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The different roles of algorithms in research on governmental decision-making for citizen services

Karin Hedström
Örebro University School of Business, Örebro University, Örebro, Sweden

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Abstract

Purpose – The aim of this paper is to explore the role of algorithms in research focusing on automated decision-making of citizen services.

Design/methodology/approach – A scoping review of literature published between 2016 and 2025 was conducted. Studies were analyzed to identify how automated decision-making is conceptualized, the terminology used, the roles algorithms are assigned and the contexts in which they operate.

Findings – The review reveals significant conceptual ambiguity in research on automated decision-making. Furthermore, automated decision-making systems are shown to operate within broader socio-technical networks encompassing people, organizational structures, technologies and formal rules. Current research offers fragmented understandings of automated decision-making, focusing largely on administrative efficiency rather than citizen experiences.

Practical implications – The findings point to an urgent need for policy frameworks, standardized guidelines and training that embed public values such as fairness, transparency and accountability. Policies should promote digital literacy and citizen empowerment to ensure engagement with automated decision-making and algorithmic systems in citizen services and public sector governance.

Originality/value – This study contributes to a nuanced understanding of the complexity of automated decision-making, highlighting the context and institutional logic. Algorithms were found to play seven different roles supporting humans in automated decision-making processes. This, together with different degrees of automation in the decision-making process, challenges a more dualistic view of automated decision-making.

Keywords Automated decision-making, Algorithmic decision-making, Scoping review, Public values, Citizen

Paper type Conceptual paper

1. Automated decision-making in public sector decision-making

Within public administration, IT is often used to increase efficiency, reduce costs and support public values such as impartiality and equality (Cordella and Bonina, 2012; Bannister and Connolly, 2014). Digitalization continues to expand, including the partial or full automation of administrative processes and citizen interactions. This also covers automated decision-making, where computers either support human case officers or make decisions independently (Wihlborg *et al.*, 2016). As a result, the traditional balance between standardized and

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discretionary decisions in public administration is being reshaped through the automation of street-level bureaucracy (Widlak *et al.*, 2021). Research on automated decision-making in the public sector generally focuses on the internal arrangements of public administration (Denk *et al.*, 2022). However, since citizens are central to the public sector, it is equally crucial to understand how automated decision-making affects citizens. This paper, therefore, focuses on the role of automated decision-making in research on government services for citizens. Based on a scoping review of peer-reviewed research literature from 2016 to 2025, we therefore aim to answer the following question:

Q1. What is the role of algorithms in automated decision-making for government services?

This addresses the lack of conceptual discussion in the field of e-government and the need for a broader discussion on how automation is embedded in automated governmental decision-making in published research. This has implications not only for research on the role of technology for decision-making in public administration but also for policymaking. There is a need for improved transparency and details on when and how algorithms are used in public sector decision-making effecting citizens' lives. The scoping review also investigates different conceptualizations and contextualizations of automated decision-making related to public values and the applications of these solutions.

The paper begins by outlining different perspectives on automated decision-making and reviewing research on human–machine collaboration and public values. Section 3 describes the scoping review. Section 4 presents the results, including an overview of key concepts, the degree of automation, patterns of human–machine collaboration and a typology of algorithmic decision-making. The section ends with a discussion of the situated nature of automated decision-making. Section 5 deepens the analysis in relation to previous literature, highlighting the entanglement of humans and algorithms and the values at stake. The paper concludes with Section 6, followed by limitations and directions for future research.

2. The role of the algorithm

Automation in governmental decision-making can be viewed on a scale from where the algorithm has no active role in the decision process to where the algorithm acts autonomously and executes the entire decision-making process without any human involvement [see Smith *et al.*, 2010 referring to Sheridan's taxonomy (1992, p. 358)]. Smith *et al.* (2010) illustrate automated decision-making using the following steps:

(1) The computer offers no assistance; the human must do it all.
- The computer offers a complete set of action alternatives;
- narrows the selection down to a few;
- suggests one, and
- executes the suggestion if the human approves;
- allows the human a restricted time to veto before automatic execution;
- executes automatically, then necessarily informs the human;
- informs her after execution only if she asks; and
- informs her after execution, if it, the computer, decides to do so.

(2) The computer decides everything and acts autonomously, ignoring the human.

When the model from 1992 was introduced, automated decision-making in public administration was primarily rules based, which is considerably different from today, where AI-supported data-driven decision-making is also possible. Rule-based automated decision-making relies on explicit knowledge and preprogrammed instructions or rules (Wang *et al.*, 2023), while data-driven automated decision-making uses machine learning techniques to uncover patterns or structures based on historical data (Wang *et al.*, 2023). These new technologies create powerful opportunities to use algorithm outputs in public sector decision-making, making the degree of automation more complex and offering various decision-making processes with different levels of human involvement in digital public administration.

