Erasmus School of
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DO YOU FEEL IN CONTROL?

A study on the relationship between perceived agent autonomy and behavioral intention to use recruitment technologies among managers at the Municipality of Rotterdam.

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Abstract

This study uses quantitative and qualitative methodologies to investigate the relationship between perceived agent autonomy and behavioral intention regarding a novel recruitment system among 67 managers at the Municipality of Rotterdam. The research also incorporates three qualitative interviews. By extending the UTAUT-model by Venkatesh et al. (2003), this study examines *performance expectancy, effort expectancy, social influence, perceived agent autonomy* and *facilitating conditions* in order to predict behavioral intention and use behavior.
Results indicate a significant positive relationship between *perceived agent autonomy* and *behavioral intention.* Increased perceived autonomy during system use increase the likelihood of adoption, aligning with theories such as the *self-determination theory* by Ryan & Deci (2000).
This study confirms previous research's relationship between performance expectancy and behavioral intention. The quantitative analysis shows that effort expectancy has a significant effect on behavioral intention while qualitative analysis shows a less important relationship.
Internal social influence on system usage appears limited. This emphasizes the importance of positive managerial support and the utilization of change agents to promote system adoption.
A final factor explaining the acceptance of the new system and associated with positive attitudes towards adoption is facilitating conditions. Moderation analyses in this research show no significant moderating effects.
In conclusion, perceived agent autonomy significantly influences the intention to adopt and use new recruitment technologies among managers at the Municipality of Rotterdam. Social influence and facilitating conditions are factors as well. These findings provide insights into technology adoption among public sector managers and can be used in future digital transformations.

Key words: *Technology Acceptance, Perceived Agent Autonomy, Decision Support Systems, Public Sector.*

Introduction

In recent decades, technological advancements and the use of information technologies (IT) have become an integral part in organizational science. Organizations implement these innovations to enhance operational efficiency and maintain competitive positions (Cascio & Montealegre, 2016).
This is also the case in the domain of recruitment, as organizations adopt e-recruiting technologies to streamline the hiring process. E-recruiting involves the use of IT to identify, attract and select potential employees (Lee, 2011, p231). Due to the increased demand for knowledge workers efficient recruitment systems are essential, as they support organizations in filling positions accurately and quickly (Lee, 2011).
The Municipality of Rotterdam, with 16.000 employees and 2.000 vacancies annually, exemplifies the implementation of e-recruitment practices. One system used by the municipality is BrainsFirst, which by identifying deep brain skill analysis attempts to match candidates to positions in an objective and inclusive way. Despite positive interactions between managers and BrainsFirst, as well as job candidates and BrainsFirst, its usage remains relatively low. This raises questions about the underlying factors that could explain this lack of usage.
One theory that tries to explain these underlying factors is The Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003). This model offers insights into behavioral intention and eventual use of technologies by measuring four different variables. However, one aspect not addressed in the UTAUT-model is 'perceived agent autonomy' a concept that originates in Human-Computer Interaction (HCI) and is considered an important factor in influencing user intentions (Day et al., 2012; Ulfert, Antoni, Ellwart, 2022)

This study seeks to explore the impact of perceived agent autonomy on behavioral intention within the framework of the UTAUT-model by Venkatesh et al. (2003). It seeks to increase the explanatory power of the model to shed light on the factors driving adoption of e-recruitment technologies in the public sector. The central research question in this study is as follows:

"How does perceived agent autonomy affect user intentions to adopt and use recruitment technologies among team leaders at the Municipality of Rotterdam?"

Following the central research question, theoretical, social and public administration relevance of this study need to be addressed.
Theoretical significance of this study arises from the limited research on applying the UTAUT-model in the public sector context. The potential differences between public sector and private sector organizations underscore the importance of testing whether the adapted UTAUT-model is a good fit to predict technology adoption in the public sector. Although previous research has addressed perceived agent autonomy in AI-chatbot interaction (Sankaran, Zhang, Aarts, Markopoulos, 2021) this study aims to place perceived agent autonomy within the broader context of technological transformation in public organizations.

The interplay and relationship between autonomy as proposed by Ryan & Deci (2000) in their self-determination theory and technology adoption remains relatively unexplored.
From a social perspective, organizational transformations, including technological transformations, potentially impact employee well-being (Bryson et al., 2013). By providing insights and tools for technology integration, while prioritizing the needs of employees, this research contributes to maintaining workers' well-being during periods of technological transformations.
The relevance in the public administration context lies in a combination of the theoretical and social significance. By contributing to the understanding of technology acceptance, this study aids in the development of a model that can be used to successfully implement new technologies in public organizations. Considering that IT's are increasingly prominent in public organizations, understanding what drives workers to adopt and use new technologies is pivotal for the effective implementation of new technologies, ultimately strengthening the public sector.

In the following sections, this study will discuss several theories on technological recruitment and innovation in the public sector and its differences to the private sector, decision support systems, technology acceptance, and (agent) autonomy. The research methods will be explained including design of the research, operationalization of the theories, respondent selection and quantitative and qualitative analysis. Following this, the results will be discussed where the hypotheses are tested. Finally, in the conclusion and discussion section the results will be discussed within the theoretical context, as well as the limitations suggestions for future research.

Theories

In this section, the theoretical framework that is the foundation of this research will be introduced. The focus of this framework is understanding the relationship between perceived agent autonomy and the adoption of e-recruitment technologies in the context of public sector organizations. In order to provide a comprehensive understanding, the historical context of recruitment in the public sector context will be briefly explored. Secondly, the differences between public and private sector recruitment will be highlighted. After, decision support systems will be discussed in order to view recruitment technologies as part of a broader landscape. The UTAUT-model will be discussed, explaining all UTAUT-variables used in this research. Finally, the proposed addition to the UTAUT-model, *perceived agent autonomy*, will be discussed. Initially autonomy will be explained in the self-determination theory (Ryan & Deci, 2000) context. After, the potential for perceived agent autonomy as a predictor to behavioral intention will be underlined.

A historical context of public sector recruitment and selection

This section delves into the historical evolution of recruitment in the public sector context. While the main focus of this research is on the relationship between perceived agent autonomy and the adoption of e-recruitment technologies, a historical background is crucial to provide context to this research.

Recruitment, which is defined as: "The process of searching, attracting, and hiring qualified applicants for employment in an organization." (Devi & Banu, 2014, p. 4) has historical roots that are intertwined with public administration theory. From early administrative efforts written on clay tablets to the ideas of meritocracy as developed by Max Weber, the evolution of recruitment efforts reflects the shifting paradigms both in society and organizations (Pierce, 1995; Devi & Banu, 2014).
A pivotal moment in the history of recruitment is World War II, as the surge in personnel demand lead to the emergence of specialized recruitment firms. Post World War II, these recruitment firms evolved into specialized agencies that assisted organizations in their recruitment efforts, aligning with a changing economic landscape (UKEssay, 2018).
The 1980's marked a technological milestone in the recruitment world with the integration of computer technologies and fax machines into the recruitment process, which significantly streamlined the operations. The implementation of the internet in the process further revolutionized recruitment by enabling more globalized recruitment efforts (UKEssay, 2018).

Within this historical context, this research narrows its focus by examining the relationship between perceived agent autonomy and the adoption of e-recruitment technologies. To be able to contextualize this relationship, in the following sections this research will delve into the differences between public and private sector recruitment, levels of innovation, disparities in managerial dynamics and the role of Decision Support Systems.

The importance of understanding differences between public and private sector recruitment

While this research is not centered on the differences between public and private sector recruitment, it is important to understand the distinctions between the two sectors, as they provide valuable insights into the unique environment in which this research takes place. The primary focus of this research, as mentioned before, is how perceived agent autonomy can influence the intentions of team leaders at the Municipality of Rotterdam to adopt recruitment technologies. The disparities between public and private sector recruitment provide context for understanding the challenges that come with the adoption of technological innovation within the public sector. These challenges include: anti-government rhetoric, budget constraints (Lavigna & Hayes, 2004) (Siever, Vogel & Keeney, 2022) as well as a relatively fast aging workforce (UWV, 2018). These are challenges that private sector organizations do not have to deal with to the same extent.

Another factor that needs to be considered is the differing levels of innovation between public and private sector organizations. The exploration of the impact of perceived agent autonomy on the adoption of technology in the public sector seems to align with the distinctive innovation rates in the public and private sector, where private sector organizations tend to react faster to technology adoption trends (Hinkley, 2023). This research seeks to uncover how intentions to embrace new technologies are shaped in the context of slower technology adoption trends in the public sector. This is influenced by factors such as higher public scrutiny, funding and budget limitations, as well as organizational silos as a result of the generally more fragmented nature of public organizations (Hinkley, 2023). The innovation disparities between public and private sector organizations provide insights into the challenges the public sector faces that potentially affect the adoption process of recruitment technologies.

As this research focuses on understanding how perceived agent autonomy affects the intentions of public sector employees to adopt new recruitment technologies, it is important to recognize the differences between public and private sector managers. Distinct managerial characteristics in the public sector, such as an emphasis on job security, the smaller influence of performance gains on intention, and the need to navigate complex changes in organizational structures, provide an insight into the characteristics of the public sector managers researched in this article. Thus, the influence of perceived agent autonomy can be understood better (Barton & Walden, 1978; Worrall et al., 1998; Hinkley, 2023).

By including the disparities in recruitment practices, innovativeness and managerial characteristics in the public sector and public sector managers, and by comparing them to the private sector, a comprehensive context is provided for researching how perceived agent autonomy might affect behavioral intentions of managers at the Municipality of Rotterdam when adopting recruitment technologies. This approach seeks to account for the multifaceted nature of technology adoption and innovation dynamics in the public sector.

Recruitment technologies as part of a broader decision support systems (DDS) landscape

To understand the relationship between perceived agent autonomy and e-recruitment technology adoption, it is important to explain the broader landscape of Decision Support Systems (DSS). DSS, which are computer-based systems that aid in the decision-making process by analyzing and presenting data, provide a framework for this research (Keen, 1980). Recruitment technologies, such as BrainsFirst, fall within the realm of decision support systems, more specifically model-driven decision support systems. Therefore, the terms DSS and recruitment technologies (in this study BrainsFirst) are used interchangeably.
By expanding the scope of this research beyond specific recruitment technologies such as BrainsFirst, a broader perspective of DSS is provided. The decision to do so could enable the Municipality of Rotterdam to gain more comprehensive insights. Specifically, model-driven DSS are highlighted, systems that streamline the decision-making process by providing analysis models (Power, 2002). The strategic implementation of model-driven DSS requires clear organizational guidelines that need to define the purpose of the system and its intended use (Omilion-Hodges & Ptacek, 2021).
This research, guided by the research question: "How does perceived agent autonomy affect user intentions to adopt and use recruitment technologies among team leaders at the Municipality of Rotterdam?" seeks to enhance the explanatory value of the UTAUT-model in the e-recruitment technology context. By incorporating literature on Decision Support Systems and keeping in consideration the broader landscape of public sector innovation, this study aims to provide comprehensive understanding of the factors that influence technology adoption in the public sector context.

Unified Theory of Acceptance and Use of Technology (UTAUT)

Now that the differences between public and private sector organizations and managers, as well as decision support systems have been explained, it is interesting to discuss the drivers of technological acceptance and use. After all, a system can be developed but it also has to be integrated in work practices and used by employees. In recent decades, many models have been developed that try to predict and explain the eventual acceptance of new technologies in organizations. The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) is one of these models.
UTAUT was developed as a model to provide a general way to explain the acceptance and use of technology within organizations. There was a need for this, since the ‘pick and choose’ way in which previous models had been developed resulted in the possibility that important aspects of other models were not included in measurements (Venkatesh et al., 2003). UTAUT seeks to be a comprehensive model that determines whether new technologies will be succesfull, enabling organizations to effectively place interventions in order to implement new technologies more successfully (Venkatesh et al., 2003). UTAUT does this by finding four predicting factors that affect behavioral intention, which in its turn influences use behavior. These predictors are: *performance expectancy*, *effort expectancy*, *social influence*

and *facilitating condition'.* In addition to these four predictors, three moderators (gender, age, experience) are included in the model used in this research.

