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Røhl, Ulrik B. U.; Hansen, Morten Balle

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Automated, administrative decision-making and good governance: Synergies, trade-offs, and limits

Ulrik B. U. Roehl¹  | Morten Balle Hansen² 

¹Department of Digitalization, Copenhagen Business School, Frederiksberg, Denmark

²Department of Political Science and Public Management, University of Southern Denmark, Odense, Denmark

Correspondence

Ulrik B. U. Roehl, Department of Digitalization, Copenhagen Business School, 60 Howitvej, DK-2000 Frederiksberg, Denmark.
Email: ubur.digi@cbs.dk

Abstract

Automated, administrative decision-making (AADM) is a key component in digital government reforms. It represents an aspiration for a better and more efficient administration but also presents challenges to values of public administration. We systematically review the emerging literature on use of AADM from the perspective of good governance. Recognizing the inherent tensions of values of public administration, the broad review identifies key synergies, trade-offs, and limits of AADM and good governance associated with nine values: Accountability, efficiency, equality, fairness, resilience, responsiveness, right-to-privacy, rule-of-law, and transparency. While synergies represent “low-hanging fruits”, trade-offs and limits are “hard cases” representing challenges to good governance. Taking the specific decision-making context into account, practitioners and scholars should attempt to nurture the “fruits” and lessen the tensions of the “hard-cases” thereby increasing the desirable societal outcomes of use of AADM.

Evidence for practice

- Public authorities employing automated, administrative decision-making as well as relevant regulators must be aware of the inherent synergies, trade-offs, and limits vis-à-vis good governance.
- Six synergies of automated, administrative decision-making and good governance are identified. They represent the advantages of both automated decision-making and good governance. Such advantages are particularly associated with values of efficiency, equality, rule-of-law, and transparency.
- Eleven trade-offs and limits of automated administrative decision-making and good governance which must be balanced to support good governance are identified. Particular attention should be given to values of accountability, fairness, resilience, responsiveness, resilience, and right-to-privacy.

INTRODUCTION

Half a century ago, Herbert Simon (1973, 269) predicted that people will be “...more and more an observer, moderator, maintenance man, and repairman for a nearly autonomous process that can carry on for significant intervals of time without direct human intervention.”

Simon’s prediction has since been confirmed by increasing reliance on information and communication technology (ICT) in public administration and in society at large across the globe.

One trend is the accelerating use of automated decision systems that support and increasingly make formal administrative decisions (sometimes labeled “algorithmic decisions” or “smart decisions”). Such automated decision-making has been praised as a solution to several problems of public administration (e.g., Kuziemski & Misuraca, 2020), but has also been criticized for creating new problems (e.g., Eubanks, 2018).

This article conducts a systematic, critical-integrative review (George et al., 2023) of the literature concerning use of *automated, administrative decision-making* (AADM) through the prism of *good governance*.

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Administrative decisions are central to public administration as it is through those legally binding decisions that public administrative bodies decide on what is lawful or not in specific cases in relation to individuals or firms (collectively labeled addressees)^{1,2}. Administrative decisions cover a wide spectrum of decisions both beneficial to addressees (e.g., granting unemployment benefits or childcare benefits) and restrictive (e.g., denial of permission to build a house or denial of parole).

We define AADM as administrative decision-making that is partly or fully based on automated outputs generated by algorithmic systems that incorporate relevant regulations of a given policy area. Such decision-making ranges on a continuum from semi-automated (the final decision being made by a public servant based on assistance from the system) to fully automated (the final decision being made by the system). In practice, the use of AADM often combines semi and fully-automated instances and is based on combinations of simple and advanced technologies. (Peeters, 2020; Roehl, 2022).

Administrative decision-making is a very tangible manifestation of public authority while values of good governance provide an important basis for the legitimacy of this authority. Assessing the pros and cons of its increasing automation through values of good governance therefore represents an important and meaningful basis for an informed understanding of its automation.

Drawing on the voices of Francis Fukuyama, Christopher Hood, Bo Rothstein, and Robert I. Rotberg, we elaborate an understanding of good governance as an institutional and administrative order of government characterized by values of fairness, rule-of-law, accountability, efficiency, and resilience.

Good governance implies tensions between different public values (Perry et al., 2014). Hood (1991), for example, stresses the inherent tensions between efficiency, fairness, and resilience while Pollitt and Bouckaert (2017) emphasize the trade-offs and paradoxes that contradictory values tend to produce. To analyze the relations and tensions of AADM and good governance, we introduce the concepts of synergies, trade-offs, and limits. A synergistic relation describes how the use of AADM may enhance the values of good governance. A trade-off describes how use of AADM may diminish the values of good governance. Limits describe situations where the use of AADM beyond a certain threshold or limit substantially changes the relation to values of good governance.

Scholars predict that the use of AADM will increase in both scope and depth due to advances in, for example, data processing capacity and machine learning techniques (Juell-Skielse et al., 2022). Empirical examples of use of AADM are widespread: The fully automated, now defunct, OCI debt recovery system in Australia is a high-profile example (Carney, 2018) while a more mundane one is the semi and fully-automated decision system used by the Swedish Transportation Agency to assess driver license applications (Andersson et al., 2018).