Previous research has emphasized that Sheridan's (1992) model of automated decision-making fails to capture the complexity of human–machine collaboration during the decision-making process, as it focuses solely on the decision-making action *per se* (by humans or algorithms), and not on the process. Parasuraman *et al.* (2000) and Miller and Parasuraman (2003), therefore, added four information processing functions that algorithms can perform in relation to human decision-making to the original model: information acquisition, information analysis, decision and action selection and action implementation. The decision-making process involves different degrees and types of collaboration between the algorithm and the human decision-maker. Roehl (2022) suggests that the use of technology in automated administrative decision-making should be classified based on six ideal types ranging from minimal automation to autonomous decisions, not so different from the categorization suggested by Smith *et al.* (2010). Roehl (2022), however, bases his categorization on the "shared responsibility" between the human and the technology, whereas Smith *et al.* (2010) focused on the effects of automation on accountability.

Related to this, we can see that the phenomenon of automated decision-making lacks consensus on the labels used (Goldkuhl, 2022). Some researchers use "automated decision-making" (Wihlborg *et al.*, 2016), others use "algorithm-based decision-making" (Cerrillo i Martinez, 2019) and some use "robotic process automation" (Ranerup and Henriksen, 2019).

2.1 Human–machine collaboration in public sector decision-making

Street-level bureaucrats traditionally exercise considerable discretion and autonomy (Lipsky, 2010). With the digital transformation of public administration, this is changing (Buffat, 2015; Busch and Henriksen, 2018). Face-to-face interactions are increasingly replaced by digital interfaces, reshaping citizen–government relations. Bovens and Zouridis (2002) warned that street-level work could become system-level bureaucracy, where system designers dominate and caseworkers play minimal roles. Busch and Zinner Henriksen (2018) describe this shift as "digital discretion," where computerized routines guide or replace human judgment. Delegating decisions to digital technologies—sometimes with little or no human oversight—alters the citizen–state relationship and affects legitimacy and public values. These decisions are often complex, as seen in areas such as immigration control (Kuziemski and Misuraca, 2020). This raises concerns about how automation influences professional discretion. A more nuanced understanding of automated decision-making is needed, including how varying degrees of automation shape the role of human judgment.

2.2 Public values and automated decision-making

Previous research has highlighted that automated decision-making systems risk black-boxing the grounds for decisions, which is detrimental to transparency, being an important virtue for achieving accountability (e.g. Diakopoulos, 2016), and ultimately a legitimate society. These new arrangements and power relations among the involved actors partly

relocate public values such as accountability, at the same time as laws and other practices become embedded into the technology. This development risks limiting public officials' discretion in relation to citizens (Petrakaki, 2018).

It is important for public organizations to be seen as legitimate by their citizens, and one way to establish legitimacy is through transparent decisions (Næsborg-Andersen and Motzfeldt, 2019). Previous research has highlighted the risk that using automated decision-makers can black-box the grounds for decisions (e.g. Diakopoulos, 2016). Algorithms may be protected, and some are inherently difficult or even impossible to understand, especially when machine learning is used (Liu *et al.*, 2019). Consequently, the public officials may not know how the algorithms work or how the decisions they adopt are made (Cerillo i Martinez, 2019; Liu *et al.*, 2019). This reduces transparency, and consequently, accountability and legitimacy of public administration (Motzfeldt and Næsborg-Andersen, 2018). The ability to hold public administration accountable for decisions made on behalf of the political system and how these decisions affect citizens, i.e. public accountability, is central for a democratic society (Bovens *et al.*, 2014).

Automated decisions reduce the "human aspect," potentially lowering unconscious cognitive biases (Cerillo i Martinez, 2019). They can also increase transparency when subjective judgments are replaced by rule-based processes. Thus, automation can both mitigate and amplify bias. Denk *et al.* (2022) found that citizens expect computer-made decisions to be less secure, transparent and sensitive to personal circumstances, but also more impartial, than those made by humans.

3. Research methodology: a scoping review

A scoping review was conducted to map peer-reviewed research on automated decision-making of citizen services in public administration. The purpose of a scoping review is to synthesize a heterogeneous body of research to understand its nature and characteristics (Arksey and O'Malley, 2005). The framework used in this study includes six steps:

(1) identifying the research question;
(2) identifying relevant studies;
(3) study selection;
(4) charting the data;
(5) collating, summarizing and reporting the results; and
(6) consultation with stakeholders (Arksey and O'Malley, 2005).

Identifying the research question: The research question:

RQ1. What is the role of the algorithm in automated decision-making?

is based on a lack of conceptual discussion in the field and the need for a broader discussion of how algorithms are embedded in automated governmental decision-making toward citizens in published research. The scoping review investigates different conceptualizations and contextualizations of automated decision-making. Following Arksey and O'Malley (2005)] advice, the research question is broad.