The first variable that will be tested in this research is *performance expectancy.* The performance expectancy in UTAUT measures five different constructs (perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations) that have an effect on to what extent workers perceive a new technology as beneficial to their performance (Venkatesh et al., 2003). Performance expectancy is the strongest predictor of behavioral intention in this model. Age (younger workers tend to be influenced more by extrinsic rewards) and gender (performance expectancies focused on task accomplishment seem to be more salient in men) are expected to have a moderating effect on this relationship (Venkatesh et al., 2003). Retrieved from Venketesh et al. (2003) is the following hypothesis:

H1a: *There is a positive relationship between performance expectancy and behavioral intention.*

H1b: This relationship will be moderated by ***gender*** *and* ***age,*** *such that the effect will be stronger for men and particularly for younger men.*

Effort expectancy concerns: "The degree of ease associated with the use of a system" (Venkatesh et al, 2003, p. 450). Effort expectancy in the UTAUT model is measured using three constructs, namely: perceived ease of use, complexity and ease of use. Whereas effort expectancy has a significant effect on behavioral intention in the initial period after implementation of a technology, this effect seems to become non-significant as time passes. This can possibly be explained by the fact that in the first period after implementation any potholes in the road could have an inhibiting effect on the use of the technology. As technology use progresses, instrumental concerns will have a greater effect on behavioral intention (Venkatesh et al, 2003). In contrast with performance expectancy, effort expectancy is suggested to be more salient for women than for men, Lynott and McCandless (2000) suggest gender roles as an explanation for this. Hypothesis 2:

H2a: *There is a negative relationship between effort expectancy and behavioral intention.*

H2b This relationship will be moderated by ***gender, age,*** *and* ***experience,*** *such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.*

A third variable researched is *social influence.* Paraphrased from Venkatesh et al. (2003), social influence concerns the degree to which an individual values the opinions of managers, peers or close relations whether he/she should use a system (Venkatesh et al, 2003) is a third factor in the UTAUT model. In other words, the subjective norm to use a system might have an effect on the intention to use this system (Venkatesh et al., 2003). Social influence concerns the role and significance of social norms in the shaping of peoples' feelings and

believes of certain technologies. Synthesized from Venkatesh et al. (2003) is the following hypothesis:

H3a: *There is a positive relationship between social influence and behavioral intention.*

*H3b: This relationship will be moderated by **gender**, **age**, and **experience**, such that the effect will be stronger for women, particularly older women, particularly in the early stages of experience.*

Facilitating conditions are described by Venkatesh et al. (2003) as: "The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system." (Venkatesh et al., 2003, p 453). The three constructs that are embedded in this definition are: *perceived behavioral control, facilitating conditions* and *compatibility*. Perceived behavioral control seems to overlap with the predictor '*perceived agent autonomy'* that is proposed in the next chapter. However, whereas perceived behavioral control concerns issues regarding compatibility and knowledge of a system, perceived agent autonomy measures intrinsic feelings such as 'loss of self' and 'dependency' (Bennett et al., 2023). Perceived agent autonomy measures this feeling across multiple levels, meaning that tight integration of technologies influences autonomy that surpasses everyday use of a specific system (Mueller et al, 2020). This independent variable has a possible relationship with *use behavior* as opposed to *behavioral intention*. The difference between these two variables being that where behavioral intention refers to a users' willingness and plan to engage in specific use behavior, use behavior concerns the actual performance of the behavior (i.e. the user will actually engage with the system). The following hypothesis is synthesized from Venkatesh et al. (2003):

H4a: *There is a positive relationship between facilitating conditions and use behavior.*

*H4b: This relationship will be moderated by **age** and **experience**, such that the effect will be stronger for older workers, particularly with increasing experience.*

Influence of behavioral intention on use behavior

The influence of behavioral intention on use behavior is an important aspect of this study. As explained by Venkatesh et al. (2003), a significant and positive relationship could exist between an individual's intention to use a system and the actual utilization of that system. This implies that individuals are more inclined to translate their intention into actual system use. To test this relationship, the following hypothesis is distilled:

H5: There is a positive relationship between behavioral intention to use a system and use behavior for this system.

In order to increase the validity and repeatability of this research, it is important to clarify the methodology for measuring and assessing actual usage in this study. Given the fact that there

is limited system adoption of BrainsFirst at the Municipality of Rotterdam, a vignette study approach has been utilized to measure a hypothetical form of actual usage. This allows respondents to predict their actual use behavior by offering insights in how their interaction with BrainsFirst would be. In addition, respondents were asked about their behavioral intentions. The vignette study will be discussed in the methods section of this research.

Autonomy

Autonomy and human agency are considered fundamental concepts within Human-computer interaction (HCI). Autonomy and agency are used to describe phenomena such as sense-of-control, material independence and identity (Bennett et al., 2023). The feeling of 'being in control' of one's own actions that is integrally associated with autonomy, is considered one of the basic human needs in the Self-Determination Theory by Ryan and Deci (2000) and 'fundamental to human dignity' (Valencia et al., 2020). A high amount of autonomy and agency are associated with improved life satisfaction, a buffer against stressors and physical and mental well-being in general (Ryan & Deci, 2000), whereas the (fear of) losing autonomy and agency are associated with stressors. This section explains the concepts of autonomy and agency using the Self-determination theory. It then discusses autonomy and agency within the context of Human-Computer Interaction (HCI) and Decision Support Systems (DSS).

Self-Determination theory

Ryan and Deci's (2000) Self-Determination Theory (SDT) is an approach to human motivation. It attempts to explain people's 'inherent growth tendencies' and psychological needs that, when satisfied, facilitate self-motivation and personality integration, as opposed to performing an activity due to extrinsic motivations such as (monetary) rewards (Ryan & Deci, 2000). Ryan and Deci (2000) identified three needs, namely the need for: competence, relatedness and autonomy.

As described under competence, social-contextual environments do not lead to increased intrinsic motivation when not accompanied by a high degree of autonomy ("Internal locus of causality") (Ryan & Deci, 2000, p. 58). Employees feel the need to be in control of their own actions. A sense of self-direction in making decisions can lead to higher levels of motivation. Within the context of recruitment technologies, it can be argued that intrinsic motivation to use the systems does not increase when employees feel as if the technological change is being imposed by managers. This is both the case when the use of a system is mandated, as well as when managers attempt to 'sell' a system by emphasizing the benefits of the technology in work processes.
The need for competence, derived from the cognitive evaluation theory (CET) aims to explain variance in intrinsic motivation. It is argued that social-contextual events, for instance rewards and feedback enhance intrinsic motivation when adding to the feeling of one's competence (i.e. making someone feel competent at his/her job). Alternately, social-contextual events that negatively influence one's feeling of competence decrease intrinsic motivation (Ryan & Deci,

2000). Important to note is the importance of someone having a sense of self-determination about his behavior to lead to motivation, both positive and negative. Threats, deadlines or goals undermine the sense of autonomy.
According to the SDT, high intrinsic motivation is fueled by a sense of security and relatedness. In other words, an individual's need to be in an environment in which people share the same values and with whom they feel a connection, can have a positive effect on perceived intrinsic motivation (Ryan & Deci, 2000). In the context of acceptance and intention to use new technologies in the workplace, an environment (read organization) in which employees share the same values regarding these technologies can lead to a higher intrinsic motivation to use these technologies.
In the context of recruitment and selection processes, digital support systems are increasingly being used by organizations with the aim of helping employees to make decisions regarding recruitment and selection of candidates. Therefore, it is interesting to consider the role of autonomy in decision support systems. The use of DSS is associated with a decrease in information overload (Howard, 2019) and an improvement in efficiency in work processes (Gaur, Agarwal and Chatterjee, 2023). Due to technological developments DSS are becoming increasingly autonomous. Whereas these systems used to be limited to relatively simple tasks (e.g., spam filters), they are now being applied to solve diverse and complex tasks (Ulfert, Antoni, Ellwart, 2022).
Although there are clear advantages to using recruitment technologies, such as BrainsFirst, in work processes, the implementation of these systems often proves problematic. Research by Day et al. (2012), among others, shows that lack of control over a task (i.e. by delegating it to an autonomous system) can lead to technology demands accompanied by higher levels of work-related stress. Examples of negative work outcomes include a perceived lack of control, perceived high workload and negative perceptions of technology in general (Day et al., 2012). The subjective (negative) perceptions employees have about the technology do not seem to align with the objective benefits of DSS use.

Perceived autonomy as a predictor of behavioral intention

As described in the self-determination theory, feeling in control of one's own actions is one of the three basic human needs that are used to explain intrinsic motivation. DSS that autonomously make work-related decisions that influence daily work practices (such as hiring a new team member) can, by some workers, be experienced as a threat to their autonomy. Norman (1994) suggests that autonomy has an impact on users' perceptions of technology, therefore being a predictor to user intentions in the DSS context. This is supported by research on autonomous vehicles (e.g. Beier et al., 2006). It is shown that self-driving vehicles with low amounts of autonomy (i.e. a high amount of human interaction is needed) are associated with higher user intentions than vehicles that are highly autonomous (Ulfert et al., 2022).

In their research on the role of agent autonomy in the context of DSS, Ulfert et al. (2022) find evidence for a negative relationship between autonomy of a DSS and behavioral intention to use a DSS. As Ryan and Deci (2000) explain in their self-determination theory, one of the main psychological needs that need to be satisfied in order to enhance well-being is

autonomy. Given that DSS (partially) reduces agent autonomy, and autonomy influences agent perception of technology (Norman, 1994), it can be argued that a positive relationship might exist between the perceived agent autonomy over a DSS (such as BrainsFirst) and behavioral intention. The implementation of (part of) the self-determination theory adds the benefit of approaching the concept of technology acceptance in a more subjective and holistic manner. This way, technology in general and the implementation of said technology in an organization can be catered to employees' needs, possibly leading to more successful implementation. It is important to also consider the potential risk of adding more complexity to an already complex model, potentially limiting the practicality. This will be discussed further in the discussions section of this research. The following hypothesis will be tested in this paper:

H6: *There is a positive relationship between perceived agent autonomy over a recruitment technology and the intention to use a recruitment technology.*

On the next page, a summary of all hypotheses and their driving variables is presented, as well as a visual representation of the proposed extensions to the UTAUT model (this research's conceptual model).

Hypothesis number	*Dependent variable*	*Independent variable*	*Moderators*
H1	Behavioral intention	Performance expectancy	Gender, Age
H2	Behavioral intention	Effort expectancy	Gender, Age, Experience
H3	Behavioral intention	Social influence	Gender, Age, Experience
H4	Use behavior	Facilitating conditions	Age, Experience
H5	Use behavior	Behavioral intention	None
H6	Behavioral intention	Perceived agent autonomy	None

Table 1. Summary of hypothesis with moderators

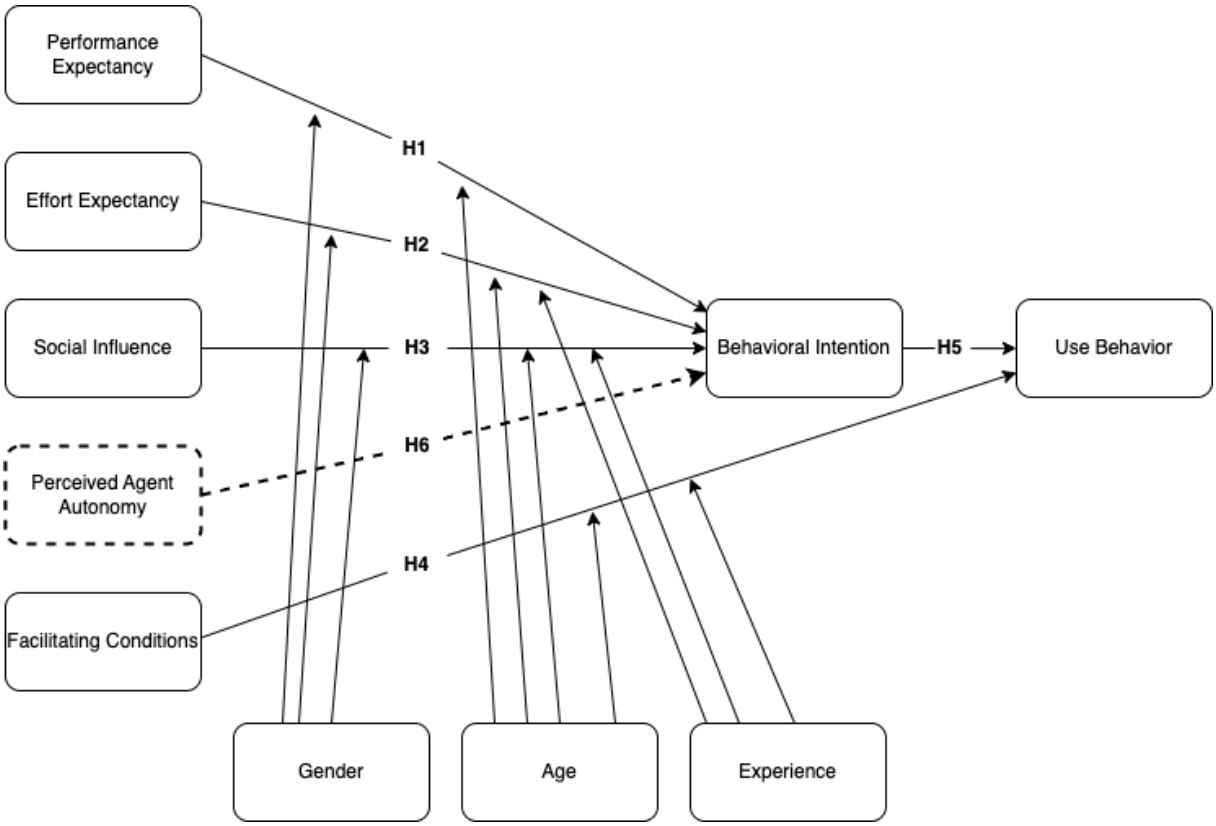

Figure 1. Proposed extension of the UTAUT model (Venkatesh et al., 2003) using perceived agent autonomy as a predictor for behavioral intention.

