "Contact with citizens" implies how often the participant comes into contact with citizens during their job to which the possible answer to the question were "Never", "Rarely", "Every now and then", "Often", or "Always".

3.4.2.1 Descriptive statistics

The control variables help to describe the demographic characteristics of the sample. The statistics of these variables suggest by looking at each median, that a participant is generally a female between 46-55 years old with a University degree which has no technical direction and does not possess a managerial position and has rarely contact with citizens during her work activities.

When having a closer look at each variable, the characteristics of the sample group becomes clearer. The frequencies of "Gender" (with N= 76) shows that the female gender (56.6%) was slightly more represented than the male gender (42.1%). Furthermore, the ages of this sample, displayed in table 4, were mostly represented in the category "46-55 years" with 35.5% but the remaining frequencies were fairly evenly distributed in the categories "36-45 years" (23.7%), "56-65 years" (21.1%), and "25-35 years" (18.4%). Only one participant was present in the lowest category "Younger than 25 years" and no participant was present in the last category "Older than 65" which is understandable since all participants are employees which means in the Netherlands that you normally go with retirement at the age of 65 or 67 depending on your birth year (Rijksoverheid, 2020). So to say, the ages of the participants ranges from 25 till 65 which can be seen as a meaningful representation since in the Netherlands the average age of an employee is 41 years old (CBS, 2019).

	Frequency	Valid Percent	Cumulative Percent
1 Younger than 25 years	1	1.3	1.3
2 25-35 years	14	18.4	19.7
3 36-45 years	18	23.7	43.4
4 46-55 years	27	35.5	78.9
5 56-65 years	16	21.1	100
Total	76	100	
Missing	3		
Total	79		

Table 4: Frequencies of "Age" variable

Regarding to the educational level of the participants, 43.4% possesses a University of applied science degree and 51,3% a University degree leaving 5.2% with a lower level educational degree. This means that the lower levels of education are barely represented in this sample and should be considered when drawing conclusions. Additionally, 85.1% of the participants (with N=74) did not follow an education which was technically orientated and only 8% had a type of managerial position which should be considered as well when drawing conclusions.

The frequencies shown in table 5 of the variable "Contact with citizens" (with N=76), are rather concentrated at the left side of the scale meaning that the participants are never (25%), Rarely (38.2%) or every now and then (26.3%) in contact with citizens during their work activities. This signifies that the public officials from the sample are mostly active at the office rather than working in the field. This was also visible in the "Function" variable since most of the participants were a type of policy advisor from different policy domains within the municipality.

	Frequency	Valid Percent
1 Never	19	25
2 Rarely	29	38.2
3 Every now and then	20	26.3
4 Often	5	6.6
5 Always	3	3.9
Total	76	100
Missing	3	
Total	79	

Table 5: Frequencies of "Contact with citizens" variable

4. Data analysis

This section will show the possible relationships between the variables by analysing the descriptive statistics, bivariate correlations and regressions models. Since this data is new and has not been investigated before, the descriptive statistics of the variables will be described at first. Thereafter, further analysis of the data is conducted via correlations and regression models in order to provide a test of the hypotheses.

4.1 Descriptive statistics

To create a sample with meaningful cases, all the respondents who did not fill in any questions or did not reach and completed the questions regarding to the ADM concerns were left out. This resulted into 79 meaningful cases for further analysis. Furthermore, the "I don't know" choice who could be filled in for certain questions were reported as missing values. The frequencies of all the separate questionnaire items are stated in Appendix B.

4.1.1 Main variables

4.1.1.1 ADM experience

In the operationalization section it was mentioned that within the "ADM experience" variable one can look at the "ADM work experience" and "ADM knowledge" of the participants. Table 6 which contains the frequencies of the work experience with ADM systems, displays that the majority of the participants (65.7%) claims to never have worked with an ADM system before. Furthermore, 23.9% claims to rarely work with these systems and 12 participants did not know. Among these 23 participants who use ADM systems, 39.1% had a neutral opinion or agreed on understanding the ADM systems they work with and their ability to explain it to others.

	Frequency	Valid Percent
1 Never	44	65.7
2 Rarely	16	23.9
3 Every now and then	4	6
4 Often	3	4.5
Total	67	100
6 I don't know	12	
Total	79	

Table 6: Frequencies of "ADM work experience"

Table 7 indicates to what extent the participants heard about the use of ADM systems before and 25.3% agreed on hearing about this use of algorithms by municipalities followed by 15.2% disagreed and 12.7% completely agreed with this statement. Moreover, the table shows that the 23 individuals, who work with ADM systems, are at the end of the right side of the scale meaning they know indeed about the use of ADM the most since they are working with it. This suggest from all participants, the majority has some knowledge about ADM systems.

	Frequency	Valid Percent
1 Completely disagree	5	6.3
2 Disagree	12	15.2
3 Neutral	9	11.4
4 Agree	20	25.3
5 Completely agree	10	12.7
6 Use ADM	23	29.1
Total	79	100

Table 7: Frequencies of heard about use ADM among the participants

The participants were also asked to what extent they believe that ADM was appropriate for three type of goals: for risk analysis, decision making and controlling purposes. This resulted in that 70.9%

of the participants agreed that it is appropriate for identifying and analysing risks in policy areas and 55.1% agreed it was appropriate for controlling decisions in policy areas. Regarding to the use of ADM to make decisions in policy areas, responses are more mixed: the opinions were distributed among "Disagree" with 37.2% and "Agree" with 35.9%.

Additionally, the participants were able to fill in questions about the importance of keeping up with developments regarding to the use of ADM and their willingness to learn new ADM skills. Among the participants, 41.8% agreed, 27.8% were neutral and 21.5% completely agreed that it is important to keep up with ADM developments. Furthermore, 44.3% of the participants agreed on willing to invest extra time in learning new skills to work with algorithms and 24.1% had a neutral position and 20.3% completely agreed.

4.1.1.2 ADM concerns

Looking at the frequencies of the ADM concerns, the first variable "Fairness" had 49.4% of its frequencies at the "Neutral" position and 29.2% at the "No confidence" position meaning that the majority of the participants were neutral or had no confidence in how fair the decisions of the ADM system are. Furthermore, 16.5% had some confidence that an ADM system treats people fairly when making decisions. So to say, the frequencies show that the participants have rather some fairness concerns regarding to ADM systems.

The ADM concern "Accountability" had the frequencies the highest at the "Neutral" opinion with 48.1% and the frequencies of the standpoints "No confidence" (26.6%) and "Some confidence" (20.3%) were rather close to each other. There were hardly any percentages at the two extremes of "No confidence at all" and "A lot of confidence". This means that the participants have slightly some accountability concerns since they take a neutral or a more negative standpoint when it comes to the accountability of the municipality with regards to the decisions of the ADM systems.

Next, the variable "Privacy" had also the most frequencies at the "Neutral" (39%) position followed by the frequencies at the "Some confidence" (31.2%) position. The frequencies show that participants had rather a more confidence than no confidence (19.5%) standpoint which means they had generally slightly less privacy concerns regarding to how carefully the ADM system handles the citizens' personal data.

The last ADM concern "Transparency" had its frequencies peaked with 50.6% at the "Neutral" position. 12.7% of the participants had "Some confidence" and 35.5% had "No confidence" meaning that the participants are mainly neutral and rather have no confidence than some confidence considering how transparent the decision from an ADM system are and can be understood by individuals. This shows that there is a certain degree of transparency concern among the participants.

Figure 2 displays a general overview of the confidence levels of the participants towards the fairness, accountability, privacy and transparency aspects of the ADM systems in which "A lot of confidence" is included in 'Confidence' and "No confidence at all" included in 'No confidence'. The

figure shows that in general the participants have the most concerns regarding to the transparency of the ADM system and the least concerns regarding to how well the system protects the privacy of citizens.

Figure 2: Overview participants' confidence towards ADM concerns

4.1.1.3 Use ADM in public administration

The variable "Use ADM in public administration" has 44.7% of the participants at the "Agree" position meaning that those participants have a certain intention to use ADM systems in the public administration. Additionally, 6.6% strongly agree on this use and 42.1% are taking a neutral position. This displays a rather neutral and 'positive' view of using ADM in the public administration by the participants.

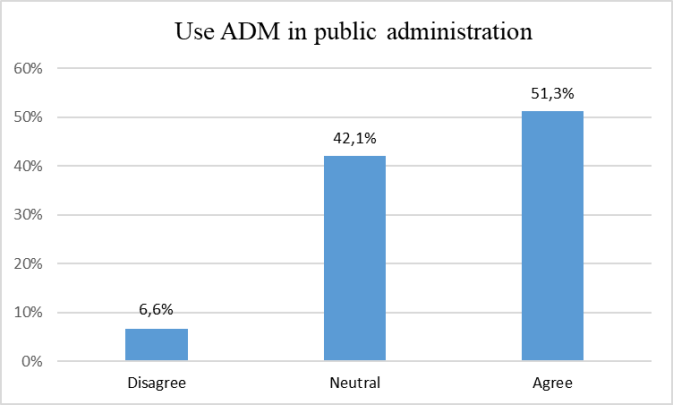

Figure 3: General overview opinions towards "Use ADM in public administration"

4.2 Bivariate correlations

This section displays the bivariate correlations between the variables which have been connected to each other in the theory section. This means an analysis between the variables "ADM experience" and each ADM concern and between each ADM concern and "Use ADM in public administration" variables. Since the variables "Fairness", "Accountability", "Privacy" and "Transparency" are 'concerns' their scales have been reversed resulting in higher scores for respondents with more concerns (instead of 'more confidence'). This was done to provide more clarity in the upcoming analyses. All variables are treated as continuous and have a quite normal distribution which means that Pearson R was used to assess the relationships[2].