Identifying relevant studies: Initially, searches were conducted in the Digital Government Reference Library (DGRLv20), which contained 19,932 references of English-language, peer-reviewed studies within digital government, governance and democracy. The search strategy was based on abstracts, titles and keywords using the following search terms: "citizen," "decision*," "automate*," "robot*" and "algorithm." As more articles were found,

additional keywords were included (e.g. “RPA”). After reviewing the search results, it was noted that potential articles were missing, in addition to the 530 articles generated from DGRLv20. Therefore, in November 2024, searches were complemented with the SCOPUS database, which covers content from 7,000 publishers. In SCOPUS, searches were conducted using a combination of the following search terms: “decision/decision-making,” “citizen,” “automate*,” “robot*,” “rule-based,” “algorithmic” and “RPA.” The search resulted in 660 potential articles. Duplicates from the two databases were removed, and articles were initially selected based on reading the title and abstract, resulting in 48 potentially interesting articles from searches in the two databases. To update the literature, we did a supplementary literature search in the SCOPUS database for 2025. The interest in automated decision-making has exploded, and the search resulted in 132 retrieved and potentially interesting articles published in 2025.

Study selection: To ensure research quality, only peer-reviewed journal and conference articles published in English were considered. Based on the research questions, studies were screened for relevance to automated decision-making and its impact on citizens. Abstracts were reviewed first, followed by full-text reading when appropriate. Twenty articles were initially selected. Articles discussing automated decision-making in the public sector without empirical or scenario-based examples of citizen–government decision-making were excluded (e.g. Carlizzi and Quattrone, 2023; Juell-Skielse *et al.*, 2022; Beck and Ranchordas, 2025), as were teaching cases (e.g. Rinta-Kahila *et al.*, 2024). The updated 2025 search added 18 more articles, reflecting the sharp rise in interest during that year. Eight articles could not be retrieved, resulting in a final sample of 30 studies. The process of identifying, screening and selecting the articles that were included in the final analysis is illustrated in the flowchart (Figure 1).

Charting the data: Information relevant to the research question was obtained and selected. To systemize this charting, information was recorded based on key items: full reference, research methodology, role of technology in the decision-making process, labeling of automated decision-making, role of the algorithm, type of citizen service/application, purpose of the study, research contribution, relevance for citizens, public value(s) addressed and country of application. These items were recorded in a “data charting form” (Arksey and O’Malley, 2005) using Excel, forming the basis for the analysis. The analysis focused on conceptualizations of labeling of automated decision-making, role of the algorithm in the decision-making process, type of citizen service/application, public values related to automated decision-making for citizen services and country where the examples originate from.

Collating, summarizing and reporting the results: The framework for analyzing the role of the algorithm in citizen-centric decision-making in public administration is based on Smith *et al.* (2010). This framework, although dated, is still cited in research on automated decision-making (see e.g. Roehl and Crompvoets, 2025). The analysis is based on empirical data presented as case studies (e.g. Cetina Presuel and Martinez Sierra, 2024), illustrative cases (e.g. Fountain, 2022) or scenarios (e.g. Busch, 2023). Empirical examples related to medical applications were excluded, as they focus on patient–doctor relations rather than

Figure 1. Illustration of the process of identifying, screening and selecting the articles

citizen–government interactions (e.g. Aysolmaz, 2023; Fountain, 2022). The content of the articles was analyzed based on the labels used to describe "automated decision-making," public values, the role of the algorithm in the decision-making process, type of service and application and the country where the empirical examples were implemented (see Appendix). The research presented in the included articles is, however, seldom detailed enough for a thorough analysis of the computer's role in the decision-making process.

Consultation with stakeholders: Consultation with stakeholders provides additional resources and supports a broader perspective of the findings. The research results were discussed during an hour-long Zoom interview with a representative from the Swedish Agency for Digital Governance, who has extensive experience of, and interest in, citizen-centric digital governance from a Nordic perspective. The purpose of the consultation was to validate the findings. The consultation also contributed with insights on how citizen-centric automated decision-making is embedded in Nordic policymaking, and how the agency is working with automated decision-making.

4. Automated decision-making and citizen services

4.1 The many names of automated decision-making

Researchers use many different terms to describe "automated decision-making," creating ambiguity about what the concept means (as noted by Goldkuhl, 2022). Clarification is needed for both "automated" and "decision-making." Automated decision-making generally refers to an action (decision-making) performed by an actor (human or algorithm). Implicit in the concept is that the decision-making action, being automated (for a more thorough linguistic analysis of automation, see Goldkuhl, 2022), is carried out by a machine, i.e. without human involvement. However, the analysis shows that many studies refer to "automated" decision-making where humans actually make decisions based on algorithmic results (e.g. Kuziemski and Misuraca, 2020), thus, not truly automated decisions. The same applies to "decision-making," which, although a specific action, is generally viewed as part of a broader process. This means that, while it is analytically possible to separate the actor/decision-maker (algorithm or human) from the action/actual decision, it is not always feasible as they are embedded in institutional arrangements and thus intertwined.

The analysis reveals how researchers:

- use different concepts to refer to the phenomenon of automated decision-making; and
- ascribe the algorithm varying roles as part of a decision-making process.

This highlights the importance of the collaboration between the algorithm and human, stressing the intersection between the human and algorithm. What is considered automated is, however, seldom discussed in detail, making it difficult to concretely unpack the human–machine collaboration.