Methods

Design

The purpose of this study is to examine the influence of perceived agent autonomy on the behavioral intention to use a new recruitment technology, as well as test the entire UTAUT model with the addition of perceived agent autonomy as a predictor. This in order to test whether the explanatory value of the UTAUT model increases. To do this, this study followed a quantitative approach in which hypotheses were based on previous theories and tested by using quantitative statistical analyses. This research complements the quantitative data of 67 respondents with qualitative interviews. The research was conducted among employees of the municipality of Rotterdam with a managerial position. Because of a lack of response, the researcher opted to also conduct three semi-structured interviews with employees within the Municipality of Rotterdam. This triangulation of the data enhances the reliability and validity of the research (Creswell & Poth, 2017). This reduces the likelihood of bias or measurement errors. Another benefit of data triangulation is that it provides a more comprehensive and nuanced understanding of the researched topic. The goal of the triangulation is to find consistencies in both the quantitative and qualitative data, thereby strengthening the findings. If inconsistencies or contradictions are discovered, the researcher may find possible explanations for this and potentially identify areas for future research (Creswell & Poth, 2017).

Sample

As stated earlier, this research focuses on the influence of perceived agent autonomy on the intention to use a recruitment technology among managers within the Municipality of Rotterdam across all departments. Because people in a non-managerial position often do not partake in the recruitment process and do not have a say in which systems are used, this group was not included in the study. Furthermore, considering the fact that less than 100 people who currently work in the organization have used BrainsFirst in their work practices (either as a hiring manager or job applicant), there were no selection criteria regarding actual usage of the system. Therefore, this research includes both people that have and have not used BrainsFirst in their work practices. The researcher opted for a snowball sampling method with an invitation to participate in the study being posted on the municipalities' internal message board. When respondents finished the survey, they were asked to urge colleagues to also participate in the research, potentially leading to more respondents.

When the researcher noticed that the number of respondents fell short of the desired number, the decision was made to use purposive sampling as well. Respondents were personally addressed with the request to participate in the study. The researcher also visited the offices of the Municipality of Rotterdam to personally address potential respondents.

In this research managers of the Municipality Rotterdam were surveyed about perceived autonomy and variables synthesized from the UTAUT model by Venkatesh et al. (2003). The procedure followed to collect the data was as follows. A survey was made in Qualtrix and was distributed using the internal communication channels of the Municipality Rotterdam. When clicking on the link of the survey respondents were presented with a welcome message thanking them for their participation in the research. A short summary of the research was given explaining its scope. A privacy statement was presented in accordance to the Erasmus School of Social and Behavioural Sciences' guidelines. Finally, respondents were asked to give their consent by clicking on a 'yes' or a 'no' button.

Hereafter, respondents were presented with a vignette outlining the recruitment process when using BrainsFirst. Because there was a possibility that not all respondents were familiar with the system, it was important that respondents had a clear understanding of the process. The downside of this is that respondents were presented with a large body of text immediately after giving consent. This could potentially increase non-response bias; however, by including a vignette a standardized context was created for respondents. This ensured a common understanding of the recruitment process using Brainsfirst. This could add to the validity and reliability of the research. The vignette was developed based on internal documents outlining the recruitment process using BrainsFirst. After the development of the vignette, it was sent to three managers at the Municipality of Rotterdam in order to assess its clarity and ensure a realistic description. The vignette used in this study can be found in Appendix A.

Finally, respondents were presented with the survey questions accompanied by short introductory text before each new construct. In this way, respondents were notified of construct changes and could use this to answer questions more easily and accurately. After filling out the survey, respondents were thanked for participating and were given the option to contact the researchers if they felt the need to alter or remove an answer.

Operationalization of independent, dependent, moderating and control variables

Perceived agent autonomy was measured using the *perceived autonomy* scale from: "Exploring People's Perception of Autonomy and Reactance in Everyday AI Interactions" (Sankaran et al., 2021). There are two reasons this scale was chosen. Firstly, the scale showed a high internal reliability (Cronbach's alpha = 0.83) meaning there is high probability that all items measure the same construct (Creswell & Poth, 2017). Secondly, the scale is validated in peer reviewed research making it probable that the perceived autonomy in managers of the Municipality Rotterdam will be measured correctly, contributing to the validity and reliability of this study. The scale items measuring autonomy can be found in Appendix A. In this research, the 5 items measuring autonomy showed a high internal reliability (Cronbach's alpha = 0.885) which makes it possible to combine the five items into one scale named "AUTONOMY_MEAN".

The items used in estimating the independent variables in the UTAUT-model are synthesized directly from Venkatesh et al. (2003). Items measuring constructs that were found insignificant in their research *(Self-efficacy*, *Attitude towards using technology* and *Anxiety*)

were not included in the final survey. All items showed good internal reliability. The scales measuring significant constructs can be found in the table on the following page.

Variable	*Source*	*Measurment*	*Number of items*	*Cronbach's Alpha*	*New name*
Performance expectancy	Venkatesh et al. (2003)	5-pt Likert scale	3	0.845	PERFORMANCE_MEAN
Effort expectancy	Venkatesh et al. (2003)	5-pt Likert scale	4	0.899	EFFORT_MEAN
Social influence	Venkatesh et al. (2003)	5-pt Likert scale	4	0.667	SOCIAL_MEAN
Perveived agent autonomy	Sankaran et al. (2021)	5-pt Likert scale	5	0.885	AUTONOMY_MEAN
Facilitating conditions	Venkatesh et al. (2003)	5-pt Likert scale	3	0.772	FACILITATING_MEAN

Table 2. Overview of all independent variables with measurment levels and reliability analyses

Performance expectancy, Effort expectancy, Social influence, Perceived agent autonomy, Facilitating conditions Behavioral intention to use the system and *Use behavior* were all included in this research. The scale items showed high internal reliability and were validated by sufficient research that they can be deemed reliable. All of the above items were translated to Dutch as it could possibly increase the number of respondents filling in the survey completely (Babbie, 2010) and were measured using a 5-point Likert scale ranging from 1 (zeer mee oneens) tot 5 (zeer mee eens) with 2 (mee oneens) 3 (neutraal) and 4 (mee eens) as intermediaries.

In addition to the independent variabes, two dependent variables were tested, namely behavioral intention and use behavior. The specific difference between these two variables is that whereas behavioral intention refers to the mental state or intention to perform behavior in the future, use behavior refers to the actual behavior of an individual (Agudo-Peregrina et al., 2014). Seeing as this research currently studies a hypothetical situation in which BrainsFirst has not been implemented across the organization, these two variables tend to slightly overlap. However, staying as close to the original research by Venkatesh et al. (2003) (i.e. also testing for the relationship between *facilitating conditions* and *use behavior*) it was chosen to test for both variables.

Synthesized from Venkatesh et al. (2003) were the moderating variables *gender*, *age* and *experience*. These variables were used in this research to explore potential influencing relationships between the independent variables and dependent variables. By considering these moderators this study aimed to create an enhanced understanding of if and how certain characteristics influence technology adoption among managers at the Municipality of Rotterdam.

Finally, control variables were added to increase the reliability of the research. The control variables used were: *managerial position* and *level of education*. Level of education was measured on three levels: MBO, HBO and WO. Because of the relatively small sample size more options would possibly result in less significant results.

Method of analysis

For the survey section of this research, a quantitative method of analysis was used. The data collected was analyzed using SPSS, a statistics program for social sciences. In SPSS, the internal validity of the scales mention in the *operationalization* heading were tested by finding their Cornbach's Alpha. After, the internal correlation of the variables was tested using the Spearman's correlation test. This was done to find underlying patterns in large amounts of data and to find potential unnoticed correlations. When conducting regression analyses, the relationships between all independent variables and their respective dependent variables will first be tested. Following this, all variables will be combined into a model and the optimal model will be examined based on the study population. The Akaike Information Criterion, which measures the balance between explanatory value on the one hand and standard deviation on the other hand, will be considered in order to find the best possible balance of variables in the model.

The moderation effects were tested by first standardizing the results for the dependent, independent and moderation variables. This was done because calculating an interaction term between independent and moderation variables tends to result in excessive amounts of multicollinearity in the model. The standardized data was achieved by using the analyze → descriptive statistics → descriptives function in SPSS. Here, all variables used in the moderation analyses were pasted and the fuction 'save standardized values as variables' was selected. After calculating the Zscores of the variables, the interaction terms of the moderation variables and their respective independent variables were calculated using the transform → compute variable function in SPSS. Here, the standardized independent variables were multiplied by the standardized moderation variables. Finally, all moderation hypotheses were tested by conducting simple regression analyses using the analyze → regression → linear function in SPSS.
So far, only the quantitative methods have been discussed. More on the methods and analysis regarding the qualitative part of this research can be found on page 19.

Assumptions and conditions for regression

Before regression analyses are conducted it is important to test the assumptions and conditions for regression analysis. These assumptions need to be met to ensure validity and reliability of the results. A table explaining the key assumptions that were tested can be found in Appendix E.
The first assumption that has to be met in order to create valid and reliable results is the linearity assumption. All independent variables need to have a linear relationship with the dependent variable. This means that for the variables PERFORMANCE_MEAN, EFFORT_MEAN, SOCIAL_MEAN and AUTONOMY_MEAN there needs to be a linear relationship with the dependent variable *behavioral intention.* For the independent variable FACILITATING_MEAN there needs to be a linear relationship with the independent variable *behavior actual*. Using the *compare means → test for linearity* function in SPSS all

independent variables are found to be significantly linear ($p < 0.01$) with their dependent variables respectively. All variables showed an insignificant deviation from linearity, meaning that the linearity assumption is met.

A second assumption for regression that was tested was independence. Independence is not something that can be tested statistically. In the study design, however, independence of data has been taken into account. All respondents were asked to fill in their surveys independently. Also, anonymity was ensured meaning that respondents did not feel pressured into giving socially desirable answers. Therefore, it can be confidently stated that the condition of data independence has been met.

Thirdly, tests have been conducted to assess whether the data was homoscedastic. Scatterplots of the residuals compared to the predicted values did not reveal patterns or systematic deviations from the constant. Therefore, we can assume that the condition of homoscedasticity is met.

The VIF-values of all independent variables were found in order to test for multicollinearity. For PERFORMANCE_MEAN, EFFORT_MEAN, SOCIAL_MEAN AND AUTONOMY_MEAN THE VIF-values were 2.236, 2.001, 1.619 and 1.954 respectively, meaning that the assumption of uncorrelated predictors was met.

Finally, to accurately perform a regression analysis, it is important that the dependent and independent variables are (approximately) normally distributed. This study used the Q-Q plot in SPSS to test whether the observed values are equal to the expected values. On the following page, the Q-Q plots of all the dependent and independent variables, displaying normality, can be found.

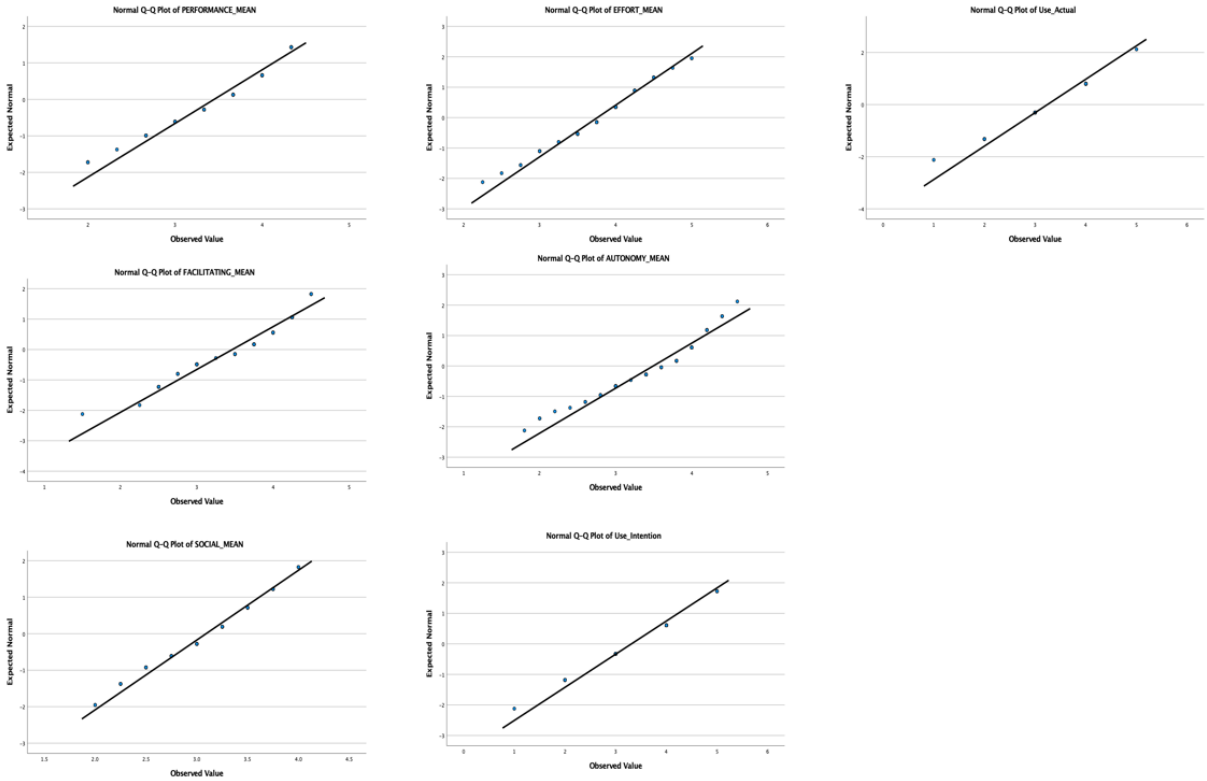

Figure 2. Q-Q Plots of independent and dependent variables.