The first set of correlations in table 8 uses the variable "ADM experience" and as described earlier one can look more specifically at the "ADM work experience" and "ADM knowledge" within this variable. However, since the formulated hypothesis in the theory section is primarily aimed at the "ADM work experience" and as explained having more work experience means also having more ADM knowledge this variable was used for further analysis. In this way, it provides a clear distinction between the ADM users and no users and is a better overarching variable to measure the ADM experience. The correlations with "ADM knowledge" variable was considered but there was not substantially strengths found and it only correlated significantly with "Transparency". Nevertheless, it was chosen to continue with the "ADM work experience" variable as the "ADM experience" variable. The bivariate correlation between the "ADM experience" and each ADM concern are displayed in the table below.

Table 8: Correlation between "ADM experience" and the ADM concerns

	ADM experience	Fairness	Accountability	Privacy	Transparency
ADM experience		-.139	-.137	-.224	-.233
Fairness			.458**	.469**	.525**
Accountability				.377**	.668**
Privacy					.358**
Transparency					

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 8 shows that the Pearson R for each ADM concern is negative, which means that if a participant has ADM work experience, he or she has less ADM concerns. The fairness (R = -.139) and accountability (R = -.137) concerns have a rather weak correlation coefficient. The privacy (R = -.224)

[2] Spearman's rho was considered as well but did not substantially change the strengths or significance of the correlations.

and transparency (R = -.233) concerns show a weak and slightly moderate correlation. Neither of the ADM concerns correlates significant with "ADM experience" which means that one cannot be certain if this negative association is true. The associations among the concerns are positive moderate to strong and all significant at a 0.01 alpha level which indicates that when a public official has a concern it is very likely the he or she has also another ADM concerns. It is interesting to note that the correlation between transparency and accountability is very high, since they are both important public administration aspects.

The second bivariate correlations are between the ADM concerns and the "Use ADM in public administration" variable. Table 9 displays again that the correlations are negative, meaning that if a participant has more ADM concerns, he or she has less intention to use ADM in the public administration. The Pearson R of fairness (R = -.511) is the highest and indicates a rather strong correlation which is significant at the 0.01 alpha level. Also the privacy (R = -.363) concern is significant at that alpha level and has a moderate correlation. The accountability (R = -.260) and transparency (R = -.262) concerns have both a rather weak and moderate correlation which is significant at the 0.05 alpha level. Each ADM concern correlates significantly with the "Use ADM in public administration" variable which means that the risk of assuming the relationship that a lower level of ADM concerns means a higher intension to use ADM in the public administration is true when it actually is not, is very small.

Table 9: Correlations between the ADM concerns and "Use ADM in public administration"

	Use ADM in public administration	Fairness	Accountability	Privacy	Transparency
Use ADM in public administration		-.511**	-.260*	-.363**	-.262*
Fairness			.458**	.469**	.525**
Accountability				.377**	.668**
Privacy					.358**
Transparency					

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

4.3 Regression analysis

Similar to the previous section, the regression analysis consist of two steps. An analysis between the variables "ADM experience" and each ADM concern and between the ADM concerns and "Use ADM in public administration" variables. The regression analysis will test the assumed hypotheses and either accept or reject them. Appendix C contains the tested and approved assumptions for the regressions.

To test the components of hypothesis 1, a multiple linear regression was performed between "ADM experience" as the independent variable and the control variables[3] "Gender", "Age" and "Contact with citizens" with each ADM concern as a dependent variable which resulted in 4 separate regressions. Table 10 shows that the Adjusted R square is very low in each model with the exception of the model in which "Privacy" is the dependent variable. That regression model accounts for 13,6% of the total variance in the privacy concern. Furthermore, as the correlations predicted, the ADM experience has a negative effect on each ADM concern. However, the predictor was not significant at any alpha level in the models which means that the all the components from hypothesis 1; *'Public officials who have experiences with ADM systems are more likely to have less (a) fairness, (b) accountability, (c) privacy and (d) transparency concerns.'* are rejected. With respect to the control variables, only "Contact with citizens" was significant (p= .015) at the 0.05 level in the 'privacy' model meaning that for each point to the right on the scale of "Contact with citizens" the privacy concern increased with 0.28 points when all other variables are kept constant. So public officials who have more contact with citizens during work have more privacy concerns with respect to the ADM system.

Table 10: Regression results "ADM experience" and each ADM concern including control variables

	Fairness			Accountability			Privacy			Transparency		
	B	Std. E.	Beta	B	Std. E.	Beta	B	Std. E.	Beta	B	Std. E.	Beta
ADM experience	-.150	.127	-.156	-.102	.125	-.107	-.162	.139	-.142	-.173	.110	-.199
Gender	-.037	.189	-.025	-.088	.186	-.060	.011	.209	.006	-.063	.165	-.047
Age	.008	.097	.010	.021	.096	.029	.212	.108	.237	.107	.085	.159
Contact with citizens	-.035	.103	-.044	-.035	.103	-.044	.281*	.113	.299	.055	.090	.077
Constant		3.457			3.079			1.807			3.138	
Adj. R square		-.039			-.026			.136			.032	
N		65			65			63			65	

* Significant at the 0.05 level.

** Significant at the 0.01 level.

To test the components of hypothesis 2, a multiple linear regression was conducted to predict the "Use ADM in public administration" based on the ADM concerns as the independent variables. The same model was analysed but then included the control variables gender, age and contact with citizens[4]. Table 11 shows with an adjusted R square of .238 the four ADM concerns in the regression model account for 23.8% of the total variance in the "Use ADM in the public administration" variable. The F-test is significant (p= .001) meaning that one can assume that the model explain a significant variance in the "Use ADM in public administration" variable. When looking at the significance of the predictors, only the variable "Fairness" was significant (p= .001). By including the control variables "Gender", "Age" and "Contact with citizens", the model stays significant (p= .001) and significance of the effect

[3] Other control variables were tested as well but did not substantially change the other variables in the model also given their unequal distribution and small N.

[4] Other control variables were tested as well but did not substantially change the other variables in the model also given their unequal distribution and small N.

of “Fairness” hardly changes with B= -.387 to B= -.399. Furthermore, the control variable “Age” is significant at the alpha level 0.05 (p = .045) meaning older people are less likely to use ADM in the public administration.

This regression has been conducted again but then with the inclusion of “ADM experience” to see if there is a direct effect on the intention to use ADM. The control variables gender and contact with citizens have been left out because of their insignificance in the previous models and the smaller N in this model. Table 11 show that “Age” is no longer significant but “Fairness” (p= .001) still is as well as “ADM experience” (p= .017). Additionally this, significant, model explains 31,6% of the total variance in the “Use ADM in the public administration” and the effect of fairness increased slightly to B= -411. So for each point of increase on the scale of the “Fairness” variable, the intention to use ADM in the public administration by a public official decreases by 0.41 points when all other variables are kept constant. These results mean that hypothesis 2 only with regards to the fairness concern: *H2(a)* ‘*Public officials with less fairness concerns are more confident to use ADM in the public administration*.’ can be accepted. Moreover, the positive direct effect of the ADM experience (B= .227) means that for each point of increase on the scale of this variable, the intention to use ADM in the public administration by a public official increases by 0.23 points when all other variables are kept constant. Having a higher level of ADM experience leads to being more confident to use ADM in the public administration.

Table 11: Regression results “Use ADM in public administration”. Model 1a excluding control variables, Model 1b including control variables, Model 1c including ADM experience.

	Model 1a			Model 1b			Model 1c		
	B	Std. E.	Beta	B	Std. E.	Beta	B	Std. E.	Beta
Fairness	-.387**	.115	-.438	-.399**	.116	-.458	-.411**	.115	-.469
Acountability	-.031	.126	-.034	-.053	.124	-.060	.011	.130	-.012
Privacy	-.114	.086	-.157	-.057	.095	-.079	-.068	. 093	-.092
Transparency	.036	.146	.035	.074	.147	.073	. 120	.152	.122
ADM experience	-	-	-	-	-	-	.227*	.093	.270
Control variables									
Gender	-	-	-	.120	.130	.093	-	-	-
Age	-	-	-	-.145*	.071	-.227	-.116	.074	-.176
Contact with citizens	-	-	-	-.001	.071	.002	-	-	-
Constant		4.927			5.095			4.606	
Adj. R Square		.238			.265			.316	
N		75			74			63	

* Significant at the 0.05 level.

** Significant at the 0.01 level.

4.3.1 Path diagram

When returning to the theoretical model in which it is assumed that the level of ADM experience influence the level of AMD concerns and they in turn influence the intention to use ADM in the public administration, the model displays a certain path. The formulated hypotheses test these assumed direct effects and strengths between the variables of this path diagram. As shown in the theoretical model there is the possibility of an indirect effect (Denters, 2019) which means that "ADM experience" can have an indirect effect on "Use ADM public administration" via the ADM concerns. The direct effect of "ADM experience" on ADM concerns is negative and the direct effect of ADM concerns on "Use ADM in public administration" is also negative which means by using the 'product rule' the indirect effect will be negative as well.