The different concepts used to describe automated decision-making in research are illustrated in Figure 1. The most common concept is "automated decision-making" (e.g. Goggin and Soldatic, 2022), followed by "algorithmic decision-making" (e.g. Flügge, 2020). Automated decision-making is often used as an umbrella term, including AI-generated or rule-based decision-making and various types of algorithmic decision support. The development of conceptualization follows the current technological advancements, where data-driven decision-making, such as data analytics and knowledge models, has become increasingly available in public administration, allowing more tasks to be delegated to algorithms as part of human decision-making. It is important to note that algorithms can, but not necessarily, include the use of AI (see also Bannister and Connolly, 2020).

Although authors often discuss similar ideas under the label of automated decision-making, the applications they examine vary widely. As a result, many studies describe the focus as automated decision-making even when algorithmic outputs are used to support human decisions. In such cases, the decision itself is not automated; a human makes it based on algorithm-generated information (e.g. Kaun *et al.*, 2024). A similar conceptual issue arises when researchers label the use of algorithms that generate inputs for a broader decision-making process as automated decision-making, even though these algorithms do not make decisions themselves, as seen in cases such as immigration assessment (Kuziemski and Misuraca, 2020) or high-risk patient identification (Fountain, 2022).

4.2 Automated decision-making as part of human decision-making

The collected research articles can be viewed on a scale describing the degree of automation, ranging from algorithmic decision support where humans make the decisions to fully automated decision-making with automatic dispatch notices. This perspective on automation follows the work of Sheridan (1992) and Parasuraman *et al.* (2000), where the room for professional discretion depends on the degree of automation. Grimmelikhuijsen (2023) compared the "classic" form of automation, with a low degree of discretionary power where the computer makes the decision to a higher degree of discretionary power where algorithms are used as decision support for human decision-making.

Although professional discretion in decision-making is limited or even absent in a fully automated decision process, it can still be exercised. For instance, the decision-maker can oversee the process and, if needed, influence it. In lower degrees of automation, the algorithm provides various types of decision support, leaving more room for professional discretion. In higher degrees of automation, the algorithm makes the initial decision, but the human may adjust or approve it, exercising professional discretion in collaboration with the algorithm. There are also cases where the algorithm makes the decision, but the human announces it, allowing room for explanations. It is also common for computers to make positive decisions, while letting humans handle negative decisions, i.e. conditionally automation (Ranerup and Henriksen, 2019; Wihlborg *et al.*, 2016; Roehl and Crompvoets, 2025).

4.3 The seven roles of algorithmic decision support

Research on automated decision-making assigns the algorithm seven roles in the decision-making process (see Table 1). The logic behind the table is inspired by the work of Smith *et al.* (2010) where algorithmic decision-making can be viewed on a scale from where the algorithm offers no assistance at all to a process where the algorithm acts autonomously and executes the entire decision-making process without any human involvement. Although algorithms may serve multiple functions, we separate these roles to highlight the diverse forms automated decision-making can take.

Advising refers to the use of computers as advisors in decision-making. Flügge (2020) illustrates this role in a study of Danish caseworkers' views on automated job-placement decisions, focusing on how algorithms influence transparency and trust. Roehl and Crompvoets (2025) likewise show how, in work-retention settings, algorithms guide staff on which steps to take with clients. They use this and other cases to discuss what constitutes good administration when automated decision-making is involved.

Detection involves identifying patterns, anomalies or prespecified features. Algorithms can support decision-making regarding fraudulent behavior or information within social welfare (de Bruijn *et al.*, 2022). They illustrate how explainability, impartiality and discrimination are affected by the use of algorithms in decision-making processes.

Table 1. Degree of automation and the role of the algorithm in automated decision-making

The algorithm offers no assistance; the human must do it all	
Algorithmic decision support	Advising
	Detection
	Evaluation
	Identification
	Prediction
	Preparation
	Profiling
Decision taken by an algorithm	Decision adjusted by a human
	Decision approved by a human
	Positive decision is taken by a computer, a negative decision is taken by a human
	Decision taken by computer, but dispatch notice given by a human
The algorithm does everything, without human involvement, including automatic dispatch notices	

Another example is Grimmelikhuijsen (2023), who investigates accessibility, transparency, explainability and trust in his work on using algorithms to detect suspected welfare fraud.

Evaluation refers to the use of algorithms to assess and interpret collected information. A striking example is Suter's (2020) analysis of China's social credit system, where data from multiple sources is evaluated and publicly displayed, shaping citizens' access to services and activities. Suter's study examines issues of transparency within this system. Another example is Alon-Barkat and Busuioc's (2023) research on an "algorithmic performance evaluation tool" used in hiring teachers in The Netherlands. Their work focuses on how "algorithmic advice" influences human decision-making and explores potential discrimination arising from its use.