Qualitative methods

To enhance the reliability and validity of the quantitative findings, this study was complemented by three semi-structured interviews. The qualitative sample consisted of three HR-managers at the Municipality of Rotterdam. All managers had their own unique perspective. One manager served as team lead within the HR team, the second manager worked with the company BrainsFirst extensively and therefore was familiar with the system's potential and risks. The third manager was responsible for developing hiring strategies and providing guidance to fellow managers. The use of purposive sampling was aimed at creating a diverse sample with managers that were familiar with BrainsFirst, ensuring the ability to go in-depth about the intricacies that come with system implementation. Though the small sample size meant that results from the qualitative analysis were not generalizable, they could be used to substantiate findings in the quantitative data. The choice for three interviews was deliberate, as the diversity among the respondents allowed for an enrichment of the data while ensuring a manageable timeframe.

In order to align the qualitative investigation with the quantitative data, the interview questions were synthesized from the questionnaire. This approach was used to facilitate direct comparison with the quantitative results, as well as identify new insights. This way, it was possible to verify whether the outcomes of the survey matched those of the interview participants.

The phrasing of the interview questions was quite theoretical. This decision was made because coherency and theoretical clarity needed to be ensured. This way, the interview questions were grounded in the theoretical framework that was proposed earlier. Also, by grounding the interview questions in theory, the transparency of this research was enhanced by providing readers with a clear understanding of the researcher's perspective and the lens through which the data was interpreted (Kallio et al., 2016). The complete interview guide is provided in appendix C.
Following the interviews, transcripts were produced. The data was subjected to inductive coding, a process in which the data was analyzed without predetermined categories. This approach allowed for the emergence of themes directly from data, reducing the risk of missing nuances in the data. After the coding process, the data was organized into themes. All this facilitated a comprehensive and concise exploration of the qualitative data.

Results

This chapter will discuss the results. First, there will be a focus on descriptive statistics in order to provide a clear image of the research group. This will include a focus on the mean scores of the different variables, the standard deviations and the correlations between the different variables, displayed in a correlation table. Next, regression analyses will be conducted and the hypotheses will be tested. First, all variables of the original UTAUT model will be tested independently, after, the relationship of the proposed addition to the UTAUT model and main hypothesis, *perceived agent autonomy* and its respective dependent variable *behavioral intention* will be tested. Finally, the UTAUT model will be tested in its entirety with the addition of the independent variable *perceived agent autonomy*.

Descriptive Statistics

The quantitative section of this research consisted of a survey distributed among managers at the Municipality of Rotterdam. As stated before, the response rate to the research was relatively low. The research resulted in 67 respondents, of which 58 filled out the research completely. Of these 58 respondents, 38.3% were male, 46.3% were female and 1.5% did not wish to disclose this information. The average age of the respondents was 47.55 years, with ages ranging from 28 years to 65 years. Of the 58 respondents who filled out the survey in its entirety, their highest level of education was 1.5% MBO, 29.9% HBO and 55.2% WO. Below, a table can be found showing these statistics.

Variable	*Gender*		*Age*		*Level of education*	
	Male	26 (38.3%)	Lowest	28	MBO	1 (1.5%)
	Female	31 (46.3%)	Highest	65	HBO	20 (29.9%)
	Undisclosed	1 (1.5%)	Mean	47.6	WO	37 (55.2%)

Table 3. Descriptive statistics of sample

The independent variable *performance expectancy* which was measured using a scale based on three scale items shows a mean score of 3.41 on a 5-point Likert scale, indicating little above the theoretical average expectancy of performance gains when using the system. The variable shows a minimum of 2.00 and a maximum of 4.33 with a standard deviation of 0.67.

The independent variable *effort expectancy* which is measured using a scale based on four scale items shows a mean score of 3.75 on a 5-point Likert scale. This indicates little above the theoretical average scores on expectancy of effort. Because all items of the effort scale were positively formulated (e.g. “I would find the system easy to use” instead of “I would find the system difficult to use”) this means that on average respondents anticipated to put in less than average effort to familiarize themselves and get skillful at using the system. The variable shows a minimum of 2.25 and a maximum of 5.00 with a standard deviation of 0.59

The independent variable *social influence* shows a mean of 3.07 on a 5-point Likert scale. This indicates average social influence, as compared to the theoretical mean of 3.0. It is important to note, however, that the first two survey questions measuring social influence ("*People who influence my behavior think that I should use the system*" and "*People who are important to me think that I should use the system*") scored below average with a mean of 2.66 and 2.75 respectively. This might indicate little social influence from individuals in the organization, but above the theoretical average of 2.5 social influence when taking into account the level of innovativeness in the organization. The SOCIAL_MEAN scale showed a minimum of 2.00 and a maximum of 4.00, with a standard deviation of 0.54.

The independent variable *perceived agent autonomy* shows a mean of 3.49 on a 5-point Likert scale, indicating above theoretical average perception of agent autonomy when using a decision support system. This could mean that respondents anticipated relatively high levels of control when using the system. The variable showed a minimum of 1.80 and a maximum of 4.60 with a standard deviation of 0.68 which could be an indication of a relatively large divergence in respondents' opinions and perceptions on perceived agent autonomy.

The final independent variable, *facilitating conditions*, is based on a scale made up of four scale items and shows a mean of 3.46 on a 5-point Likert scale, indicating that respondents experience an above theoretical average level of facilitating conditions by the organization. This might suggest that respondents experience relatively high levels of organizational support. The variable shows a minimum of 1.50 and a maximum of 4.50, with a standard deviation of 0.71. See the table below for the independent variables and their scores

Variable	*Minimum*	*Maximum*	*Mean*	*SD*
Performance expectancy	2.00	4.33	3.41	0.67
Effort expectancy	2.25	5.00	3.75	0.59
Social influence	2.00	4.00	3.07	0.54
Perceived agent autonomy	1.80	4.60	3.49	0.68
Facilitating conditions	1.50	4.50	3.46	0.71

After showing descriptive statistics for the independent variables it is important to also do this for the dependent variables used in this research, *behavioral intention* and *use behavior*. *Behavioral intention* shows a mean of 3.21 indicating a little above average intention to use this specific system. The variable shows a minimum of 1, indicating little intention to use the system and a maximum of 5, indicating a large intention to use the system. The standard deviation is 0.91 which is relatively large. *Use behavior* shows a mean of 3.24 also indicating little above average expectation to use this system. *Use behavior* shows a minimum of 1 and a maximum of 5 with a standard deviation of 0.77.

Variable	*Minimum*	*Maximum*	*Mean*	*SD*
Behavioral intention	1.00	5.00	3.21	0.91
Use behavior	1.00	5.00	3.24	0.77

Table 5. Minimums, maximums, means and SD's of dependent variables

Correlation matrix

The correlation matrix in Table 5 is presented to show the relationships between the variables in this study. The variable *Performance expectancy* shows a positive correlation with the variables *effort expectancy*, *social influence*, and *perceived agent autonomy*. The second variable, *Effort expectancy* positively correlates with *social influence*, as well as *perceived agent autonomy* and *facilitating conditions*. The first dependent variable of this study, *behavioral intention*, is positively and significantly correlated with all the independent variables. The second dependent variable, *use behavior* similarly shows positive correlations with the independent variables except for the variable *effort expectancy*. The control variables, *managerial position* and *level of education*, demonstrate correlations to a varied degree with the independent and dependent variables. (* $p < 0.05$, ** $p < 0.01$)

Independent variables	*Mean*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Performance expectancy	3.41	0.67	1								
2. Effort expectancy	3.75	0.59	0.617**								
3. Social influence	3.07	0.54	0.516**	0.551**							
4. Perceived agent autonomy	3.49	0.68	0.664**	0.538**	0.502**						
5. Facilitating conditions	3.46	0.71	0.571**	0.594**	0.530**	0.580**					
Dependent variables											
6. Behavioral intention	3.21	0.91	0.609**	0.521**	0.568**	0.606**	0.627**				
7. Use behavior	3.24	0.77	0.571**	-0.365**	0.549**	0.603**	0.531**	0.847**			
Control variables											
8. Leader (YES=1)	1.16	0.37	0.167	-0.014	o.304*	0.131	0.013	0.250*	0.257*		
9. Education (WO=1)	2.62	0.52	0.329**	0.148	0.154	0.276*	0.291*	0.182	0.102	-0.125	

Table 6. Correlation Matrix
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tail*

Hypothesis 1

H1a: *There is a positive relationship between performance expectancy and behavioral intention to use a system*

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.360	33.609**
2	0.399	18.284**
3	0.377	9.641**

Table 7. Explanatory value and significance model 1-3 hypothesis 1.

Variables	Model 1	Model 2	Model 3
Constant	0.534	-0.111	0.347
Performance expectancy	0.808**	0.798**	0.780**
Mangerial position (YES = 1)		0.382	0.407
Level of education (HBO = 1)			1.048
Level of education (WO = 1)			1.039

Table 8. Regression analyses model 1-3 hypothesis 1.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

To test whether a (positive) relationship exists between performance expectancy and behavioral intention to use a system, a linear regression analysis was performed on 5 models. The first model consists of a regression analysis with only the independent variable *performance expectancy* and the dependent variable *behavioral intention*. The remaining models are an extension of the first model with stepwise addition of the control variables.
The model above shows that when looking at the relationship between performance expectancy and behavioral intention, a significant positive relationship can be found between a high level of performance expectancy and the level of intention to use a system. Performance expectancy has a high (adjusted $R^2 = 0.360$) and significant ($p < 0.01$) explanatory value for the degree of behavioral intention with a beta of 0.808. When incrementally adding the control variables *managerial position*, it is noticeable that the explanatory value of the model increases to $R^2 = 0.399$ and the significance level remains strong with $p < 0.01$. When adding the control variable (level of education), it is noticeable that the explanatory value of the model decreases slightly (adjusted $R^2 = 0.377$). However, this small decrease has no effect on the significance level ($p < 0.01$). The F-values of the model decrease (F-value = 9.641) when adding the control variables but remain above the 'critical F-value' which based on df = 1 and residuals = 50 is at F-value = 3.943. On the basis that the model is statistically significant and the relationship between performance expectancy and behavioral intention remains significant and positive, H1a can be approved.

H1b: *The relationship between performance expectancy and behavioral intention will be moderated by **gender** and **age,** such that the effect will be stronger for men and particularly for younger men.*

As explained in the theory section of this paper, we propose that younger male respondents will exhibit a stronger relationship between performance expectancy and behavioral intention. Two hierarchical regression analyses were performed to test whether significant moderation effects exist.

Variable	*B*	*SE*	*T-value*	*P*
Analysis 1				
Constant	0.644	0.502	1.284	0.205
Performance Expectancy	0.771	0.145	5.325	<0.001
Interaction term PE x Sex (Male = 1)	0.088	0.094	0.937	0.353
Analysis 2				
Constant	0.586	0.567	1.034	0.306
Performance Expectancy	0.795	0.159	5.035	<0.001
Interaction term PE x Age	0.063	0.111	0.571	0.571

Table 9. Moderation analyses hypothesis on age and gender.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

As can be seen in table 9 above, the data in this research show an insignificant interaction effect (beta = 0.063, t = 0.571, p > 0.05) this indicates that based on this data, the relationship between performance expectancy and behavioral intention does not vary as a function of age (see analysis 1). Furthermore, the data in analysis 2 (beta = 0.088, t = 0.937, p > 0.05) also indicate that a significant moderation effect based on gender does not seem to exist in this data. Therefore, hypothesis 1b is rejected.

Hypothesis 2

H2a: *There is a negative relationship between effort expectancy and behavioral intention*

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.249	19.945**
2	0.304	13.465**
3	0.323	7.810**

Table 11. Explanatory value and significance model 1-3 hypothesis 2.

Variables	*Model 1*	*Model 2*	*Model 3*
Constant	0.294	-0.275	-1.394
Effort expectancy	0.802**	0.808**	0.768**
Mangerial position (YES = 1)		0.649*	0.705**
Level of education (HBO = 1)			1.105
Level of education (WO = 1)			1.317

Table 10. Regression analyses model 1-3 hypothesis 2.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

As stated before, the items measuring effort expectancy were formulated positively (i.e. *"I would find the system easy to use"* as opposed to *"I would find the system difficult to use"*). This means that to confirm hypothesis 2a there should be a positive significant relationship between *effort expectancy* and *behavioral intention*.