Now that the regression analyses have been performed, the path diagram can be drawn in which the significance and strengths of the effects are displayed. The standardized coefficients (Beta) are used in the diagram to show the effects in order to consider the relative strengths of different coefficient in the model (Denters, 2019). The dotted lines indicate that the relationship is not significant as it resulted from the regression models. Since there is no significant direct effect of "ADM experience" on any of the ADM concerns, no indirect effect on the "Use ADM in public administration can be determined. However, the regression indicated there is a direct effect of "ADM experience" on the intention to use.

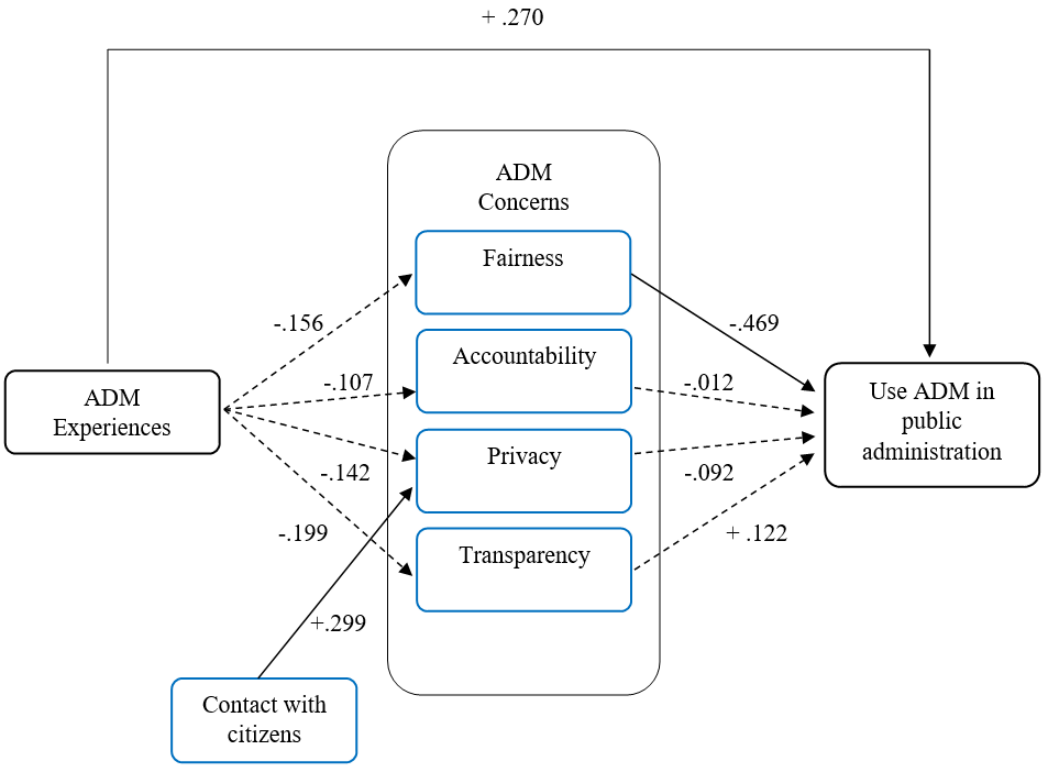

Figure 4: Path diagram

5. Discussion and Conclusion

This last section will provide an answer to the stated research question by discussing the findings from the analysis. Thereafter it discusses the possible implications of this research.

To answer the research question "*To what extent do public officials from the municipality of Enschede trust the use of ADM in the public administration, and to what extent can this trust be explained by ADM concerns?"* the descriptive statistics were analysed and the components of the hypothesis were accepted and rejected.

The descriptive results made clearer how the public officials at the municipality of Enschede think about the use of ADM in the public administration and their trust towards such systems. Even when the frequencies showed that not a large number of the participants do work with ADM system, the majority however agreed on hearing about the use of ADM before. Additionally, only a small percentage of the sample was not in favour of using ADM in the public administration. Furthermore, it is interesting to note that the participants believed that ADM was very appropriate of risk analysis and controlling purposes but that the opinions were rather mixed when ADM is used for decision making. This might be related to, as described by Headström et al. (2016), that co-operation between the public official and the system is often required and this is more often the case with decision making. Therefore the participants might found the ADM system not always appropriate for this.

When looking at how the participants thought that an ADM system could be fair, accountable, safeguards citizens privacy and is transparent, generally they were rather neutral or had not so much confidence towards this. Only with regards to how well an ADM system can protects the citizens privacy, the public official had more confidence. This might be the case since it does not concern the personal data of the public officials but of the citizens and as mentioned there are General Data Protection Regulations by the EU to which the systems has to comply. So to say, the public official have some concerns towards the ADM system itself but are generally in favour of using these systems in the public administration.

The second part of the research question is explanatory and therefore two hypothesis have been tested to explain to what extent this trust is related to the ADM concerns. Regarding to the first hypothesis it was tested if the experience with ADM systems had an effect on each of the ADM concerns. The analysis showed that there were weak and no significant correlations and regression model which means that there was no effect found that the ADM experience would lead to more or less concerns. Furthermore, the second hypothesis tested if each of the concerns could affect the intention to use ADM in the public administration. It was found that there were negative moderate to strong significant correlations between the concerns and the intention to use ADM which means that it is very likely that when a public official has less concerns their intention to use will increase. This corresponds with the original model of Aysolmaz et al. (2019) who found these association proven. The regression model however showed that, besides the model itself, only the "Fairness" concern was significant meaning that

in this study it can only be claimed that public officials with less fairness concerns are more confident to use ADM in the public administration.

Besides the ADM concerns, it was also tested if the intention to use ADM could be directly explained by the ADM experience. This relationships was found to be significant, in the same regression model, meaning that there is a direct effect of having more ADM experience leading to being more confident to use ADM in the public administration. Moreover, the regression model explained 31,6% of the total variance of the intention to use ADM in the public administration which a reasonable figure.

To conclude, this research showed that the public officials have a relatively high level of trust in using ADM in the public administration even when they are not always confident that the ADM system is fair, accountable or transparent. Additionally, this trust can be explained by how fair a public official thinks that the decisions of an ADM system are and by their level of work experience and corresponding knowledge with ADM systems.

Besides the main results, there was an additional significant and positive effect found from the control variable "Contact with citizens" on the privacy concern. This suggest that the more often a public official works with citizens during their job, the higher their privacy concerns will be. This fact may be of interest of the municipality since they could consider when creating or implementing a new ADM system for public officials who work more often with citizens that such a system is extra secure with the personal data of the citizens. Moreover, the main results can also be in the interest of the municipality since they can be more certain that public officials are willing to use ADM systems but that this trust partly depends on the fairness of the system and the experience of the public official.

5.1 Theoretical and practical implications

This research created new insight into what extent a public official trust the use of ADM in the public administration. The majority of the participants trust the use of the ADM systems which corresponds with the mentioned literature about how public officials 'agree' with the usefulness of earlier technological applications in the public administration (Van Deursen & Van Dijk, 2009). Furthermore, the theoretical model by Aysolamz et al. (2019) coincide with the finding that a higher level of ADM fairness concern leads to less intention to use ADM. Nevertheless, their model also found that the privacy and transparency concerns significantly affected this intention to use. Moreover, as the literature (e.g. Aysolmaz et al 2019; Copeland, 2018) suggest that the chosen concerns are strongly related to each other and representative for the public administration, that was found proven by the correlation models in this study.

However, this study did not found an effect of the ADM experience on the ADM concerns which means that there might be other 'antecedents' which influence the level of ADM concerns. Additionally, only "Fairness" had an effect on the intention to use and therefore is it possible that the public official might encounter other ADM concerns or that the ADM concerns generate other behavioural outcomes.

The overarching APCO framework itself on which the theoretical model was based might still be relevant but it is possible that other 'antecedents' and 'behavioural outcomes' fit better with respect to this context. Therefore, further research on this topic is of interest.

The rather small sample size of this study could cause some practical implications. Because of this sample size the conclusions are primarily applicable for the municipality of Enschede or a similar municipality. The descriptive statistics of the control variables showed that the sample did include a representative distribution of the gender, age and level of contact with citizens of the participants but not with respect to the education level, type of education, managerial position and the function type. This means that the conclusion rather represent public officials who work at the office as an advisor who has a higher non- technical educational degree. However, the unequal distribution of the educational level does also in a way fit with the municipality since the majority of work tasks often require a higher level of education. Moreover, public officials who have to work with ADM systems are rather present at an office position as a type of advisor or administrator concerned with decision making than an official who works outside which makes this research still valuable. Nevertheless, it should be considered when an ADM system is introduced which 'type' of public officials are supposed to work with it so the system can be more tailor made and therefore more effective. Street-level bureaucrats for instance, are directly in touch with citizens and the 'street-level algorithms' which assist in those tasks must be able to make the correct decisions right away, also in unfamiliar cases (Alkhatib & Bernstein, 2019).

When looking at the chosen cross-sectional research design, it can be said that, even the design made it possible to measure more independent and dependent variables, the at one point in time measurement shows correlations and associations rather than a causal relationship between the variables. This design did not measure a change in opinions over time but this study can be a starting point for a repetitive research in the near future given the increasing use of ADM system. Furthermore, this design is sensitive for reversed causation between the variables which can occur between the ADM experience and ADM concerns. However, there was no relation found between these variables which makes this problem not really present. Since a questionnaire was used, there was a chance of a low response rate. To prevent this, the questionnaire was not too complicated or too long.