Identification describes the use of facial recognition technologies for identifying human faces in processes such as authentication or criminal justice and trafficking searches (Fountain, 2022). A core question often investigated in studies on identification is how facial recognition algorithms are built using biased models (Fountain, 2022; Cetina Presuel and Martinez Sierra, 2024). Fountain (2022) investigates facial recognition in relation to systematic racism. He and Zhang (2025), however, argue that the use of facial recognition in some Chinese cities "pose systematic challenges to multiple fundamental civil rights" (p. 4).

Prediction refers to the use of algorithms to forecast human behavior and risks, such as recidivism or failure to appear in court (de Bruijn *et al.*, 2022; Busch, 2023). Cetina Presuel and Martinez Sierra (2024) describe how such tools support parole decisions, raising concerns about bias and racism. de Bruijn *et al.* (2022) show how judges rely on predictive tools in pretrial decisions and argue that explainability is essential for trust and transparency. Predictive policing provides another example, using algorithms to identify potential crime hotspots (Fountain, 2022). Cetina Presuel and Martinez Sierra (2024) warn that these systems may reinforce existing biases, leading to "over-policing of certain neighborhoods" (p. 8) contributing to systemic discrimination.

Preparation of information involves tasks such as screening, filtering and gathering data to support human decision-making. One example is tax declaration preparation (Aysolmaz *et al.*, 2023), which examines how concerns about transparency in algorithm-supported processes affect perceptions of fairness, accountability, privacy and user trust. Another example is Kuziemski and Misuraca's (2020) study of Canada's automated immigration system, where algorithms check the completeness of applications. Their work discusses how such automated support shapes trust and democracy.

Profiling refers to the use of algorithms to assign individuals to specific categories based on various characteristics as part of a decision-making process. One example is highlighted in Kuziemski and Misuraca's (2020) work, describing how unemployed individuals in Poland are categorized into different groups to determine the level of support. This example is part of a discussion about the influence of automated decision-making on the relationship between governments and citizen trust and democracy. Kaun *et al.* (2024) highlight profiling in unemployment services, where unemployed people are divided into different categories according to their needs for training and support. The results are discussed in relation to transparency and social justice.

4.4 The situated nature of automated decision-making

Viewing automated decision-making as degrees of automation in public organizations is analytically possible and can provide insights into the role of algorithms in the decision-making process (see Table 1). However, this approach focuses on the output side of the algorithm and is contextually blind, not considering the specifics of the public organization, the choice of application, governing administrative processes or institutional logic.

There are differences between automated decision-making and algorithmic decision support that affect the relationship between the citizen and the street-level bureaucrat. Therefore, to understand automated decision-making, we cannot rely solely on a stage model like the one presented in Table 1. We also need to uncover which public values are being supported or repressed in the decision-making process.

To further uncover the research agendas, the analysis, therefore, also includes the different public values highlighted or investigated in the collected articles. Research highlighting transparency has analyzed algorithmic decision-making and support for tax declarations (Aysolmaz *et al.*, 2023), job placement and health service applications (Flügge, 2020). Another example is Suter's (2020) analysis of China's social credit system from the perspective of transparency. Transparency is often seen as a prerequisite for trust and legitimate governance (e.g. Cetina Presuel and Martinez Sierra, 2024; Flügge, 2020), making trust another core theme. Trust can relate to confidence in the system (e.g. Kuziemski and Misuraca, 2020; Cetina Presuel and Martinez Sierra, 2024; Busch, 2023), which involves trusting decisions based on algorithmic results, as well as trust in government and governance systems (e.g. Kuziemski and Misuraca, 2020; Cetina Presuel and Martinez Sierra, 2024). Another important area is trust in relation to understanding decisions, which is linked to transparency (Aysolmaz *et al.*, 2023) and is crucial for citizen trust and legitimate government.

Another major value area is discrimination. Alon-Barkat and Busuioc (2023) analyzed a fictive hiring process in a Dutch high school, focusing on two types of biases in automated decision-making: automation bias, where humans rely too much on algorithmic results, and selective adherence to algorithmic advice. de Bruijn *et al.* (2022) scrutinized the use of algorithms for immigration control in the UK, where the algorithm decides which groups of immigrants need more detailed investigation. de Bruijn *et al.* (2022) noted that this might challenge equal treatment and lead to discrimination against certain groups of immigrants. Goggin and Soldatic (2022), who examined automated decision-making in social services through the example of "Robodebt," a debt-recovery system, emphasized the importance of digital inclusion and equality for people with disabilities.

The analysis of automated decision-making for citizen services illustrates that transparency is the most highlighted public value in the collected research, followed by trust, discrimination and impartiality (Figure 2). Advocates of automated decision-making often emphasize how automation can increase productivity, efficiency and contribute to a fairer

and less-biased decision-making process. Values related to productivity and efficiency are less visible in the analysis.

5. Discussion

5.1 The entanglement of humans and algorithms

The collection of research illustrates how automated decision-making includes fully automated decisions as well as the use of algorithms supporting different parts of the decision-making process. This sometimes makes it difficult to unpack the role of the algorithm. The consultation with the stakeholder from the Swedish Digital Agency stressed the importance of strengthening citizens' decision-making power. They base their work a life-event perspective, where the vision is to offer seamless digital services irrespective of the actors involved for core life events such as death of a relative.