The model above shows that when looking at the relationship between effort expectancy and behavioral intention, a significant positive relationship can be found between a high level of effort expectancy and the level of intention to use a system. effort expectancy has a high (adjusted $R^2 = 0.249$) and significant ($p < 0.01$) explanatory value for the degree of behavioral intention with a beta of 0.802. When incrementally adding the control variables, it is noticeable that the explanatory value of the model increases to a maximum of $R^2 = 0.323$ and the significance level remains strong with $p < 0.01$. The F-values of the model decrease (F-value = 7.810) when adding the control variables but remain above the 'critical F-value' which based on df = 1 and residuals = 50 is at F-value = 3.943. Interesting to note is that there is a significant positive relationship ($p < 0.01$) between having a managerial positon and how little effort a user thinks they experience in using a system (beta = 0.705, $p < 0.01$) can be found. On the basis that the model is statistically significant and the relationship between effort expectancy and behavioral intention remains significant and positive, H2a can be approved.

*H2b: The relationship between effort expectancy and behavioral intention will be moderated by **gender, age,** and **experience,** such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.*

Variable	*B*	*SE*	*T-value*	*P*
Analysis 1				
Constant	0.401	0.735	0.561	0.577
Effort Expectancy	0.771	0.189	4.070	<0.001
Interaction term EE x Sex (Male = 1)	0.056	0.1106	0.532	0.597
Analysis 2				
Constant	0.495	0.740	0.667	0.508
Effort Expectancy	0.757	0.191	3.955	<0.001
Interaction term EE x Age	0.076	0.105	0.719	0.475
Analysis 3				
Constant	-0.096	0.735	-0.121	0.896
Effort Expectancy	0.897	0.191	4.697	<0.001
Interaction term EE x Experience	0.127	0.092	1.380	0.173

Table 11. Moderation analyses hypothesis 2b on gender, age and experience.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Hypothesis 2b suggests moderation effects of the variables *gender*, *age*, and *experience* on the relationship between effort expectancy and behavioral intention. As can be seen in table 13, no significant moderation effect exists based on gender ($b = 0.056$, $t = 0.532$, $p > 0.05$). This suggests that gender does not play a significant moderating role in the relationship between effort expectancy and behavioral intention. Also, the moderating variables *age* and *experience* do not show significant moderation results ($b = 0.076$, $t = 0.719$, $p > 0.05$) and ($b = 0.127$, $t = 1.380$, $p > 0.05$). Considering all this, hypothesis 2b can be rejected.

Hypothesis 3

H3a: *There is a positive relationship between social influence and behavioral intention.*

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.334	28.056**
2	0.316	14.154**
3	0.317	7.618**

Table 12. Explanatory value and significance model 1-3 hypothesis 3.

Variables	*Model 1*	*Model 2*	*Model 3*
Constant	0.164	0.125	-0.555
Social influence	1.018**	0.974**	0.908**
Mangerial position (YES = 1)		0.206	0.285
Level of education (HBO = 1)			0.690
Level of education (WO = 1)			0.909

Table 13. Regression analyses model 1-3 hypothesis 3.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

To test whether a (positive) relationship exists between social influence and behavioral intention to use a system, a linear regression analysis was performed on 3 models. The first model consists of a regression analysis with only the independent variable *social influence* and the dependent variable *behavioral intention*. The remaining models are an extension of the first model with stepwise addition of the control variables.

The model above shows that when looking at the relationship between social influence and behavioral intention, a significant positive relationship can be found between a high level of social influence and the level of intention to use a system. Social influence has a high (adjusted $R^2 = 0.334$) and significant ($p < 0.01$) explanatory value for the degree of behavioral intention with a beta of 1.018. When incrementally adding the control variables, it is noticeable that the explanatory value of the model decreases slightly to an of $R^2 = 0.317$ and the significance level remains strong with $p < 0.01$. The F-values of the model decrease (F-value = 7.618) when adding the control variables but remain above the 'critical F-value' which based on df = 1 and residuals = 50 is at F-value = 3.943. On the basis that the model is statistically significant and the relationship between effort expectancy and behavioral intention remains significant and positive, H3a can be approved.

*H3b: The relationship between social influence and behavioral intention will be moderated by **gender**, **age**, and **experience**, such that the effect will be stronger for women, particularly older women, particularly in the early stages of experience.*

Variable	*B*	*SE*	*T-value*	*P*
Analysis 1				
Constant	0.346	0.589	0.587	0.560
Social Influence	0.963	0.190	5.072	<0.001
Interaction term SI x Sex (Male = 1)	0.013	0.100	0.132	0.895
Analysis 2				
Constant	0.157	0.609	0.257	0.798
Social Influence	1.021	0.194	5.251	<0.001
Interaction term SI x Age	0.017	0.092	0.189	0.851
Analysis 3				
Constant	0.124	0.601	0.206	0.837
Social Influence	1.027	0.192	5.358	<0.001
Interaction term SI x Experience	0.117	0.099	1.191	0.239

Table 14. Moderation analyses hypothesis 3b on gender, age and experience.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Hypothesis 3b suggests three variables that potentially moderate the relationship between social influence and behavioral intention. The analysis of variable 1, *gender*, shows b = 0.013, t = 0.132 and p > 0.05. This suggests that gender does not play a moderating role in the relationship between social influence and behavioral intention (see analysis 1) Also, variable 2, *age*, shown in analysis 2, shows no significant moderation effect with b = 0.017, t = 0.189 and p > 0.05. Finally, the third and final potential moderating variable, *experience*, shows no significant moderation effect (b = o.117, t = 1.191, p > 0.05, see analysis 3). These findings suggest that the impact of social influence on behavioral intention is not contingent upon the age of the respondent, gender of the respondent and level of experience with BrainsFirst as a recruitment tool. Overall, the results do not support our moderation hypothesis and hypothesis 3b can be rejected.

Hypothesis 4

H4a: *There is a positive relationship between facilitating conditions and use behavior*.

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.268	21.859**
2	0.320	14.385**
3	0.315	7.548**

Table 15. Explanatory value and significance model 1-3 hypothesis 4.

Variables	*Model 1*	*Model 2*	*Model 3*
Constant	1.228*	0.789	0.054
Facilitating conditions	0.581**	0.577**	0.562**
Mangerial position (YES = 1)		0.534*	0.541*
Level of education (HBO = 1)			0.840
Level of education (WO = 1)			0.773

Table 16. Regression analyses model 1-3 hypothesis 4.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

To test hypothesis 4a a multiple regression analysis was run with the independent variable *facilitating conditions* and the dependent variable *use behavior*. In models 2 and 3, control variables were added stepwise. The above models show significant adjusted R^2 ranging from 0.268 through 0.315. Interesting to note is that the R^2 decreases slightly when adding the control variable 'level of education'. The independent variable *facilitating conditions* shows high significance levels ($p < 0.01$) in all models, indicating a significant relationship between the independent and dependent variables. In this model, the control variable *managerial position* is only significant in both model 2 and model 3, possibly meaning that respondents in a managerial position experience more facilitating conditions than other respondents. The F-values of the are higher than the critical F-value which is calculated to be F-value = 3.943. Considering that this model shows that according to this model, the level of facilitating conditions is a statistically significant predictor for use behavior, hypothesis H4a can be approved.

H4b: The relationship between facilitating conditions and use behavior will be moderated by ***age*** *and* ***experience****, such that the effect will be stronger for older workers, particularly with increasing experience.*

Variable	*B*	*SE*	*T-value*	*P*
Analysis 1				
Constant	1.336	0.465	2.872	0.006
Facilitating Conditions	0.556	0.129	4.297	<0.001
Interaction term FC x Age	0.079	0.108	0.730	0.469

Analysis 2				
Constant	1.227	0.444	2.763	0.008
Facilitating Conditions	0.581	0.125	4.633	<0.001
Interaction term FC x Experience	0.006	0.089	0.069	0.946

Table 17. Moderation analyses hypothesis 4b on age and experience.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

The final moderation hypothesis, hypothesis 4b, suggests a moderating effect of *age* (analysis 1) and *experience* (analysis 2) on the relationship between the independent *facilitating conditions* and *use behavior*. In order to test this hypothesis, two regression analyses were conducted. The results of the moderation analysis on age show no significant moderation effect ($b = 0.079$, $t = 0.730$, $p > 0.05$). This could suggest that in this specific case the age of a respondent does not influence the effect of facilitating conditions on behavioral intention. Furthermore, the results of the moderation analysis on experience does not show a significant moderation effect either ($b = 0.006$, $t = 0.069$, $p > 0.05$) also suggesting no significant moderating effect of experience with BrainsFirst on the relationship between facilitating conditions and use behavior. Based on these analyses, hypothesis 4b will be rejected.

Hypothesis 5

H5: *There is a positive relationship between the intention to use a DSS and the actual use behavior with a DSS.*

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.771	141.548**
2	0.719	70.279**
3	0.725	34.975**

Table 18. Explanatory value and significance model 1-5 hypothesis 5.

Variables	Model 1	Model 2	Model 3
Constant	0.872**	0.818**	0.494
Behavioral intention	0.716**	0.706**	0.704**
Mangerial position (YES = 1)		0.104	0.098
Level of education (HBO = 1)			0.400
Level of education (WO = 1)			0.307

Table 19. Regression analyses model 1-5 hypothesis 5.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Hypothesis 5 tests if *behavioral intention* is a significant predictor for actual usage, measured with the item *use behavior*. As can be expected from previous research, the above models show that behavioral intention is a significant ($p < 0.01$) predictor for use behavior (beta =

0.716). The overall model shows a high R^2 with R^2 being 0.725, meaning that approximately 72.5 percent of the variance in use behavior can be explained by behavioral intention. Interesting to note is that the explanatory value of the model decreases when adding control variables. Taking all data into consideration, this model seems to be a good fit for the data and purpose of this study. H5 can be approved.

Hypothesis 6

H6a: *There is a positive relationship between perceived agent autonomy over a recruitment technology and the intention to use a recruitment technology.*

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.357	32.581**
2	0.375	18.136**
3	0.354	8.820**

Table 20. Explanatory value and significance model 1-3 hypothesis 6.

Variables	*Model 1*	*Model 2*	*Model 3*
Constant	0.420	0.159	0.001
Perceived Agent Autonomy	0.827**	0.796**	0.769**
Mangerial position (YES = 1)		0.438	0.461
Level of education (HBO = 1)			0.189
Level of education (WO = 1)			0.264

Table 21. Regression analyses model 1-3 hypothesis 6.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Hypothesis 6 is a hypothesis added to the pre-existing model of Venkatesh et al. (2003) and the main hypothesis of this study. To test this hypothesis, a model was created consisting of the independent variable *perceived agent autonomy* consisting of a scale composed of 5 items, and the dependent variable *behavioral intention*. After testing this model without control variables, control variables were added stepwise.

The model above shows that when testing for the relationship between perceived agent autonomy and behavioral intention, a significant positive relationship can be found (R^2 = 0.357, beta = 0.827, $p < 0.01$). With the addition of control variables to the model, the beta of perceived agent autonomy and the R^2 of the entire model decrease slightly, the p value of the model as a whole and the predictor variable stay very significant with $p < 0.01$). The F-value of the model stay above the critical F-value with F = 5.340. Based on the data in model 3, with an adjusted R^2 of 0.354 it can be stated that in this specific case 35.4 percent of the variance in behavioral intention could be explained by the level of perceived agent autonomy when using a DSS, in this case the recruitment technology BrainsFirst. H6 can be approved.

Testing of entire model

Model	*Adjusted R^2*	*Akaike Information Criterion*
Model 1	0.366	-33.933
Model 2	0.380	-34.288
Model 3	0.451	-40.390
Model 4	0.477	-42.257
Model 5 (Effort expectancy excluded)	0.486	-44.221

Table 22. Adjusted R^2 and AIC of all proposed UTAUT-models

After testing the relationship between the individual predictors and the dependent variables, it is scientifically interesting to also test the full model. To do this, the 4 predictors that when testing the hypotheses showed a significant positive effect on the dependent variable *behavioral intention* will be incrementally added to the model. To test whether the addition of explanatory variables is proportional to any increased standard deviation of the model, the Akaike Information Criterion (AIC) will be tested. If it becomes more negative (indicating a better relationship between explanatory value and standard deviation) the independent variable will be added, if it becomes more positive (resulting in a worse relationship between explanatory value and standard deviation) it will not be included in the model.

The results of the regression analyses indicated that Model 5, which excluded the variable *effort expectancy*, demonstrated the best fit to the data when testing for the Akaike Information Criterion (AIC). The AIC values for each model were as follows: Model 1 (-33.933), Model 2 (-34.288), Model 3 (-40.390), Model 4 (-42.257), and Model 5 (-44.221), as can be seen in table 19.
The adjusted R-squared values increased progressively from Model 1 (0.366) to Model 5 (0.486), suggesting an improved ability to explain the variance in use intention as additional control variables were included. However, it is important to note that the adjusted R-squared alone does not determine the best model fit.
Considering the AIC values, Model 5, which excluded the variable *effort expectancy*, showed the lowest AIC (-44.221) among the models. The decrease in the AIC could be an indication of a better fit to the data compared to the other models.
These findings suggest that Model 5 provides the best trade-off between model complexity and explanatory power. A trade-off has been made. A general point of criticism on the UTAUT-model is the fact that the addition of many variables has made the model too complex. By excluding the variable *effort expectancy*, the model achieved a less negative AIC, indicating improved fit. Therefore, in further testing of the model, the independent variable 'effort expectancy' will be excluded. It is important to note that the exclusion of the variable *effort expectancy* does not render the variable irrelevant or unimportant. Instead, this procedure offers insights into the interplay of variables within this specific sample and context. In summary, this process, driven by AIC comparisons, allows the researcher to uncover the nuanced relationships between variables. While the technical nature of this process can be complex, it seeks to provide insights that extend beyond statistical significance.