5.2 Further research

The primary recommendation for further research is to conduct this research at a larger scale. Then there are more municipalities and public officials involved and a better and more representative view of their opinions will be created and investigated. Moreover, if the sample size is larger, this allows for a more rigorous test of the hypotheses. This study showed that public officials have an intention to use ADM systems and that it can be partly explained by the fairness of and ADM experience with the system. A larger sample size can provide new insight to possible other or additional 'antecedents' and 'behavioural outcomes' which were now not investigated. It is possible that other concerns influence the intention to

use ADM and future research should have a look at which aspects in turn influence the concerns since the ADM experience was not found as an influencer in this study. Furthermore, this study found that the opinions about how appropriate ADM is for decision making were rather mixed and future research might explain why this was the case. Potentially new influencers or variables could also be related to institutional and organizational aspects of the public sector and officials rather than the individual opinions on which this research focussed on. This can be for instance, differences between municipalities or other levels of government which in turn can lead to other results as for example with respect to the "Contact with citizens" variable which can have a different effect among governmental layers.

Many questions remain unanswered since current studies, as for my own, are mainly focused on the effects of ADM at one layer or aspect of government (Alkhatib & Bernstein, 2019; Brauneis & Goodman, 2018; Brown et al., 2019). Further research should therefore have a closer look at the differences between municipalities or among the layers of government as well to provide more insights on this relatively new topic of interest.

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Data Appendix

Appendix A: Original survey questions and translation

Variable	Dutch	English
ADM experiences	In hoeverre maakt het werken met algoritmen onderdeel uit van uw werkzaamheden?	To what extent is working with algorithms part of your work?
	In hoeverre vindt u het gebruik van algoritmen aanvaardbaar voor de volgende doelen? *Het signaleren van verhoogde risico's op een bepaald beleidsterreinen* *Het nemen van beslissingen op een bepaald beleidsterreinen* *Het controleren van beslissingen op een bepaald beleidsterreinen*	To what extent do you consider the use of algorithms acceptable for the following purposes? *Identifying increased risks in certain policy areas* *Making decisions in certain policy areas* *Controlling decisions in certain policy areas*
	In hoeverre gebruikt u in uw werk algoritmen voor de volgende doelen? *Het signaleren van verhoogde risico's op een bepaald beleidsterreinen* *Het nemen van beslissingen op een bepaald beleidsterreinen* *Het controleren van beslissingen op een bepaald beleidsterreinen*	To what extent do you use algorithms for the following purposes in your work? *Identifying increased risks in certain policy areas* *Making decisions in certain policy areas* *Controlling decisions in certain policy areas*

	In hoeverre bent u het eens of oneens met de volgende stellingen? *Ik heb ooit eerder gehoord over het gebruik van algoritmen door gemeenten* *Ik vind het belangrijk om ontwikkelingen rondom het gebruik van algoritmen door gemeenten bij te houden* *Ik ben bereid extra tijd te steken in het leren van nieuwe vaardigheden om met algoritmen te kunnen werken* *Ik snap hoe de algoritmen die ik gebruik werken* *Ik kan aan collega's uitleggen hoe de algoritmen die ik gebruik werken* *Ik kan aan burgers uitleggen hoe de algoritmen die ik gebruik werken* *Ik kan de beslissingen van de algoritmen goed interpreteren*	To what extent do you agree or disagree with the following statements? *I have heard about the use of algorithms by municipalities before* *I think it is important to keep up with developments regarding the use of algorithms by municipalities* *I am willing to invest extra time in learning new skills to work with algorithms* *I understand how the algorithms I use work* *I can explain to colleagues how the algorithms I use work* *I can explain to citizens how the algorithms I use work* *I can interpret the decision of the algorithms well*
ADM concerns:	Hoeveel vertrouwen heeft u in de volgende aspecten wanneer er gebruik wordt gemaakt van algoritmen door een gemeente?	How much confidence do you have in the following aspects when algorithms are used by a municipality?

Fairness	*Dat burgers over het algemeen eerlijk worden behandeld door algoritmen*	*That citizens are generally treated fairly by algorithms*
	Dat burgers over het algemeen gelijk worden behandeld door algoritmen	*That citizens are generally treated equally by algorithms*
	Dat burgers vinden dat beslissingen van algoritmen onpartijdig zijn	*That citizens believe that algorithm decisions are unbiased*
Accountability	*Dat de gemeente verantwoording aflegt over beslissingen van algoritmen*	*That the municipality is accountable for decisions made by algorithms*
	Dat er duidelijk beleid en regelgeving is op het gebied van algoritmen	*That there are clear policies and regulations in the area of algorithms*
	Dat de gemeente maatregelen neemt als een burger problemen ervaart door beslissingen van algoritmen	*That the municipality takes measures if a citizen experiences problems due to algorithm decisions*
Privacy	*Dat de privacy van burgers wordt gewaarborgd door algoritmen*	*That the privacy of citizens is guaranteed by algorithms*
	Dat er zorgvuldig wordt omgegaan met de persoonsgegevens van de burgers door algoritmen	*That the citizens' personal data is handled carefully by algorithms*
Transparency	*Dat het voor burgers duidelijk is hoe een bepaalde algoritmische beslissing tot stand is gekomen*	*That it is clear to citizens how a certain algorithmic decision was made*

	Dat beslissingen van algoritmen worden geïnterpreteerd door mensen *Dat beslissingen van algoritmen aan burgers worden uitgelegd* *Dat burgers een mogelijkheid hebben om te reageren op een beslissing van een algoritme*	*That algorithmic decisions are interpreted by individuals* *That algorithm decisions are explained to the citizens* *That citizens have the opportunity to respond to an algorithm's decision*
Use ADM in public administration	In hoeverre bent u het eens of oneens met de volgende stellingen? *De gemeente zou meer dan nu het geval is gebruik moeten maken van algoritmen* *Het gebruik van algoritmen vergroot de afstand tussen overheid en burger* *Het gebruik van algoritmen draagt bij aan een efficiëntere gemeente* *Ik zou persoonlijk in mijn werk meer gebruik willen maken van algoritmen* *Het gebruik van algoritmen in de gemeente is in het voordeel van de burgers* *Het gebruik van algoritmen maakt mijn werk gemakkelijker*	To what extent do you agree or disagree with the following statements? *The municipality should make more use of algorithms than it is doing now* *The use of algorithms increases the distance between government and citizen.* *The use of algorithms contributed to a more efficient municipality.* *I personally would like to make more use of algorithms in my work.* *The use of algorithms in the municipality is beneficial for the citizens.* *Using algorithms makes my job easier*

Gender	Wat is uw gender?	What is your gender?
Age	Wat is uw leeftijd?	What is your age?
Education	Wat is uw hoogst genoten opleiding	What is your highest level of education?
Technical direction education	Heeft u een opleiding gevolgd waar kennis van algoritmen onderdeel van uitmaakte (bijv. in de wiskunde, informatica, computerwetenschappen, kunstmatige intelligentie of andere opleiding).	Have you followed an education that included knowledge of algorithms (eg in mathematics, computer science, computer science, artificial intelligence or other education).
Function	Wat is uw functie binnen de Gemeente?	What is your function within the municipality?
Managerial position	Heeft u een leidinggevende functie?	Do you have a managerial position?
Contact with citizens	In hoeverre maakt contact met burgers onderdeel van uw werk?	To what extent is having contact with citizens part of your job?

Appendix B: Frequencies of all survey items

Frequencies of the items related to the "ADM experience" variable:

WorkExper_Q1 ADM work experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Never	44	55,7	65,7	65,7
	2 Rarely	16	20,3	23,9	89,6
	3 Every now and then	4	5,1	6,0	95,5
	4 Often	3	3,8	4,5	100,0
	Total	67	84,8	100,0	
Missing	6 I don't know	12	15,2		
Total		79	100,0		

Q2_1 Identifying increased risks in certain policy areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	1	1,3	1,3	1,3
	2 Disagree	3	3,8	3,8	5,1
	3 Neutral	6	7,6	7,6	12,7
	4 Agree	56	70,9	70,9	83,5
	5 Completely agree	13	16,5	16,5	100,0
	Total	79	100,0	100,0	

Q2_2 Making decisions in certain policy areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	4	5,1	5,1	5,1
	2 Disagree	29	36,7	37,2	42,3
	3 Neutral	17	21,5	21,8	64,1
	4 Agree	28	35,4	35,9	100,0
	Total	78	98,7	100,0	
Missing	999	1	1,3		
Total		79	100,0		

Q2_3 Controlling decisions in certain policy areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	2	2,5	2,6	2,6
	2 Disagree	8	10,1	10,3	12,8
	3 Neutral	18	22,8	23,1	35,9
	4 Agree	43	54,4	55,1	91,0
	5 Completely agree	7	8,9	9,0	100,0
	Total	78	98,7	100,0	
Missing	999	1	1,3		
Total		79	100,0		