In an algorithmic society (Peeters and Schuilenburg, 2021), decision-making shifts toward standardized classification processes and away from individualized judgments, reducing the space for professional discretion. Although algorithms are often intended to support rather than replace human judgment in decision-making, there remains a risk that decision-makers will over-rely on computational outputs, even in situations where they still have discretion to intervene. There are hopes that automated decision-making and algorithmic decision support will make public decisions affecting citizens more efficient, less biased and fairer by minimizing human judgment. Busch and Henriksen (2018) emphasize the significance of "digital discretion," where automated processes and analytical systems increasingly substitute, or even fully replace, human judgment. This ongoing shift reshapes not only the relationship between citizens and the state but also redefines the role of street-level bureaucrats and the very notion of professional discretion. Referring to this development as "digital discretion" implicitly attributes an active, decision-making role to algorithms. Yet discretion itself cannot be digital; it represents the autonomy of the professional, drawing on their expertise and experience when making judgments. Although algorithmic outputs may inform and support such judgments, the central challenge lies in determining how human discretion and algorithmic assistance should be balanced. Because human decision-makers and algorithmic systems are increasingly intertwined, it becomes "[…] unclear where the line lies between human discretion and automation" (van Toorn and

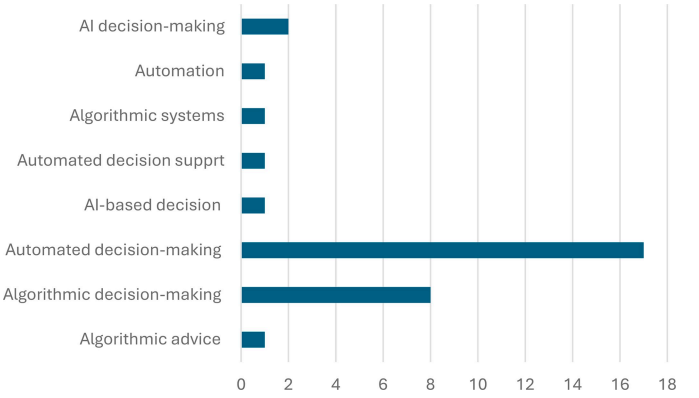

Figure 2. Conceptualizations in research on automated decision-making

Carney, 2024, p. 10). This interdependence is precisely what characterizes the notion of "digital discretion." Even when algorithms are embedded within human decision-making processes, it remains crucial to analytically distinguish between the two. Doing so prevents the algorithm's role from becoming obscured and helps clarify the scope of responsibility held by human decision-makers.

5.2 The values of automated decision-making

The review demonstrates that the values emphasized across studies vary according to the specific welfare application examined. Public values and automated decision-making are thus situated and in interplay with the surrounding context. Moreover, the context of this complex decision-making process is public administration, with its own logics; and type of service and application (e.g. social service, automated speeding control) under investigation varies. Country context is also important, as different countries have different institutional arrangements including types of services they provide to citizens.

Busch and Henriksen (2018) argue that digital discretion removes personal biases from decision-making, thereby better supporting ethical and professional values in the decision-making process. However, there are a few studies focusing on efficiency and productivity in relation to the use of algorithms in automated decision-making research. Scholarly attention has largely focused on the potential risks associated with algorithmic use, while comparatively fewer studies examine the underlying values, such as efficiency and productivity, that initially are used to legitimize the adoption of algorithms in the decision-making processes.

Another value missing from research articles is citizen resourcefulness and power over one's own life situation. From the consultation, we learned that the Agency for Digital Government is conducting pilot projects that use AI to gather reliable information and deliver it as personalized guidance for navigating challenging life situations, for example clarifying what support or benefits citizens may be entitled to. This initiative is intended to simplify the application process for individuals with limited governmental literacy and, more broadly, for all citizens. By providing a personalized interface, it also aims to enhance inclusion. Within this initiative, automated decision support will facilitate access to information by shifting interpretive work, supported by structured and trustworthy government resources, closer to the citizen. Such support can be particularly valuable in stressful circumstances, such as managing administrative tasks following the death of a family member.

6. Conclusion

So, what role do algorithms play in research on automated decision-making in relation to government services for citizens? Our analysis of the reviewed literature indicates that their role varies considerably depending on the specific application and the institutional context. Public values are shaped by the service domain, the nature of the application and the organizational setting. This is evident in concerns about discrimination risks when facial recognition is used for identification (e.g. Cetina Presuel and Martinez Sierra, 2024) or for predicting recidivism (de Bruijn *et al.*, 2022).

Automated decision-making is embedded in broader decision processes, and the term may refer either to algorithmic tools that support human decision-makers or to fully automated systems. The literature uses concepts such as "automated decision-making," "algorithm-based decision-making" and "robotic process automation" inconsistently, reflecting a lack of conceptual clarity.