Model	*R-squared (adjusted)*	*F-value and significance*
1	0.486	18.969**
2	0.483	14.307**
3	0.466	9.285**

Table 23. Explanatory value and significance model 1-3 hypothesis of the proposed new UTAUT-model

Variables	*Model 1*	*Model 2*	*Model 3*
Constant	-0.953	-0.993*	-1.322
Performance expectancy	0.398**	0.392*	0.412*
Social influence	0.537***	0.492**	0.484**
Perceived agent autonomy	0.353*	0.364*	0.311*
Managerial position (YES = 1)		0.207	0.215
Level of education (HBO = 1			0.402
Level of education (WO = 1)			0.377

Table 24. Regression analyses model 1-3 of proposed UTAUT-model.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed)*

The findings on the previous page show that removing the variable *effort expectancy* from the model increases the AIC. Therefore, the variables *performance expectancy*, *social influence* and *perceived agent autonomy* were tested.

The results of the regression analyses provided insights into the relationships between performance expectancy, social influence, perceived agent autonomy, and behavioral intention. Model 1, which included performance expectancy, social influence, and perceived agent autonomy as predictors, revealed interesting findings, which will be discussed below.

In Model 1, all three predictors showed significant relationships with use intention to differing degrees. Performance expectancy had a positive and statistically significant effect on use intention (beta = 0.398, $p < 0.01$), indicating that individuals who perceived higher performance expectancy were more likely to have a stronger intention to use BrainsFirst in their work practices.
Similarly, social influence had a positive and significant impact on use intention (beta = 0.537, $p < 0.01$). This finding suggests that individuals who perceived greater social influence from their managers, peers or social networks were more likely to express an intention to use BrainsFirst as a decision support system.
Perceived agent autonomy also exhibited a positive and significant, albeit less significant, relationship with use intention (beta = 0.353, $p < 0.05$). This indicates that individuals who perceived higher levels of autonomy in using the system were more likely to have a stronger intention to use it.

These results suggest that performance expectancy, social influence, and perceived agent autonomy all play significant roles in shaping use intention. Individuals who perceive higher performance expectancy, greater social influence, and increased levels of autonomy are more likely to express a stronger intention to implement BrainsFirst in their hiring practices.
An interesting finding is that upon adding the control variable *managerial position* to the model (see model 2), the significance of the predictor *perceived agent autonomy* increases (such that perceived agent autonomy shows beta = 0.364, $p < 0.05$). This indicates that having a managerial position may play a role in mediating or confounding the relationship between perceived agent autonomy and use intention. In model 2, the independent variable *performance expectancy* becomes less positive (beta = 0.392) and significant. *Social influence* becomes marginally less positive and significant.
Model 3 expanded upon model 2 by including *level of education* as an additional control variable. In this model, the relationship between *perceived agent autonomy* and *behavioral intention* remains significant (beta = 0.311, $p < 0.05$), suggesting that both having a managerial position and level of education may contribute to the association between perceived agent autonomy and behavioral intention.

Interim conclusion of quantitative results

In this chapter, the researcher attempted to find underlying relationships between the independent and dependent variables. First, we looked at the population to get a better idea of the sample. Next, we looked at the underlying correlations between the different variables. Following this, regression analyses were performed to find any significant relationships between the variables. Finally, the entire model was examined and tests were performed to develop the ideal model for the study population. An interesting partial conclusion is that all independent variables have a significant and positive effect on their dependent variables. This means that, according to the data, *performance expectancy*, *effort expectancy*, *social influence*, *perceived agent autonomy* and *facilitating conditions* have a significant effect on intention to use a system and actual use of the system, respectively. It is interesting to note that when testing the entire model, the independent variable 'effort expectancy' makes the balance between explanatory value on the one hand and standard deviation of the model less strong. A third conclusion is that the predictor 'perceived agent autonomy' is highly positive and significant in an individual regression (with control variables). When testing the entire model, this variable is initially significant. Adding more predictors however, the variable becomes insignificant. This can possibly be explained by the fact that the sample is relatively small. An interesting outcome of this statistical analysis is that the significant moderation effects as proposed by Venkatesh et al. (2003) cannot be supported in this current study. One possible explanation of this is that moderation effects tend to be small and need a sufficiently large sample size to be detected (Babbie, 2010). This could, for instance, be the case in the moderating effect of *experience* on the relationship between *social influence* and *behavioral intention* (as this effect is not significant in this study, however the insignificance is not to a very large extent). This quantitative analysis has given valuable insights on how the independent variables of the UTAUT-model, as well as the level of perceived agent

autonomy, can be used to predict intentions to use a new technology in the workplace. In this case, this recruitment technology concerns BrainsFirst, however, considering the fact that in the theory section of this paper BrainsFirst is regarded a model-driven DSS, this quantitative analysis could potentially be used to understand the driving factors of other DSS as well. However, it is important to be cautious when extrapolating the results of the analysis of this specific recruitment technology to all other DSS as more in-depth research could be required.

Qualitative results

The goal of the qualitative analysis of the data is to provide a more comprehensive and nuanced addition to the quantitative data to explore the relationship between *perceived agent autonomy* and *behavioral intention*. By exploring the narrative of specific participants, a deeper understanding of the motivations and other underlying factors explaining the use of decision support systems might be gained (Creswell & Poth, 2017).

Qualitative research and thematic analysis allows for a more holistic examination of the research question, taking into account personal experiences and thus contributing to a broader understanding of the research topic. Important to note is that the aim of the qualitative analysis is not to discover new relationships between variables; rather it provides a valuable complement to the quantitative analysis by representing a more detailed exploration of experiences and viewpoints of participants (Creswell & Poth, 2017). The inductive analysis of the interviews, achieved by open coding, resulted in 39 codes, split in 9 code groups and 4 distinct themes: *performance expectancy, effort expectancy, social influence, perceived agent autonomy* and *facilitating conditions*. The code tree illustrating the coding process can be found in Appendix E.

Although the main focus of this research lies within the relationship between *perceived agent autonomy* and *behavioral intention* this research opts to place this relationship in the broader context of technology acceptance. This because the complex nature of organizations means that solely focusing on one specific relationship might result in other potential influencers being left out.

Performance expectancy

The first topic, as stated above, concerns the performance expectancy respondents have about using the system. The analysis of the interviews indicate that respondents might feel that having high performance expectancy will have a positive influence on the intention to use BrainsFirst as a recruitment tool.

The first category in the topic *performance expectancy* is *positive performance expectancy* which was synthesized from the interviews. this category shows that when respondents feel that their performance improves by using the system, intention to use this system also increases. Respondent 1 gives the following example: *"I think that's a crucial one, right? So*

is the tool going to help me do a good hire and a high quality and sustainable hire. Just say that trust, I think that's very important in this."
This quote illustrates how the expected system performance may be an important component in a potential user's decision process to actually use a system. Respondent 2 elaborates on this further. He states that it is crucial that people need to know how a system might improve their work practices. As stated in the following quote: *"People would like to know what the system delivers? So that effectiveness is crucial in that."*
The interviews revealed a second category: *performance skepticism*. This category is in certain aspects a contradiction of the first. Respondents indicate that some (potential) users of a system may be skeptical about its capabilities or reliability. Statements that this category comprises mostly concern skepticism about the system's underlying choice processes. According to the views of respondent two, some managers want to understand these processes completely in order to gain confidence in the system, as illustrated in the following quote: *"So some vacancy holders well, they want to know exactly how the instrument arrives at certain matches and so they want control over that actually. They want to understand; how does that work and what does that mean?"* According to respondent 1, some managers seem to be more skeptical about the usefulness and performance gains of system use altogether: *"Yes well, look at the time we wanted to implement BriansFirst, many people were skeptical about its usefulness. You are used to organizing your recruitment and selection in a certain way, selecting on the basis of a letter and CV. And then you're going to want to use something else instead or in addition to that. A tool that looks at selection differently than you do. So, people were skeptical about that."*

Effort expectancy

Effort expectancy is a topic that was less discussed by the three respondents. It is indicated that high effort expectancy indeed does not contribute to the intention to use a system. However, the tendency is that this is a fringe issue. This is interesting to note since the quantitative analyses of the full model also showed that adding the predictor 'effort expectancy' leads to a less favorable relationship between explanatory value and the standard deviation of the model. As stated before, the findings of the three interviews cannot be generalized to the same extent as the quantitative data; it might however serve as an indication that the amount of effort associated with the learning and usage of BrainsFirst is not the primary variable in explaining behavioral intention in this specific case. On the category 'effort increase', respondent 2 said the following: "*It requires some extra effort, it requires a different route. […] I still think that many people go for convenience and what is familiar. I think that well, effort for the somewhat less familiar, and in this case, quite an innovative tool for a municipality, that regarding certainly a portion of the managers, that.... well, doesn't directly encourage effort. Let me put it this way*."
Another interesting comment by respondent 2 ties in with the first. The respondent indicates that he/she expects "the power of habit" to have an inhibiting influence on people's innovative nature: *"I think that the majority of people tend to do what they've always done and so new initiatives like this are not necessarily embraced right away."*

Social influence

What is striking so far is that respondents feel that the expected performance of a system affects the intention to use the system, and that the expected effort is less addressed than might be expected from theory. However, respondents do state that the power of habit could possibly be an inhibiting factor on the intention to use a system. In other words, if everything is going well, why change? It is interesting to ask what the influence of managers, peers and experts is on people's perception of technology, and therefore on how positively or negatively employees of the municipality of Rotterdam view technology and technological change.

The theme *social influence* emerged from the interviews. This is in line with the theories of Venkatesh et al. (2003). The topic can be divided into three subcategories: *communicating success, internal ambassadors and innovative climate* and *societal influence*.

Both the interviews and the quantitative analyses revealed that there is a strong relationship between social influence and intention to use a system. An interesting interview outcome is that respondents indicated the importance of sharing success stories (in this case successful use of BrainsFirst as a recruitment tool) through clear communication. The moment this happens, it is possible that employees will have a more positive view of the technology and will be more inclined to apply it themselves in their work. This view is shared by respondent 1: "*When it comes to using or purchasing something that you don't have yet, or that you don't know very well yet, in which you then rely on the opinions of others. The moment they are positive and these are also people you are in direct contact with, then yes, it works through on a one-to-one basis, of that I am convinced."*

Respondent 2 also feels that the sharing of success stories positively impacts workers' perceptions of the technology. Interestingly, the respondent also states that sharing 'failed' attempts of implementation and how the HR-team learned from these failures had a positive effect on the attitudes of managers: *"By sharing those successes in particular, but also the recruitments where it had not been successful. Lessons were learned. That's how we were able to get a lot of people to engage in it, so that they got a positive attitude towards It [the technology]."*

A second category that emerged from the interviews was 'internal ambassadors and innovative climate'. Respondents indicated that a manager who is interested in technology and open to innovation within the team might have a positive effect on implementation. It was suggested that managers who are positive about tech can be used as "ambassadors" to promote new systems. On using managers as change ambassadors, respondent 2 stated the following: *"Yes, I think that has an influence. Especially when you talk about executives deploying the [system] and their teammates, who can also contribute to that. They have their own circle of influence and the moment they are positive about using BrainsFirst from their own experience of their own vacancies for example. Then you can use them as ambassadors to the skeptics"*

This is an interesting finding and could serve as a potential topic for future research, since the role of executives in promoting technologies has not often been discussed within this research.

Perceived agent autonomy

Since perceived agent autonomy is an important part of this study, respondents were asked about their opinions on whether and how this concept affects the intention to use the BrainsFirst system. From the interviews, the categories of autonomy loss and deviation from process emerged.

Respondent 2 indicated that an interesting dichotomy can be seen among managers. One group of managers seems to accept both the internal processes of the system and the explanations provided by the hiring team about them. A second group of managers seems to have more difficulty relinquishing control of the hiring process and, in response, demands a lot of information about the selection process. When asked for his/her opinion on the importance of potential loss of autonomy when using BrainsFirst, respondent 1 stated the following: *"Yes I think so. The fear of not having an impact on the selection."*

Respondent 1 identifies an interesting development among managers who struggle to relinquish control. The respondent states that managers who trust the system less, often deviate from the process developed with the makers of the assessment. This is a potential risk, since if the system deviates from the process, the results will not be as good, potentially affecting the perceived performance of the system. In this way, a "self-fulfilling prophecy" is created, confirming the negative image of those who are already skeptical about the use of the system. This view is illustrated in the following quote: *"We did see with a number of people, a number of managers, who deviated from the process so that the goal of using BrainsFirst was not achieved. It missed its intended objective. And you notice that in their way, they do talk somewhat negatively about deploying BrainsFirst as a consequence, in the sense that they don't see any added value to it."*

Facilitating conditions

The theme *facilitating conditions* is divided into three categories, namely *technological support*, *peripheral conditions* and *costs of implementation*. The technological support category discusses respondents' suggestions regarding technological support and its importance in the implementation of BrainsFirst. The 'peripheral conditions' category discusses comments about and the importance of (meeting) peripheral conditions that facilitate innovation. The 'costs of implementation' category names what it costs, both financially and in terms of time, to implement BrainsFirst as a technology.