Q3_1 Used for identifying increased risks in certain policy areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Never	12	15,2	52,2	52,2
	2 Rarely	6	7,6	26,1	78,3
	3 Every now and then	5	6,3	21,7	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q3_2 Used for making decisions in certain policy areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Never	15	19,0	65,2	65,2
	2 Rarely	4	5,1	17,4	82,6
	3 Every now and then	3	3,8	13,0	95,7
	4 Often	1	1,3	4,3	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q3_3 Used for controling decisions in certain policy areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Never	15	19,0	65,2	65,2
	2 Rarely	5	6,3	21,7	87,0
	3 Every now and then	2	2,5	8,7	95,7
	4 Often	1	1,3	4,3	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q4_1 I understand how the algorithms I use work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	1	1,3	4,3	4,3
	2 Disagree	3	3,8	13,0	17,4
	3 Neutral	7	8,9	30,4	47,8
	4 Agree	11	13,9	47,8	95,7
	5 Completely agree	1	1,3	4,3	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q4_2 I can explain to colleagues how the algorithms I use work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	2	2,5	8,7	8,7
	2 Disagree	5	6,3	21,7	30,4
	3 Neutral	7	8,9	30,4	60,9
	4 Agree	8	10,1	34,8	95,7
	5 Completely agree	1	1,3	4,3	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q4_3 I can explain to citizens how the algorithms I use work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	2	2,5	8,7	8,7
	2 Disagree	5	6,3	21,7	30,4
	3 Neutral	9	11,4	39,1	69,6
	4 Agree	7	8,9	30,4	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q4_4 I can interpret the decision of the algorithms well

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	2	2,5	8,7	8,7
	2 Disagree	2	2,5	8,7	17,4
	3 Neutral	9	11,4	39,1	56,5
	4 Agree	9	11,4	39,1	95,7
	5 Completely agree	1	1,3	4,3	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q5.2_1 I think it is important to keep up with developments regarding the use of algorithms by municipalities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	1	1,3	4,3	4,3
	2 Disagree	1	1,3	4,3	8,7
	4 Agree	15	19,0	65,2	73,9
	5 Completely agree	6	7,6	26,1	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q5.2_2 I am willing to invest extra time in learning new skills to work with algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	1	1,3	4,3	4,3
	2 Disagree	2	2,5	8,7	13,0
	3 Neutral	2	2,5	8,7	21,7
	4 Agree	9	11,4	39,1	60,9
	5 Completely agree	9	11,4	39,1	100,0
	Total	23	29,1	100,0	
Missing	System	56	70,9		
Total		79	100,0		

Q5.1_1 I have heard about the use of algorithms by municipalities before

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	5	6,3	8,9	8,9
	2 Disagree	12	15,2	21,4	30,4
	3 Neutral	9	11,4	16,1	46,4
	4 Agree	20	25,3	35,7	82,1
	5 Completely agree	10	12,7	17,9	100,0
	Total	56	70,9	100,0	
Missing	System	23	29,1		
Total		79	100,0		

Q5.1_2 I think it is important to keep up with developments regarding the use of algorithms by municipalities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	2	2,5	3,6	3,6
	2 Disagree	3	3,8	5,4	8,9
	3 Neutral	22	27,8	39,3	48,2
	4 Agree	18	22,8	32,1	80,4
	5 Completely agree	11	13,9	19,6	100,0
	Total	56	70,9	100,0	
Missing	System	23	29,1		
Total		79	100,0		

Q5.1_3 I am willing to invest extra time in learning new skills to work with algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	1	1,3	1,8	1,8
	2 Disagree	5	6,3	8,9	10,7
	3 Neutral	17	21,5	30,4	41,1
	4 Agree	26	32,9	46,4	87,5
	5 Completely agree	7	8,9	12,5	100,0
	Total	56	70,9	100,0	
Missing	System	23	29,1		
Total		79	100,0		

Frequencies of the items related to the ADM concerns:

Q6_1 That citizens are generally treated fairly by algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 No confidence	25	31,6	33,3	33,3
	3 Neutral	27	34,2	36,0	69,3
	4 Some confidence	19	24,1	25,3	94,7
	5 A lot of confidence	4	5,1	5,3	100,0
	Total	75	94,9	100,0	
Missing	6 I don't know	4	5,1		
Total		79	100,0		

Q6_2 That the privacy of citizens is guaranteed by algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	4	5,1	5,3	5,3
	2 No confidence	21	26,6	28,0	33,3
	3 Neutral	31	39,2	41,3	74,7
	4 Some confidence	17	21,5	22,7	97,3
	5 A lot of confidence	2	2,5	2,7	100,0
	Total	75	94,9	100,0	
Missing	6 I don't know	4	5,1		
Total		79	100,0		

Q6_3 That it is clear to citizens how a certain algorithmic decision was made

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	22	27,8	27,8	27,8
	2 No confidence	33	41,8	41,8	69,6
	3 Neutral	16	20,3	20,3	89,9
	4 Some confidence	8	10,1	10,1	100,0
	Total	79	100,0	100,0	

Q6_4 That the municipality is accountable for decisions made by algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	5	6,3	6,3	6,3
	2 No confidence	24	30,4	30,4	36,7
	3 Neutral	27	34,2	34,2	70,9
	4 Some confidence	20	25,3	25,3	96,2
	5 A lot of confidence	3	3,8	3,8	100,0
	Total	79	100,0	100,0	

Q6_5 That citizens are generally treated equally by algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	6	7,6	7,8	7,8
	2 No confidence	21	26,6	27,3	35,1
	3 Neutral	24	30,4	31,2	66,2
	4 Some confidence	18	22,8	23,4	89,6
	5 A lot of confidence	8	10,1	10,4	100,0
	Total	77	97,5	100,0	
Missing	6 I don't know	2	2,5		
Total		79	100,0		

Q6_6 That the citizens' personal data is handled carefully by algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	7	8,9	9,2	9,2
	2 No confidence	15	19,0	19,7	28,9
	3 Neutral	24	30,4	31,6	60,5
	4 Some confidence	24	30,4	31,6	92,1
	5 A lot of confidence	6	7,6	7,9	100,0
	Total	76	96,2	100,0	
Missing	6 I don't know	3	3,8		
Total		79	100,0		

Q6.2_1 That algorithmic decisions are interpreted by individuals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 No confidence	19	24,1	26,4	26,4
	3 Neutral	29	36,7	40,3	66,7
	4 Some confidence	23	29,1	31,9	98,6
	5 A lot of confidence	1	1,3	1,4	100,0
	Total	72	91,1	100,0	
Missing	6 I don't know	7	8,9		
Total		79	100,0		

Q6.2_2 That there are clear policies and regulations in the area of algorithms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	5	6,3	6,5	6,5
	2 No confidence	34	43,0	44,2	50,6
	3 Neutral	18	22,8	23,4	74,0
	4 Some confidence	19	24,1	24,7	98,7
	5 A lot of confidence	1	1,3	1,3	100,0
	Total	77	97,5	100,0	
Missing	6 I don't know	2	2,5		
Total		79	100,0		

Q6.2_3 That citizens believe that algorithm decisions are unbiased

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	4	5,1	5,3	5,3
	2 No confidence	40	50,6	53,3	58,7
	3 Neutral	19	24,1	25,3	84,0
	4 Some confidence	9	11,4	12,0	96,0
	5 A lot of confidence	3	3,8	4,0	100,0
	Total	75	94,9	100,0	
Missing	6 I don't know	4	5,1		
Total		79	100,0		

Q6.2_4 That algorithm decisions are explained to the citizens

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	3	3,8	3,9	3,9
	2 No confidence	26	32,9	33,8	37,7
	3 Neutral	22	27,8	28,6	66,2
	4 Some confidence	23	29,1	29,9	96,1
	5 A lot of confidence	3	3,8	3,9	100,0
	Total	77	97,5	100,0	
Missing	6 I don't know	2	2,5		
Total		79	100,0		

Q6.2_5 That citizens have the opportunity to respond to an algorithm's decision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	4	5,1	5,3	5,3
	2 No confidence	17	21,5	22,4	27,6
	3 Neutral	18	22,8	23,7	51,3
	4 Some confidence	30	38,0	39,5	90,8
	5 A lot of confidence	7	8,9	9,2	100,0
	Total	76	96,2	100,0	
Missing	6 I don't know	3	3,8		
Total		79	100,0		

Q6.2_6 That the municipality takes measures if a citizen experiences problems due to algorithm decisions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No confidence at all	3	3,8	3,9	3,9
	2 No confidence	15	19,0	19,7	23,7
	3 Neutral	26	32,9	34,2	57,9
	4 Some confidence	25	31,6	32,9	90,8
	5 A lot of confidence	7	8,9	9,2	100,0
	Total	76	96,2	100,0	
Missing	6 I don't know	3	3,8		
Total		79	100,0		

Frequencies of the items related to the "Use ADM in public administration" variable:

Q7_1 The municipality should make more use of algorithms than it is doing now

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 Disagree	11	13,9	15,5	15,5
	3 Neutral	22	27,8	31,0	46,5
	4 Agree	24	30,4	33,8	80,3
	5 Completely agree	14	17,7	19,7	100,0
	Total	71	89,9	100,0	
Missing	6 I don't know	6	7,6		
	999	2	2,5		
	Total	8	10,1		
Total		79	100,0		

Q7_2 The use of algorithms increases the distance between government and citizen.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	2	2,5	2,7	2,7
	2 Disagree	18	22,8	24,3	27,0
	3 Neutral	18	22,8	24,3	51,4
	4 Agree	23	29,1	31,1	82,4
	5 Completely agree	13	16,5	17,6	100,0
	Total	74	93,7	100,0	
Missing	6 I don't know	3	3,8		
	999	2	2,5		
	Total	5	6,3		
Total		79	100,0		