The increasing use of AADM is mirrored by a growing academic literature. Despite advances, research is specialized and scattered across disciplines (Peeters, 2020), and themes and findings tend to diverge. Some scholars implicitly touch upon issues of good governance; even so, their contributions primarily focus on singular advantages or disadvantages of AADM and not on understandings of good governance. Based on a review of existing literature, this article explicitly uncovers tensions between increasing use of AADM and values of good governance, by addressing the following research question: *How do the use of AADM and good governance relate, and to what extent do the relations represent synergies, trade-offs or limits?*

Employing core understandings from the public administration literature, the article builds on a systematic review of literature within social sciences including specialized sub-disciplines such as Critical algorithm studies, eGovernment, and Information systems. We synthesize the literature by identifying key synergies, trade-offs, and limits between the use of AADM and nine key values of good governance.

Providing a holistic review of the discussion of the use of AADM, the article not only contributes with a broad overview of an emerging literature but also points to necessary balances between the use of AADM and different values of good governance. The review thus not only provides impetus for further research but also direct public administration practitioners to particular attention points when employing AADM.

GOOD GOVERNANCE AND AUTOMATED, ADMINISTRATIVE DECISION-MAKING

The subject of good governance is both an ancient one (Griffith & Ferrari, 2000), an influential and criticized reform agenda promoted by the World Bank (Grindle, 2004), and an academic debate concerning what constitutes good governance (Perry et al., 2014) and how it relates to public value (Moore, 1997). The purpose here is not to review this substantial literature, but to extract broadly accepted values of good governance that are particularly relevant to use of AADM.

The literature contains both lengthy and short suggestions of values ranging from 73 public values (Jørgensen & Bozeman, 2007) to attempts to reduce good governance to a few prime values (e.g., Fukuyama, 2013). We attempt to strike a middle ground. Firstly, a list of values should not be too long to make the analysis infeasible but include those values that are particularly relevant to the use of AADM and the exercise of public authority it entails. For instance, in his seminal article, Rosenbloom (1983) shows that public administration operates in a tension between three approaches: Legality, efficiency, and political feasibility. Due to the definition of AADM in the above, political feasibility is excluded from our list. Secondly, the list should recognize the complexity of public administration and include contradictory values that may produce trade-offs and paradoxes (Pollitt & Bouckaert, 2017).

We draw particularly on the writings of Fukuyama, Hood, Rotberg, and Rothstein³ and emphasize eight values of good governance particularly relevant to AADM which we categorize into five broad groups as shown in Box 1. Taken together, those four authors illustrate the variation in relevant understandings of good governance just as they are widely cited. Although the exact meaning of the values varies across traditions and contexts, they are largely uncontroversial and broadly, if not globally, accepted basis for good governance.

The first group includes *accountability, transparency, and responsiveness*, which—at their core—can be said to focus on the relationship between government and citizens. Accountability broadly entails public authorities being accountable for their actions (Bovens, 2010). Fukuyama stresses the importance of political accountability and ties it to governments being responsive to their citizenry: Administrative bodies need “considerable feedback and criticism from the citizens that it is trying to service.” (Fukuyama, 2013, 357).

Secondly, *efficiency* is recognized by all four authors as a key value to good governance. Rothstein is very clear regarding his priority, though: Over time, the below-mentioned value of impartiality is always preferable to efficiency (Rothstein & Teorell, 2008). Hood and Dixon (2016) offer a more balanced view: While “prudent management” is central, it must realistically be traded-off with other values not giving priority to any of them by default.

Thirdly, *fairness* and *equality* are included. Hood (1991, 11) speaks of rectitude as a “standard of success” related to the broad value of fairness. Fukuyama, Rotberg, and Rothstein correspondently emphasize equal treatment and impartiality as central values of good governance with the latter arguing impartiality as the defining characteristic of good governance (Rothstein & Teorell, 2008). Impartiality is also closely associated with avoiding corrupt practices in administrative decision-making. A particular aspect of fairness is the differentiation between equality and equity where the latter implies a sensitivity to variations in opportunity and need (Frederickson, 1990).

Fourthly, *resilience* is particularly relevant to AADM as it allows government to function in time of “‘worst case’ conditions and to adapt rapidly in a crisis” (Hood, 1991). Major “disruptions” like Covid-19 and Russia’s attack on Ukraine in 2022 have led to a renewed focus on resilience; however, the value can also be associated with continued administrative decision-making during, for example, cyber-attacks or technical breakdowns.

Finally, *rule-of-law* is emphasized by all four authors as general, predictable, recognizable rules and methods that are “...consistently applied to everyone” (Rothstein & Teorell, 2008, 181). This focus also includes the principle of legality. Specifically, administrative bodies must only make decisions with legally binding consequences if the body has been duly authorized to do so by law (Ziller, 2012).

BOX 1 Values of good governance particularly relevant to use of automated, administrative decision-making (AADM).