All three respondents stated that having fast and adequate technological (user) support is critical to successfully implementing a technology. Clear explanation of how a system works

and what to do in case of any problems is an aspect of technology implementation that is often underestimated. For example, respondent 3 states the following: *“So good user support, which I think is an and good understandable explanation of how to use the system and what to do in case of emergencies and things like that. I think that's often underestimated. You get a user manual sent to you, for example, by mail. And then the assumption is that one knows what to do. That, I think, is often the whole big flaw in introducing systems, getting systems up and running and getting users up and running.”*

Respondent 3 also experiences a distance between the ICT people who implement systems and the users who ultimately have to use the systems. The respondent feels that this does not happen enough within the organization. He/she states the following: *"What I think is important in this is that employees get good support or user support, let me call it that, digitally but also on the shop floor. To make sure that people learn to work with a certain system, so the language that IT people speak.*

The respondent argues that this is of great importance, as frustration with the new system escapes with poor support. When employees get stuck using it, according to respondent 3, there is a chance that they will drop out. This can also affect confidence in future digital transformations, according to the respondent: *"I think a lot of colleagues, yes, just got stuck and got very frustrated as a result. Of course, that also makes you not feel very confident about the introduction of new systems.*” Here a possible interaction can be seen with the topic "social influence" since the negative experiences with the system may be shared with colleagues, who may thereby also become less trusting of the system specifically on the one hand and of the organization's competence in system implementation in general on the other.

The lack of technological support thus seems to affect employees' trust in (new) systems and the organization. Previous, negative, experiences seem to lead to distrust in the organization, creating resistance to using new systems. According to respondent 3, the constant implementation of new systems also creates a higher workload, because older employees in particular may find it more difficult to become familiar with new systems. This also affects employees' willingness to adopt new systems such as BrainsFirst.

Respondent 2 also cited facilitating as effortless a process as an important prerequisite for the successful implementation of BrainsFirst as a new recruitment system. For example, the respondent states, *"It should not be more difficult for people to deploy it. It should not involve too much work."*

On the other hand, respondent 1 feels that the facilitation aspect of implementation is currently going well. The respondent mentions that when there is a request, action can be swiftly taken and employees feel positive about this. However, this respondent mentions the (un)familiarity of the system as an inhibiting factor in the implementation. The respondent said that at the moment not enough attention is being paid to the positive impact that the usage of BrainsFirst entails: *"I think that when it comes to publicizing it [...] making sure that vacancy holders are familiar with it and what it means and what kind of impact it has, that*

could be done better." The respondent also mentions that there might be inadequate communication about not only the impact of the system, but the process of using BrainsFirst as a whole. Here, tangents can be seen with the topic 'social influence' as well as 'perceived agent autonomy'. When there is clear communication about the process the chances of potential users thinking of BrainsFirst favorably might increase. Also, the chances of deviating from the predetermined process could decrease which in turn increases the amount of successful hires and consequently increase the perception managers have of the system: *"The moment we communicate better and more broadly about: what is the tool, what does it get you, and how does the process work yes, that must affect its use as well."*

Interim conclusion of qualitative results

In summary, respondents see the following issues. First, respondents find that *employee performance expectancy* plays a role in their intention to use a system in their work. When employees feel that a system will help them perform their work better or more efficiently they seem more inclined to use it. Effort expectancy seems to play a role, but it is less than previously thought. Respondents state that although (learning) to use BrainsFirst takes an investment of time and effort, in their view this is not a decisive barrier.

The role of *innovative and positive managers within the organization*, on the other hand, is an important condition to make the implementation of the system successful. Managers who are positive about using the system can, according to the respondents, be used as ambassadors to persuade skeptical managers to use the system. Clearly communicating success stories to the organization can also have a positive effect on the opinions of potential users.

Respondents also see a role for *perceived agent autonomy* in the intention to use a system. From their experience, respondents see two distinct groups of managers. One group of managers had trust in the system and its underlying processes, there is another group that has less trust in the system (i.e. this group did not seem to accept the fact that the system made decisions without knowing how). This group seems to deviate from the pre-established processes due to lack of trust, making the system less effective. Since the managers perceive the system and process as less positive as a result, respondents feel that this may affect future use. Important to note is that these are the personal experiences of the three respondents and therefore in this research, these views cannot be generalized. They can, however, serve as interesting perspectives on how managers might react to the implementation of new technologies in the workplace.

A final category that emerged from the interviews has to do with facilitating conditions. It was chosen to incorporate in this section the respondents' suggestions on how the organization can better organize a (future) technology implementation. These *facilitating conditions* seem to have great influence on users' actual use behavior. When system implementation is simple and good technological support is abundantly present, respondents report that managers at the Municipality of Rotterdam are more inclined to use a system.

Conclusion and discussion

Conclusion and discussion

The purpose of this study was to investigate the influence of perceived agent autonomy on the intention to use a new recruitment system in operations among managers of the Municipality of Rotterdam. More specifically, using the UTAUT model of Venkatesh et al. (2003), an attempt was made to understand technology acceptance in the context of the public sector. The focus of this research was on the following five related aspects.

- The influence of performance expectancy on behavioral intention;
- The influence of effort expectancy on behavioral intention;
- The influence of social influence on behavioral intention;
- The effect of perceived agent autonomy on behavioral intention;
- The influence of facilitating conditions on use behavior.

To explore this, a quantitative research design was chosen, complemented with three interviews with HR-managers of the Municipality of Rotterdam. Using triangulation, the research tried to approach this complex problem from different angles. First, a survey was conducted among managers of the Municipality of Rotterdam, then three interviews were conducted managers to get a more nuanced and comprehensive picture of the motivations of employees to adopt and use a new recruitment technology.

In this current study, the main hypothesis, *there is a positive significant relationship between perceived agent autonomy over a DSS and the intention to use a DSS*, was shown to be supported. After conducting a quantitative analysis, the relationship between these two variables was found to be both strong and significant. This may indicate that when users experience high levels of autonomy while using a system, they are more likely to use it. This is in line with the research by Ulfert et al. (2022), as well as with the intrinsic need for autonomy as described by Ryan and Deci (2000) in their self-determination theory. This finding is confirmed by respondents in the qualitative component of this study. A second interesting outcome is that these respondents argue that some users deviate from the pre-established implementation process of BrainsFirst. They explain this by suggesting that managers to some extent do not want to give up control over the selection process. An important finding, as Omilion-Hodges & Ptacek (2021) state that clear organizational guidelines need to be followed for successful implementation of new technologies.

Similar to the main hypothesis, the positive influence of performance expectancy on intention to use a system (H1) also appears to be supported. This is in line with previous research by Venkatesh et al. (2003), among others. With a mean score of 3.41, respondents seem to expect some performance gains when using the system. The relationship between performance expectancy and behavioral intention appears stronger than the relationship between effort expectancy and behavioral intention, which was nevertheless significant and positive.

The predictor *effort expectancy* appears to be less influential based on both the quantitative and qualitative data than might be expected based on previous research (e.g. Venkatesh et al., 2003). Although there is a positive and significant relationship between the degree of ease in using a system and the intention to use that system, in the population of this study, based on the Akaike information criterion this variable seems to be less appropriate to use in a model to predict acceptance of technology. However, the importance of an effortless implementation process was reported by respondents in interviews. The system should take as little effort as possible to implement.

An interesting outcome of this study is grounded in the degree of social influence within the organization. The survey research shows that the degree of social influence is relatively low with a mean of 3.07. Looking only at the survey questions on social influence from colleagues and supervisors, it shows that these are relatively low with a mean of 2.66 and 2.75 respectively. This may be an indication of low(er) levels of affinity with technological innovation. This picture is confirmed by the interviewed respondents. They acknowledge the importance of *social influence* in appraising and adopting new technologies. Positive managers could be used to praise new systems and share success stories with colleagues, improving the perception of the system and making potential users more sympathetic to its use. This use of change agents (Gerwing, 2016) is an established method to reach the goal of organizational change. In addition, one respondent stated that less successful implementations could also have an important role. This respondent indicated that when learning points are clearly communicated, this can also have a positive effect on user perception.

Also, the hypothesis formulated for the fifth explanatory variable from the UTAUT model of Venkatesh et al. (2003), viz. *facilitating conditions*, can be supported on the basis of qualitative and quantitative data. With a mean of 3.41, respondents seem to experience a relatively high sense of facilitating conditions within the organization. Respondents in the qualitative part of the study state that good technological support, both before implementation (clear instructions) and after implementation (i.e. technological support in case of calamities or failures) is considered an essential precondition for successful technology implementation and use. Poor support, based on the qualitative data, seems to influence users' attitudes toward (future) technologies. Unsuccessful implementation may lead to frustration, which in turn can have a negative influence on future technology transformations.
In this current study, there is no evidence for significant moderating effects of age, gender and experience on the relationships between the independent and dependent variables. As explained earlier, this could be explained by the relatively small sample size potentially causing type 2 errors.

As stated in the introduction, this study aims to answer the following research question:

"How does perceived agent autonomy affect user intentions to adopt and use recruitment technologies among team leaders at the Municipality of Rotterdam?"

The results show a positive and significant relationship between the level of perceived autonomy when using a system and the intention to adopt and use recruitment technologies in the work practices. This could mean that managers who did not feel 'in control' when using BrainsFirst as a recruitment tool could be less inclined to use the system. Using the UTAUT model by Venkatesh et al. (2003) other factors that might explain technology adoption were tested and found to be significant predictors of behavioral intention and use behavior.

An interesting outcome of the qualitative analysis is that social influence within the organization affects behavioral intention to a large degree. Respondents noted that when techno-positive managers embraced a system and urged colleagues to use it as well might have a positive effect on technology adoption, now and in the future. This suggestion is in line with previous research, which shows that the use of 'change agents' in an organization can help to implement organizational change (Gerwing, 2016).

This study has made a contribution to the research field by testing the UTAUT-model in a public administration context. Furthermore, a new predictor variable *perceived agent autonomy* has been added to the model in order to increase its explanatory value. Comprehensive technological implementation, without losing track of wishes of employees, seems to be of importance for successful technological transformations and subsequent use. This study has shown that *perceived agent autonomy* and *facilitating conditions* in an organization are essential for successful innovation and content employees, as explained in the self-determination theory by Ryan & Deci (2000). Highlighting this could contribute to the strengthening of the well-being of workers in public organizations and strengthening the public sector on several levels.

Firstly, this study has shown that perceived agent autonomy significantly impacts the intention to adopt and use recruitment technologies. By allowing employees to feel more in control of their interactions with the technology, the organization can increase the sense of ownership over the system, as explained by Ulfert et al. (2022) and Ryan & Deci (2000), contributing to a smoother technology adoption.

Secondly, this study has shown that a comprehensive approach of technology adoption, involving proper guidance, training and support throughout the adoption process, can reduce resistance and uncertainty towards the technology.

Finally, the qualitative analysis in this research suggests that there is a need for organizational alignment. Aligning the technology with the values and goals of the organization might increase a sense of purpose and direction among employees. This might contribute to more engagement. Therefore, it is important that public organizations keep in mind that the feeling of being in control when using a system, as well as adequate facilitation and support from within the organization are essential in keeping employees happy and innovative.

Limitations and suggestions for future research

A notable limitation of this study is the relatively modest sample size in the quantitative phase. The small sample size may have potentially led to the misclassification of certain

relationships as insignificant. While adhering to the guideline of a minimum of 10 observations per independent variable (Concato et al., 1993), a larger sample could have bolstered reliability and validity of this research. The relatively low response rate could in part be attributed to the comprehensive vignette of the BrainsFirst implementation process. It is possible that this contributed to non-response bias, particularly in terms of respondent fatigue (i.e. respondents feeling overwhelmed by the process description) (Shultz & Luloff, 1990). The researcher foresaw this potential issue before distributing the survey. However, the potential risk of measurement errors due to respondents misunderstanding the BrainsFirst process was regarded as a higher priority. In future research, applying a more purposive sampling strategy where respondents were aware that a comprehensive vignette would be part of the survey could help mitigating the risks of non-response bias.

A suggestion for future research is to retest the data with a larger sample size. This could possibly lead to the variable *perceived agent autonomy* proving to be significant in the overall model. Furthermore, it might be interesting to investigate how the Municipality of Rotterdam is currently using change agents to facilitate organizational change. This could add to existing literature by providing a more complete picture of the change climate within public organizations.