Q7_3 The use of algorithms contributed to a more efficient municipality.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	1	1,3	1,4	1,4
	2 Disagree	4	5,1	5,7	7,1
	3 Neutral	12	15,2	17,1	24,3
	4 Agree	37	46,8	52,9	77,1
	5 Completely agree	16	20,3	22,9	100,0
	Total	70	88,6	100,0	
Missing	6 I don't know	7	8,9		
	999	2	2,5		
	Total	9	11,4		
Total		79	100,0		

Q7_4 I personally would like to make more use of algorithms in my work.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	7	8,9	9,7	9,7
	2 Disagree	18	22,8	25,0	34,7
	3 Neutral	13	16,5	18,1	52,8
	4 Agree	24	30,4	33,3	86,1
	5 Completely agree	10	12,7	13,9	100,0
	Total	72	91,1	100,0	
Missing	6 I don't know	5	6,3		
	999	2	2,5		
	Total	7	8,9		
Total		79	100,0		

Q7_5 The use of algorithms in the municipality is beneficial for the citizens.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	3	3,8	4,6	4,6
	2 Disagree	12	15,2	18,5	23,1
	3 Neutral	28	35,4	43,1	66,2
	4 Agree	16	20,3	24,6	90,8
	5 Completely agree	6	7,6	9,2	100,0
	Total	65	82,3	100,0	
Missing	6 I don't know	12	15,2		
	999	2	2,5		
	Total	14	17,7		
Total		79	100,0		

Q7_6 Using algorithms makes my job easier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Completely disagree	5	6,3	7,7	7,7
	2 Disagree	10	12,7	15,4	23,1
	3 Neutral	24	30,4	36,9	60,0
	4 Agree	18	22,8	27,7	87,7
	5 Completely agree	8	10,1	12,3	100,0
	Total	65	82,3	100,0	
Missing	6 I don't know	12	15,2		
	999	2	2,5		
	Total	14	17,7		
Total		79	100,0		

Frequencies of the items related to the control variables:

Gender_Q8 Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Female	43	54,4	56,6	56,6
	2 Male	32	40,5	42,1	98,7
	3 Other	1	1,3	1,3	100,0
	Total	76	96,2	100,0	
Missing	999	3	3,8		
Total		79	100,0		

Age_Q9 Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Younger than 25 years	1	1,3	1,3	1,3
	2 25-35 years	14	17,7	18,4	19,7
	3 36-45 years	18	22,8	23,7	43,4
	4 46-55 years	27	34,2	35,5	78,9
	5 56-65 years	16	20,3	21,1	100,0
	Total	76	96,2	100,0	
Missing	999	3	3,8		
Total		79	100,0		

Education_Q10 Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 Vocational Education and Training	1	1,3	1,3	1,3
	4 Senior general secondary education or university preparatory education	3	3,8	3,9	5,3
	5 Higher professional education (University of applied sciences)	33	41,8	43,4	48,7
	6 Research-oriented education (University)	39	49,4	51,3	100,0
	Total	76	96,2	100,0	
Missing	999	3	3,8		
Total		79	100,0		

Techdirection_Q11 Technical direction education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	11	13,9	14,9	14,9
	2 No	63	79,7	85,1	100,0
	Total	74	93,7	100,0	
Missing	999	5	6,3		
Total		79	100,0		

FunctionG Categories function

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Advisor	43	54,4	62,3	62,3
	2 Management	11	13,9	15,9	78,3
	3 Administrative	3	3,8	4,3	82,6
	4 Supportive function	7	8,9	10,1	92,8
	5 Other	5	6,3	7,2	100,0
	Total	69	87,3	100,0	
Missing	999	9	11,4		
	System	1	1,3		
	Total	10	12,7		
Total		79	100,0		

ManagerialPosition_Q13 Managerial position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	6	7,6	8,0	8,0
	2 No	69	87,3	92,0	100,0
	Total	75	94,9	100,0	
Missing	999	4	5,1		
Total		79	100,0		

ContCitizens_Q14 Contact with citizens

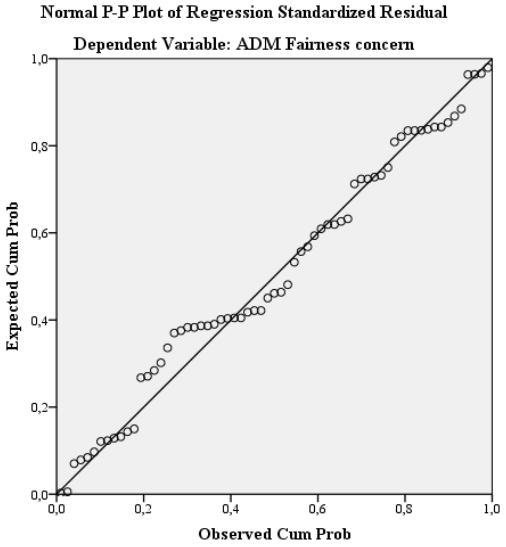
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Never	19	24,1	25,0	25,0
	2 Rarely	29	36,7	38,2	63,2
	3 Every now and then	20	25,3	26,3	89,5
	4 Often	5	6,3	6,6	96,1
	5 Always	3	3,8	3,9	100,0
	Total	76	96,2	100,0	
Missing	999	3	3,8		
Total		79	100,0		

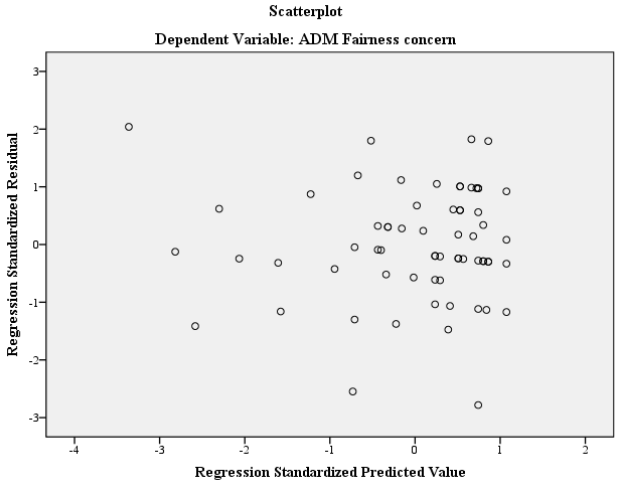
Appendix C: Regression Assumptions

Multiple linear regression:

ADM experience and fairness including control variables

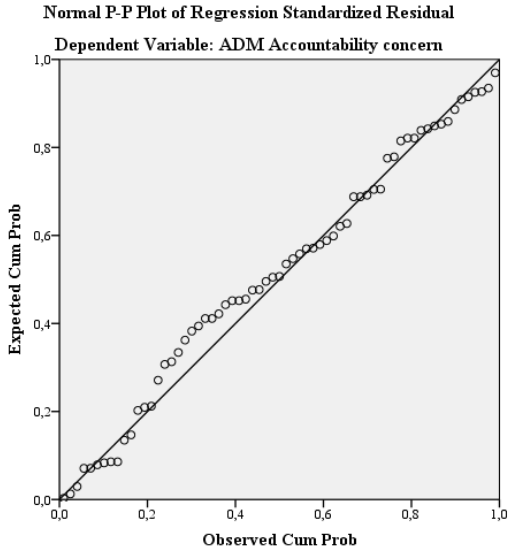
- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed enough given the small N
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 1.068) so no multicollinearity

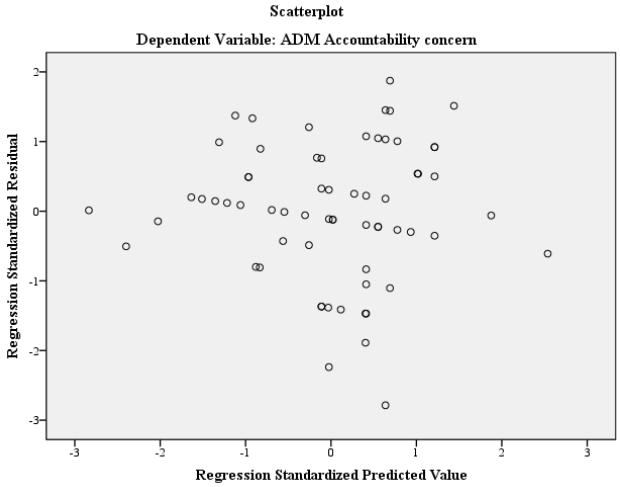




ADM experience and accountability including control variables

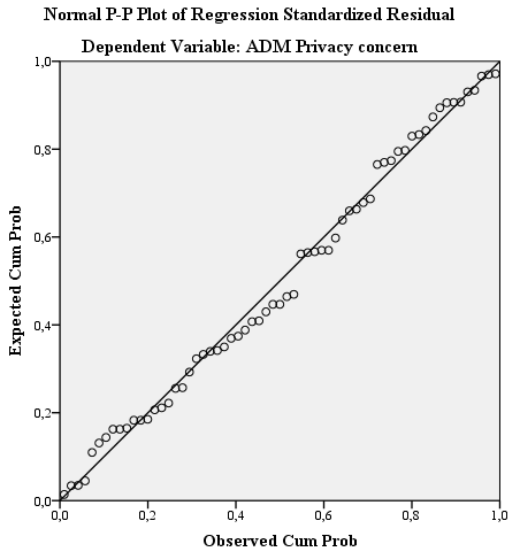
- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 1.068) so no multicollinearity