Much of the existing research provides limited detail about the technologies involved, the institutional environments in which they operate, and the specific stages of the decision-making process where they are applied. The review also shows that certain countries, most notably Australia, The Netherlands and China, are overrepresented in this research domain, while many others are scarcely addressed or altogether absent.

These gaps make it difficult to fully understand how automated decision-making functions in practice. Although providing such detail within individual research articles can be challenging, there is a need for more qualitative, in-depth empirical studies to capture the complexity of these systems. Many of the reviewed articles raise similar concerns, creating a risk of "following the followers" and overlooking more provocative or consequential questions. Broader interdisciplinary engagement is essential for challenging existing assumptions, generating new questions and deepening our understanding of automated decision-making.

Most studies adopt a public administration perspective, with far fewer exploring the experiences of citizens. Balancing these perspectives is crucial for understanding how automated decision-making is used in practice and for identifying the needs of citizens, both those of today and those of tomorrow. Given that these systems will remain part of public administration for years to come, research must also consider the expectations and experiences of future citizens.

The varying role of algorithms across domains underscores the need for clearer transparency about how automation is applied within different institutional settings, application domains and decision-making processes. Public organizations should communicate where algorithms support human judgment and where decisions are fully automated. The result from the analysis, therefore, raises a need for important policy implications addressing transparency, literacy, accountability and citizen empowerment. The first policy implication concerns the placement and use of algorithms within decision-making processes. Public organizations must be transparent about when decisions are fully automated and when algorithms provide decision support. Such openness helps prevent the "black-boxing" of algorithmic influence and keeps responsibility visible for both human decision-makers and citizens. Disclosing algorithmic logic, data sources and decision pathways is central for trust and accountability. Second, policies must safeguard professional discretion. Although algorithms can guide decisions, over-reliance risks weakening the autonomy and expertise of street-level bureaucrats. Clear guidelines and training are, therefore, needed to support critical assessment of algorithmic recommendations. Third, digital (including cybersecurity) and governmental literacy should be prioritized. Automated systems must not only improve administrative efficiency but also help citizens navigate complex life events. Personalized, trustworthy guidance tools should be implemented through inclusive and accessible policy frameworks. Fourth, ethical and fairness considerations must guide algorithmic design and deployment. Policy frameworks should ensure compliance with core public values such as equity, transparency and accountability. Finally, governance models should incorporate citizen feedback to balance administrative goals with lived experiences. Doing so ensures that automated decision-making systems evolve in line with the needs of present and future citizens.

7. Limitations and future research

One limitation of this research is that the literature largely reflects automated decision-making in Western contexts. Although a 2025 search showed growing interest in other regions, this was not an intentional focus but rather mirrors the current research landscape on citizens' perspectives in public sector automation. Another limitation is the small number of included articles, which may stem from the search string that emphasized citizen-focused

automated decision-making; a broader interpretation of "citizen" could have yielded different results.

A further limitation concerns the difficulty of assessing the role of algorithms, as many studies discuss empirical material at a general level. To better understand human–machine relations, more attention is needed to the specific technologies involved.

Future research could include a more in-depth analysis of automated and algorithmic decision-making across different domains, institutions and countries.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author used Copilot for language check and light editing for readability and word limitation purposes. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published article.

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Corresponding author

Karin Hedström can be contacted at: karin.hedstrom@oru.se

Table A1. The role of the algorithm in automated decision-making of citizens services

Article	Labeling of ADM	Role of the algorithm	Public value	Type of service and application	Country-based examples
Alon-Barkat and Busuioc (2023)	Algorithmic advice	Evaluation as part of human decision-making	Discrimination	Hiring process in schools	The Netherlands
Aysolmaz *et al.* (2023)	Algorithmic decision-making	Preparation as part of human decision-making	Fairness, accountability, privacy, transparency and trust	Tax declaration	The Netherlands
Bouwmeester (2025)	Automated decision-making	Detection and prediction as part of human decision-making. Fully automated decision-making with automatic dispatch notice	Rule of law	Childcare benefit Repayment of unemployment benefits (Robodebt)	The Netherlands, Australia
de Bruijn *et al.* (2022)	AI-based decisions algorithmic decision-making	Detection and prediction as part of human decision-making	Explainability, impartiality and discrimination	Risks analysis of fraud in the social domain (System Risk Identification) Immigration control Recidivism	The Netherlands, USA, UK
Busch (2023)	Automated decision-making	Fully automated decision-making including automatic dispatch notices. Prediction as part of human decision-making	Trust	Automated speeding control Recidivism Monetary benefits	N/A (MTurk)
Cetina Presuel and Martinez Sierra (2024)	Automated decision-making AI-based decision-making	Identification, detection and prediction as part of human decision-making	Privacy, transparency, discrimination and impartiality	Detection of welfare and tax fraud Risk analysis of fraud in the social domain (system risk indication) Facial recognition Predictive policing Recidivism or the perceived risk of alleged criminals	Netherlands, USA, Spain
Flügge (2020)	Algorithmic decision-making	Fully automated decision-making. Advising as part of human decision-making	Transparency and trust	Job placement Application for health service declaration	Denmark