An additional suggestion for future research involves the comparison of the impact of outsourcing within the context of public and private sector organizations. This comparative analysis could focus on the effect of outsourcing on the effectiveness and efficiency of public organizations. An interesting perspective to explore could be the intricate balance between efficiency and additivity of the public sector by using external systems and services on the one hand, and the erosion of expertise and dependability on the other, potentially associated with the loss of decision-making autonomy in public sector organizations. This could prove especially important in vital functions such as recruitment and selection. This new study could prove relevant given the potential of external outsourcing of technology, as is shown in this current study by the use of external systems such as BrainsFirst. By investigating the dynamics mentioned before, researchers could unveil insights in the interplay between technology adoption, organizational structures and decision-making processes in the public sector, possibly allowing for more fitting technological transformations.

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Appendixes

Appendix A: Vignette process description (Dutch)

Brainsfirst is een bedrijf dat pre-employment assessments aanbiedt die gebaseerd zijn op cognitieve neurowetenschappen en kunstmatige intelligentie. Er kan onder andere gebruik worden gemaakt van game-based assessments als Neurolympics. Dit assesment is ontwikkeld door Brainsfirst en wordt vanuit team recruitment beschikbaar gesteld. Hieronder zal stap voor stap worden toegelicht hoe het proces er uitziet op het moment dat dit instrument wordt ingezet bij vacatures.

1. Identificeer de functie en verantwoordelijkheden: Voordat u Brainsfirst gebruikt, moet u de functierol en verantwoordelijkheden identificeren waarvoor u aanneemt. Dit is belangrijk omdat het u helpt te bepalen welke cognitieve vaardigheden het belangrijkst zijn voor de functie.
2. Maak een functieprofiel: Maak tijdens een online workshop met Brainsfirst basis van de functierol en de verantwoordelijkheden een functieprofiel met de noodzakelijke cognitieve vaardigheden voor de functie. Dit functieprofiel zal worden gebruikt om kandidaten te beoordelen tijdens het aanwervingsproces.
3. Nodig kandidaten uit om het assessment in te vullen: Zodra u potentiële kandidaten hebt geïdentificeerd, nodigt team recruitment hen om het Brainsfirst assessment in te vullen. Het invullen van het assessment duurt ongeveer 45 tot 60 minuten en kan op afstand gebeuren.
4. Analyseer de beoordelingsresultaten: Zodra de kandidaten het assessment hebben afgerond, ontvangt team recruitment een rapport waarin hun cognitieve vaardigheden worden geanalyseerd op basis van het functieprofiel dat u hebt aangemaakt. Vervolgens maakt recruitment een voorselectie. Hierop volgend krijgt de vacaturehouder een selectie van de beste kandidaten voor een definitieve selectie. Het finale besluit wordt gemaakt op basis van de score van het Brainsfirst assessment in combinatie met het CV.
5. Voer een gestructureerd interview: Op basis van de assessmentresultaten kunt u een gestructureerd interview met de kandidaten voeren om hun geschiktheid voor de functie verder te evalueren. Dit gesprek moet gericht zijn op het stellen van vragen die de cognitieve vaardigheden van de kandidaten beoordelen die belangrijk zijn voor de functie.
6. Neem een aanwervingsbesluit: Ten slotte kunt u op basis van de assessmentresultaten en het gestructureerde interview besluiten wie u wilt aannemen. De assessments van Brainsfirst bieden gegevensgestuurde inzichten om u te helpen een geïnformeerde beslissing te nemen over welke kandidaat het meest geschikt is voor de job.

Wij vragen u om uw antwoorden op de volgende stellingen op het proces zoals in deze procesomschrijving te baseren. Mocht u al bekend zijn met de systemen van Brainsfirst kunt u uw antwoorden op uw eigen ervaringen baseren.

Appendix B: Survey (Dutch)

Bedankt voor uw deelname aan deze vragenlijst. Deze vragenlijst is onderdeel van een onderzoek naar de invloed van de ervaren gebruikersautonomie op de intentie om beslissingsondersteundende systemen (decision support systems) te gebruiken binnen de werkzaamheden. De vragenlijst kost ongeveer 10 minuten om in te vullen.

Uw privacy en anonimiteit zullen volledig gewaarborgd worden. Alle informatie is anoniem en kan niet naar u worden teruggeleid. De data wordt conform de Algemene Verordening Persoonsgegevens opgeslagen en verwerkt.

Mocht u vragen hebben over dit onderzoek kunt u contact opnemen door een e-mail te sturen naar 483755rs@eur.nl

Mocht u uw medewerking aan dit onderzoek willen stopzetten dan kan dit. Dit kan door een e-mail te sturen naar 483755rs@eur.nl

Nogmaals bedankt voor uw medewerking.

Door op “Ik ga akkoord” te klikken gaat u akkoord met het volgende:

- Ik heb de bovenstaande informatie gelezen en begrepen;

- Mijn deelname aan dit onderzoek is vrijwillig;

- Ik weet dat ik op elk moment kan en mag stoppen met het invullen van de survey en dat ik daarmee mijn toestemming direct intrek;

- Ik geef toestemming om de gegevens die tijdens dit onderzoek over mij worden verzameld te verwerken in het onderzoek.

De vragen in dit onderzoek gaan over uw mening en ervaringen met het gebruik van beslissingsondersteunende systemen (decision support sytems). Een beslissingsondersteunend systeem (DSS) is een computersysteem dat gebruikers kan helpen geïnformeerde beslissingen te nemen door gegevens te analyseren, te visualiseren en te presenteren.

Performance expectancy

1. Ik zou het systeem nuttig vinden tijdens mijn werk
2. Dankzij het systeem kan ik taken sneller uitvoeren.
3. Het gebruik van het systeem verhoogt mijn productiviteit.

Effort expectnacy

4. Mijn interactie met het systeem zou helder en begrijpelijk zijn.
5. Het is voor mij makkelijk om bekwaam te worden in het gebruik van het systeem.
6. Ik zou het systeem makkelijk in gebruik vinden.
7. Het systeem leren gebruiken is voor mij gemakkelijk.

Attitudes towards technology

8. Het systeem gebruiken is een slecht idee. (**R)**
9. Het systeem maakt het werk interessanter.
10. Met het systeem werken is leuk. [L SEP]
11. Ik werk graag met het systeem.

Social influence

12. Mensen die mijn gedrag beïnvloeden zijn van mening dat ik het systeem moet gebruiken. [L SEP]
13. Mensen die belangrijk voor mij zijn, zijn van mening dat ik het systeem moet gebruiken. [L SEP]
14. Het hogere management van de Gemeente Rotterdam is hulpvaardig geweest bij de toepassing van het systeem.
15. Over het algemeen heeft de organisatie het gebruik van het systeem gesteund.

Facilitating conditions

16. Ik beschik over de benodigde middelen om het systeem te gebruiken.
17. Ik heb de benodigde kennis om het systeem te gebruiken.
18. Het systeem is niet goed afgestemd op andere systemen die ik gebruik. (**R)**
19. Een specifiek persoon (of groep) is beschikbaar voor hulp bij eventuele systeemproblemen.

Behavioral intention

20. Ik ben van plan het systeem binnen de komende 6 maanden te gebruiken.

Use behavior

21. Ik voorspel dat ik het systeem binnen in de komende 6 maanden zal gebruiken. [L SEP]

Perceived agent autonomy

22. Het systeem biedt keuzes op basis van mijn werkelijke belangen.
23. Het systeem laat me mijn eigen gang gaan.
24. Het systeem helpt me acties te verrichten die ik wil verrichten, in plaats van omdat ze me worden opgedragen.
25. Het systeem laat me de regie houden over de dingen die ik doe.
26. Het systeem ondersteunt mij in het maken van mijn eigen keuzes.

Moderating variables

27. Wat is uw leeftijd (in jaren)?
28. Hoe bekend bent u met beslissingondersteunende systemen (decision support systems)?
29. Wat is uw geslacht?

Control variables

30. Heeft u een leidinggevende positie?
31. Wat is uw hoogst genoten opleidingsniveau?

Appendix C: Interview guide (Dutch)

General information

1. Toestemming om interview op te nemen
2. Leeftijd
3. Functieomschrijving

Technology usage general

1. Kunt u kort uw ervaring beschrijven met het gebruik van technologie in uw persoonlijke of professionele leven?

Perceived agent autonomy

2. Wat betekent "perceived agent autonomy" volgens u in de context van het gebruik van technologie?
3. Hoe denkt u dat ervaren autonomie van invloed is op de acceptatie en het gebruik van technologie door individuen?
4. Volgens het UTAUT-model zijn er verschillende factoren die de acceptatie van technologie beïnvloeden. In uw ervaring, hoe werkt perceived agent autonomy samen met andere factoren, zoals prestatieverwachting, inspanningsverwachting of sociale invloed?
5. Kunt u zich een specifiek geval herinneren waarin u een hoge mate van autonomie voelde tijdens het gebruik van een bepaalde technologie? Welke invloed had dat op uw acceptatie en verdere gebruik van die technologie?
6. Bent u daarentegen ooit een situatie tegengekomen waarin u een gebrek aan autonomie voelde bij het gebruik van een technologie? Hoe beïnvloedde dat uw acceptatie en bereidheid om de technologie te gebruiken?
7. Wat zijn vanuit uw perspectief enkele potentiële voordelen van het ervaren van een hoge mate van autonomie van de agent bij het gebruik van technologie?
8. Omgekeerd, zijn er mogelijke nadelen of uitdagingen verbonden aan een hoge waargenomen autonomie van de agent in de context van technologie-acceptatie?
9. Hoe denkt u dat organisaties of technologieontwikkelaars de perceived autonomy kunnen vergroten bij het ontwerpen en implementeren van nieuwe technologieën?
10. Is de ervaren autonomie van een gebruiker volgens u een cruciale factor om in overweging te nemen bij het voorspellen van de aanvaarding en het gebruik van technologie? Waarom wel of niet?

Performance expectancy

1. Hoe belangrijk is de waargenomen prestatieverbetering of effectiviteit van een technologie bij het beïnvloeden van uw acceptatie en gebruik ervan?
2. Kunt u een voorbeeld geven van een situatie waarin uw hoge prestatieverwachting uw technologieacceptatie en -adoptie positief heeft beïnvloed?

Effort expectancy

1. Hoe beïnvloedt het waargenomen gebruiksgemak en de gebruiksvriendelijkheid van een technologie uw bereidheid om deze te aanvaarden en te gebruiken?
2. Bent u ooit geconfronteerd met een technologie waarvan de waargenomen inspanning die nodig is om deze te gebruiken een belemmering vormde voor uw aanvaarding of

adoptie? Kunt u de specifieke uitdagingen beschrijven waarmee u werd geconfronteerd?

Social influence

1. In welke mate beïnvloeden aanbevelingen of meningen van vrienden, collega's of deskundigen uw beslissing om een technologie te aanvaarden en te gebruiken?
2. Kunt u zich een geval herinneren waarin sociale invloed een belangrijke rol speelde bij uw aanvaarding of invoering van een technologie? Hoe heeft dit uw besluitvormingsproces beïnvloed?

Facilitating conditions

1. Hoe beïnvloeden externe factoren, zoals de beschikbaarheid van technische ondersteuning, opleiding of middelen, uw aanvaarding en gebruik van een technologie?
2. Hebt u ooit situaties meegemaakt waarin de afwezigheid of het gebrek aan faciliterende omstandigheden uw aanvaarding of invoering van een technologie belemmerde? Kunt u die gevallen beschrijven?

Perceived agent autonomy

1. Welke invloed heeft de waargenomen autonomie bij het gebruik van een technologie volgens u op uw acceptatie en intentie om deze te gebruiken?
2. Kunt u een voorbeeld geven van een technologie waarbij een hoge mate van waargenomen autonomie van de agent een positieve invloed had op uw acceptatie en verdere gebruik van die technologie?

Behavioral intention

1. Welke factoren dragen bij tot uw intentie om een technologie te aanvaarden en blijvend te gebruiken?
2. Hoe beïnvloeden de verschillende factoren van het UTAUT-model, waaronder waargenomen autonomie van de agent, uw gedragsintentie om een technologie te aanvaarden en te gebruiken?

Appendix D: Assumptions for regression

1. Linearity: in order to create valid and reliable results, the relationship between the dependent variable and each independent variable needs to be assumed to be linear. The effects of the independent variables need to be constant across all values.
2. Independence: the observations used in the regression analysis need to be independent. This means that observations do not influence each other resulting in unbiased regression coefficients.
3. Homoscedasticity: the residuals are assumed to be constant across all levels of independent variables.
4. Normality: the error term (residuals) of all variables needs to follow normal distribution. Normality is important for accurate regression coefficient estimation, as well as valid testing of hypotheses.
5. Multicollinearity: the independent variables of the regression are assumed to be uncorrelated with each other. Predictors are assumed to not be correlated. This is measured using the VIF-values of the predictors. Ideally, these are below 5.

6. Exogeneity: for accurate, unbiased results there should be no influence of the dependent variable on the independent variable(s).
7. No influential outliers: influential outliers can have a disproportionate effect on regression results. It is important to first check the results for few influential outliers.

Appendix E: Code Tree