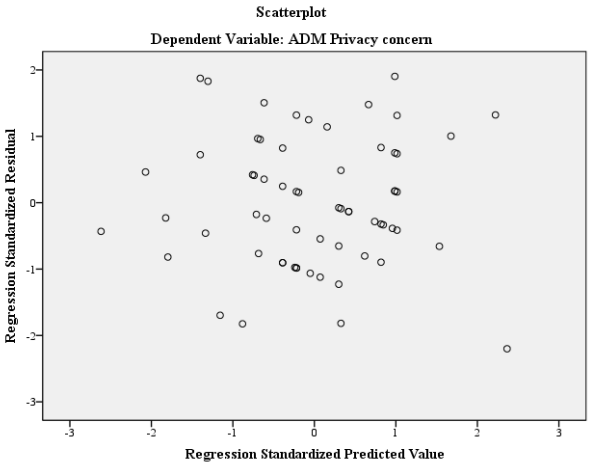




ADM experience and privacy including control variables

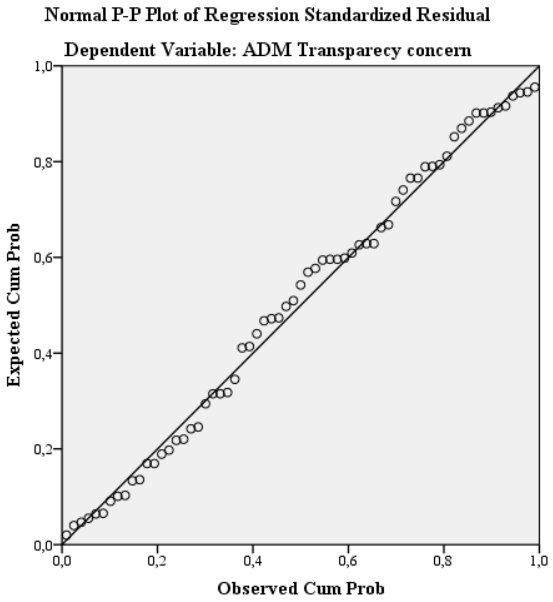
- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 1.065) so no multicollinearity

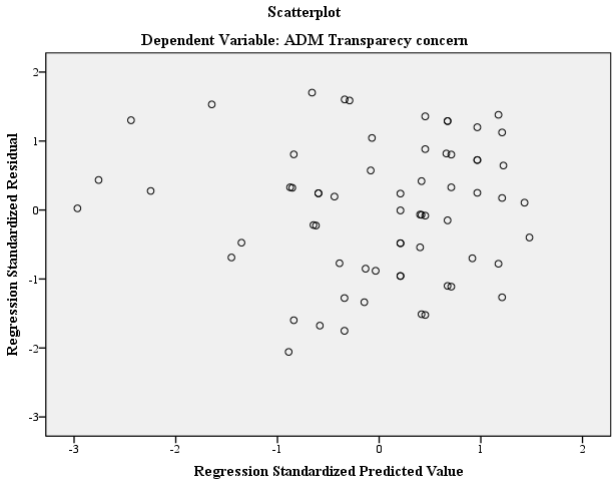




ADM experience and transparency including control variables

- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed enough given the small N
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 1.068) so no multicollinearity

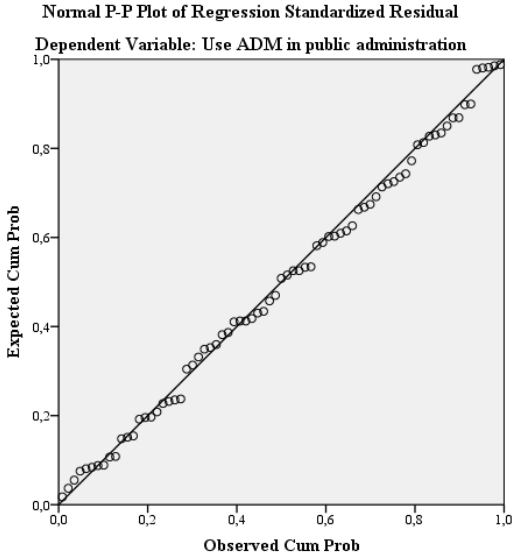


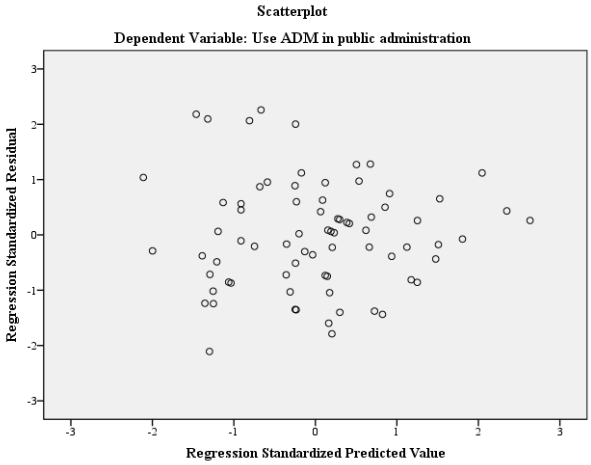


Multiple linear regression:

ADM concerns and use ADM public administration excluding control variables

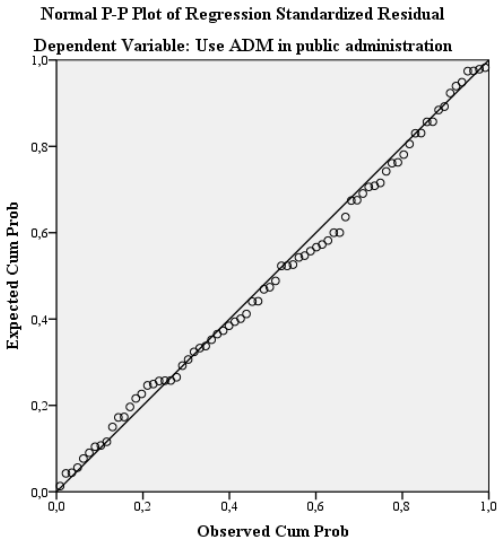
- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 2.044) so no multicollinearity

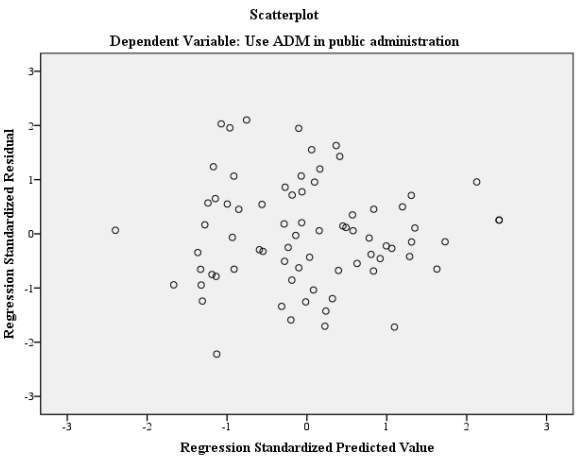




ADM concerns and use ADM public administration including control variables

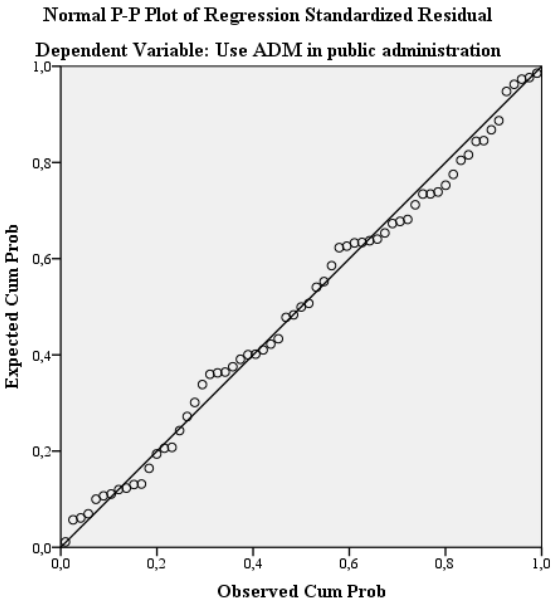
- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 2.135) so no multicollinearity

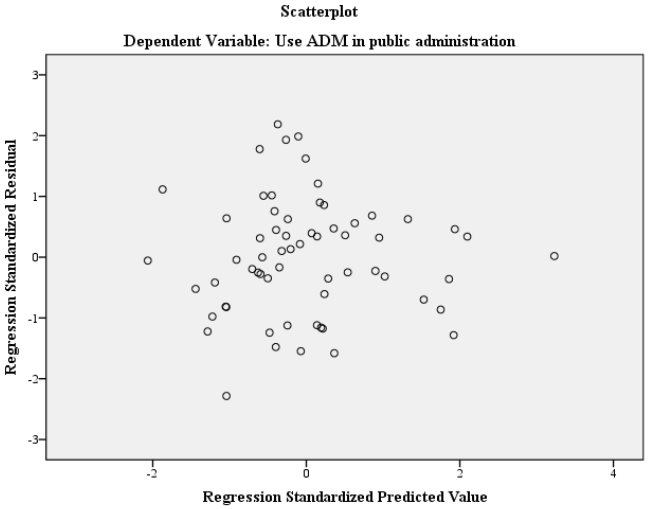




ADM concerns and use ADM public administration including control ADM experience and age