(*continued*)

Table A1. Continued

Article	Labeling of ADM	Role of the algorithm	Public value	Type of service and application	Country-based examples
Fountain (2022)	Automated decision-making	Identification and prediction a part of human decision-making	Discrimination	Facial recognition Predictive policing	UK, USA, Serbia, China, EU
Goggin and Soldatic (2022)	Automated decision-making	Fully automated decision-making with automatic dispatch notice	Inclusion and equality	Social and welfare services Welfare debt-recovery program (Robodebt)	Australia
Grimmelikhuijsen (2023)	Automated decision-making	Fully automated decision-making with automatic dispatch notice. Detection and prediction as part of human decision-making	Accessibility, transparency, explainability and trust	Visa application Suspected welfare fraud	The Netherlands
He and Zhang (2025)	Algorithmic decision-making	Detection, prediction and identification as part of human decision-making	Citizens' fundamental rights (emphasis on privacy, transparency, explainability)	Judicial assistance systems Predictive policing Facial recognition Fraud detection Welfare debt-recovery program (Robodebt)	China, USA, The Netherlands, Australia
Hillo *et al.* (2025)	Automated decision-making	Prediction as part of human decision-making. Fully automated decision-making	Legitimacy, transparency, discretion	Child protection services	Finland
Kaun *et al.* (2025)	Automated decision-making	Profiling, prediction and identification as part of human decision-making	Social justice and transparency	Unemployment service Child welfare Facial recognition	Estonia, Germany, Sweden
Kuziemski and Misuraca (2020)	Automated decision-making automated decision support	Detection, profiling and preparation as part of human decision-making	Trust and legitimacy	Immigration process and control system Employment service	Poland, Canada, Finland
König *et al.* (2024)	Algorithmic decision-making	Prediction as part of human decision-making		Prediction of burglaries	Germany

(*continued*)

Table A1. Continued

Article	Labeling of ADM	Role of the algorithm	Public value	Type of service and application	Country-based examples
			Transparency, effectiveness and engagement		
Iunes Monteiro (2025)	Algorithmic systems	N/A	Accountability	Surveillance systems High-risk systems	USA, Brazil
Marienfeldt (2025)	Automated decision-making	Fully automated decision-making. Detection as part of human decision-making	Meaningfulness	Vehicle registration Building permits Tax authorities	Germany
Masso *et al.* (2024)	Automated decision-making	Prediction as part of human decision-making	Effectiveness, discrimination and privacy	Forecast future criminal activities Identify potential crime locations	Estonia, Sweden
Nguyen *et al.* (2025)	Automation	Evaluation as part of human decision-making	Efficiency effectiveness governance	Pre-employment card Program (Program Kartu Prakerja [PKP])	Indonesia
Palukka *et al.* (2025)	Algorithmic decision-making	Fully automated decision-making with automatic dispatch notice when decisions are undisputable	Social and digital exclusion distrust	Welfare benefit eligibility	Finland
Ranerup and Henriksen (2019)	Automated decision-making	Conditionally automated decision-making	Professionalism, efficiency, service and engagement	Social service (economic support)	Sweden
Ranerup and Svensson (2022)	Automated decision-making	Conditionally automated decision-making. Decision support	Professionalism, efficiency, service and engagement	Social service (economic support)	Sweden
Rinta-Kahila *et al.* (2021)	Algorithmic decision-making	Fully automated decision-making with automatic dispatch notice	Social destruction	Automated debt calculation and collection scheme (Robodebt)	Australia

(*continued*)

Table A1. Continued

Article	Labeling of ADM	Role of the algorithm	Public value	Type of service and application	Country-based examples
Roehl and Crompvoets (2025)	Automated decision-making	Conditionally automated decision-making with automatic dispatch notice. Advising as part of human decision-making	Good administration (e.g. transparency, comprehensibility, quality of decision-making)	Illness benefits Work retention Agricultural subsidies Property value assessment	Denmark
Suter (2020)	Algorithmic decision-making AI decision-making	Evaluation as part of human decision-making	Transparency	Social credit system	China
van Toorn and Carney, 2024	Algorithmic decision support automated decision-making algorithmic decision-making	Profiling as part of human decision-making	Fairness, accountability, transparency and participation	Individualized welfare support plans	Australia
Thommandru *et al.* (2025)	Algorithmic decision-making	Detection and prediction as part of human decision-making	Privacy rights, transparency, accountability	Border control	EU
Wang *et al.* (2023)	Algorithmic decision-making	Fully automated decision-making suggestion as part of human decision-making	Impartiality	Epidemic prevention and control (health code app) Sentencing suggestions	China
Wang (2025)	Algorithmic decision-making	Advise as part of human decision-making	Privacy, transparency, technological trust	Policy matching and personalized services	China
Wihlborg *et al.* (2016)	Automated decision-making	Conditionally automated decision-making	Rules of law, legitimacy and professional values	Application for driver license permits	Sweden