- Normality is okay; the residuals are normally distributed
- Homoscedastic is okay; the residuals are equally distributed
- Linearity is okay; Residuals are normally distributed and homoscedastic
- VIF = each value is below 10 (biggest value was 2.158) so no multicollinearity





Appendix D: Syntax

```
DATASET ACTIVATE DataSet1.
USE ALL.
FILTER BY Filter.
EXECUTE.

*Cronbach Alpha for each concern*
*Privacy*

RELIABILITY
  /VARIABLES=Q6_6 Q6_2
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.


*Fairness*

RELIABILITY
  /VARIABLES=Q6_1 Q6_5 Q6.2_3
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.


*Transparency*

RELIABILITY
  /VARIABLES=Q6_3 Q6.2_1 Q6.2_4 Q6.2_5
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.
```

Accountability

```
RELIABILITY
  /VARIABLES=Q6_4 Q6.2_2 Q6.2_6
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.
```

Factor analysis fairness

```
FACTOR
  /VARIABLES Q6_1 Q6_5 Q6.2_3
  /MISSING LISTWISE
  /ANALYSIS Q6_1 Q6_5 Q6.2_3
  /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION
  /FORMAT SORT BLANK(.1)
  /PLOT EIGEN
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
```

Factor analysis accountability

```
FACTOR
  /VARIABLES Q6_4 Q6.2_2 Q6.2_6
  /MISSING LISTWISE
  /ANALYSIS Q6_4 Q6.2_2 Q6.2_6
  /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION
  /FORMAT SORT BLANK(.1)
  /PLOT EIGEN
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
```

```
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.


*Factor analysis transparency*

FACTOR
  /VARIABLES Q6_3 Q6.2_1 Q6.2_4 Q6.2_5
  /MISSING LISTWISE
  /ANALYSIS Q6_3 Q6.2_1 Q6.2_4 Q6.2_5
  /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION
  /FORMAT SORT BLANK(.1)
  /PLOT EIGEN
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.

*New Cronbach Alpha transparency*

RELIABILITY
  /VARIABLES=Q6_3 Q6.2_1 Q6.2_4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.



*New variable privacy*

COMPUTE Privacy_trust=MEAN.1(Q6_2,Q6_6).
EXECUTE.
```

New variable fairness

```
COMPUTE Fairness_trust=MEAN.1(Q6_1,Q6_5,Q6.2_3).
EXECUTE.
```

New variable transparency

```
COMPUTE Transparency_trust=MEAN.1(Q6_3,Q6.2_1,Q6.2_4).
EXECUTE.
```

New variable accountability

```
COMPUTE Accountability_trust=MEAN.1(Q6_4,Q6.2_2,Q6.2_6).
EXECUTE.
```

Cronbach Alpha of all concerns

```
RELIABILITY
  /VARIABLES=Q6_1 Q6_2 Q6_3 Q6_4 Q6_5 Q6_6 Q6.2_1 Q6.2_2 Q6.2_3 Q6.2_4 Q6.2_5 Q6.2_6
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.
```

*New variable ADM concerns

```
COMPUTE
All_ADM_Trust=MEAN.1(Q6_1,Q6_2,Q6_3,Q6_4,Q6_5,Q6_6,Q6.2_1,Q6.2_2,Q6.2_3,Q6.2_4,Q6.2
_5,Q6.2_6).
EXECUTE.
```

```
*Cronbach Alpha for ADM use*

RELIABILITY
  /VARIABLES=Q7_1 Q7_2 Q7_3 Q7_4 Q7_5 Q7_6
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL.

*New variable use ADM*

COMPUTE Use_ADM=MEAN.1(Q7_1,Q7_2,Q7_3,Q7_4,Q7_5,Q7_6).
EXECUTE.



*Frequencies of control variables*

FREQUENCIES VARIABLES=Gender_Q8 Age_Q9 Education_Q10 Techdirection_Q11
ManagerialPosition_Q13
    ContCitizens_Q14
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.

*Frequencies Use ADM in PA*

FREQUENCIES VARIABLES=Use_ADM
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.
```

```
*Frequencies of each concern/trust*

FREQUENCIES VARIABLES=Privacy_trust Fairness_trust Transparency_trust Accountability_trust
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.

*Frequencies of work experience*

FREQUENCIES VARIABLES=WorkExper_Q1
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.

*Frequencies of the appropriate goals of ADM*

FREQUENCIES VARIABLES=Q2_1 Q2_2 Q2_3
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.


*New variable 'Heard about' including ADM users*

DATASET ACTIVATE DataSet1.
RECODE Q5.1_1 (1=1) (2=2) (3=3) (4=4) (5=5) INTO HeardAbout_2.
VARIABLE LABELS  HeardAbout_2 'Heard about use ADM'.
EXECUTE.


FREQUENCIES VARIABLES=HeardAbout_2
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN
  /ORDER=ANALYSIS.
```

```
*Combined variable of keeping up with ADM developments -> all participants*

COMPUTE ImportanceDevl=SUM(Q5.2_1,Q5.1_2).
EXECUTE.

*Combined variable of willingness to learn skills -> all participants*

COMPUTE LearningSkills=SUM(Q5.2_2,Q5.1_3).
EXECUTE.

*Frequencies of interests in developments and learning skills*

FREQUENCIES VARIABLES=ImportanceDevl LearningSkills
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN
  /ORDER=ANALYSIS.


*Variable Knowledge skills user*

COMPUTE KnowSkils_Users=MEAN.1(Q4_1,Q4_2,Q4_3,Q4_4).
EXECUTE.

FREQUENCIES VARIABLES=KnowSkils_Users
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN
  /ORDER=ANALYSIS.



* Recode ADM concerns*

RECODE Privacy_trust (1=5) (1.5=4.5) (2=4) (2.5=3.5) (3=3) (3.5=2.5) (4=2) (4.5=1.5) (5=1) (6=6)
    INTO Privacy_concern.
VARIABLE LABELS  Privacy_concern 'ADM Privacy concern'.
EXECUTE.

RECODE Fairness_trust (1=5) (1.5=4.5) (2=4) (2.5=3.5) (3=3) (3.5=2.5) (4=2) (4.5=1.5) (5=1) (6=6)
    (1.33=4.67) (1.67=4.33) (2.33=3.67) (2.67=3.33) (3.33=2.67) (3.67=2.33) (4.33=1.67) (4.67=1.33)
```

```
   INTO Fairness_concern.
VARIABLE LABELS  Fairness_concern 'ADM Fairness concern'.
EXECUTE.

RECODE Transparency_trust (1=5) (1.5=4.5) (2=4) (2.5=3.5) (3=3) (3.5=2.5) (4=2) (4.5=1.5) (5=1)
   (6=6) (1.33=4.67) (1.67=4.33) (2.33=3.67) (2.67=3.33) (3.33=2.67) (3.67=2.33) (4.33=1.67)
   (4.67=1.33) INTO Transparency_concern.
VARIABLE LABELS  Transparency_concern 'ADM Transparecy concern'.
EXECUTE.

RECODE Accountability_trust (1=5) (1.5=4.5) (2=4) (2.5=3.5) (3=3) (3.5=2.5) (4=2) (4.5=1.5) (5=1)
   (6=6) (1.33=4.67) (1.67=4.33) (2.33=3.67) (2.67=3.33) (3.33=2.67) (3.67=2.33) (4.33=1.67)
   (4.67=1.33) INTO Accountability_concern.
VARIABLE LABELS  Accountability_concern 'ADM Accountability concern'.
EXECUTE.


* Correlations*

CORRELATIONS
  /VARIABLES=WorkExper_Q1 Fairness_concern Accountability_concern Privacy_concern
    Transparency_concern
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.

NONPAR CORR
  /VARIABLES=WorkExper_Q1 Fairness_concern Accountability_concern Privacy_concern
    Transparency_concern
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.

CORRELATIONS
  /VARIABLES=HeardAbout_2 Fairness_concern Accountability_concern Privacy_concern
    Transparency_concern
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

```
CORRELATIONS
  /VARIABLES=Use_ADM Fairness_concern Accountability_concern Privacy_concern
Transparency_concern
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.


* Regression*

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Fairness_concern
  /METHOD=ENTER WorkExper_Q1 Gender_Q8 Age_Q9 ContCitizens_Q14
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Accountability_concern
  /METHOD=ENTER WorkExper_Q1 Gender_Q8 Age_Q9 ContCitizens_Q14
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Privacy_concern
  /METHOD=ENTER WorkExper_Q1 Gender_Q8 Age_Q9 ContCitizens_Q14
```

```
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Transparency_concern
  /METHOD=ENTER WorkExper_Q1 Gender_Q8 Age_Q9 ContCitizens_Q14
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).


REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Use_ADM
  /METHOD=ENTER Fairness_concern Accountability_concern Privacy_concern
Transparency_concern
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Use_ADM
  /METHOD=ENTER Fairness_concern Accountability_concern Privacy_concern
Transparency_concern
    Gender_Q8 Age_Q9 ContCitizens_Q14
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

```
REGRESSION
 /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Use_ADM
  /METHOD=ENTER WorkExper_Q1 Fairness_concern Accountability_concern Privacy_concern
    Transparency_concern Age_Q9
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```