Accountability, transparency, and responsiveness

Efficiency

Fairness and equality

Resilience

Rule-of-law

TRADE-OFFS, SYNERGIES AND LIMITS

To understand relations between AADM and good governance, we draw on the tradition of values of public administration as inherently contradictory: Hood (1991) argues that any administrative design—for example, increased reliance on AADM—hardly ever satisfies all such values. Writing in the same tradition, Pollitt & Bouckaert (2017, 188) assert that “...the wonders of ICTs [do not] dissolve the need to balance, choose and recognize limits within public administration”.

To operationalize the relations, we rely on the concepts of trade-offs, synergies, and limits (Pollitt & Bouckaert, 2017). As there are no broadly agreed understandings of the three concepts, Table 1 gives an overview of the definitions employed here.

Synergies describe situations where two or more elements work together in a manner producing an increase of both elements⁴. A prime example regards the reduced involvement of public servants in administrative decision-making due to AADM which may not only increase impartiality but may also support efficiency.

Trade-offs describe a compromise between two desirable but mutually contradictory elements. For instance, use of AADM may support efficiency while simultaneously relying on high-volume data as a basis for the decision-making. As such data risks being biased, use of AADM may lead to diminishment of equal treatment.

Limits describe situations where a further increase or decrease of one element changes the relation substantially. Limits occur in conjunction with trade-offs and sometimes synergies. For instance, use of AADM for administrative decisions of low complexity may increase transparency as results are easy to understand; even so, use of AADM for administrative decisions of high complexity (and potentially fueled by unsupervised machine learning) may reach an unacceptable limit where intelligible reasons for decisions cannot be provided.

DATA AND METHODS

Studies of relations between AADM and good governance are growing in number and span several academic

TABLE 1 Definitions of trade-offs, synergies and limits^a.

Concept	Definition
Synergy	Increase of one desired element (A) leads to the increase of another desired element (B) thus producing an increase of both elements.
Trade-off	Increase of one desired element (A) leads to the diminishment of another desired element (B).
Limit	A point beyond which further decreases (or increases) of one element (A) changes the relation with another element (B) substantially.

^aInspired by Cambridge Dictionary (2021); Oxford English Dictionary (2021); and Pollitt and Bouckaert (2017).

disciplines. Systematic, critical-integrative reviews can help uncover research gaps on emerging phenomena across disciplines (Webster & Watson, 2002) suggesting new understandings (George et al., 2023). Based on our research question, we performed a systematic literature review drawing on the PRISMA guidelines (Moher et al., 2009) with supplementary inspiration from Webster and Watson (2002). The search protocol, search strings, and analytic codes are provided in Appendix C.

Data collection

All literature searches are characterized by an assessment of sensitivity (identifying all relevant studies) and specificity (filtering out irrelevant studies) (Rogers et al., 2020). Due to the emerging nature of the literature, we chose a broad, holistic search strategy that initially prioritized sensitivity over specificity.

As content-related inclusion criteria for the review, we focused on articles⁵ examining relations between values of good governance and elements of AADM and subsequently—following the broad search strategy—between values of good governance and elements of digital government akin to AADM. As there is no consensus in the literature on the nature of AADM, we employ the term “possible elements of AADM” to indicate emerging arguments found in the literature rather than “proven” causal relations. It occasionally proved difficult to determine the types of automated decisions (e.g., administrative decisions, service delivery decisions, or policy decisions) articles examined as this was often rather vaguely described. Articles therefore had to be assessed several times to establish their match vis-à-vis types of automated decisions.

Articles substantially examining relations as explicit or implicit in their results, claims or arguments (typically placed in findings, discussion or conclusion sections) were included. Peripheral mentioning, or relations described solely as initial presumptions, or postulates led to exclusion. We further included articles examining relations between AADM and values of good administration understanding the latter concept as a sub-concept to good governance (Koivisto, 2014). As quality appraisal criteria we solely

included articles of peer-reviewed journals and book chapters of well-established academic publishers. Finally, we included empirical, conceptual, and theoretical articles.

We aimed to identify relevant research literature from more than two decades (Jan 1, 2000–June 30, 2023) within social sciences written in English. We expected that ideas of relations between AADM and good governance matured during this period. The search was based on combinations of search terms related to “Automated, administrative decisions”, “Digital government”, “good governance” and “Good administration”.

Three search methods were employed: (I) A structured keyword search of the Scopus and Web of Science databases within all disciplines of social sciences; (II) A forward citation search as suggested by Rogers et al. (2020) in Scopus and Web of Science identifying literature citing the key sources on good governance discussed earlier in combination with “Automated, administrative decisions” and “Digital government”, respectively; and (III) A peer supplement method identifying omitted records based on existing knowledge of the authors and their colleagues (akin to advice from well-informed individuals as suggested by Badger et al. (2000)). Although the latter methods risk reinforcing existing understandings, we chose them as “pragmatic safety valves” supplementing the keyword search method in an evolving body of literature. In total, the search generated 2911 possible articles for inclusion after duplicates, faulty results, and so forth, were removed⁶.

The articles were initially screened for eligibility based on a manual assessment of headlines, keywords, and abstracts. As a final step and where in doubt, full-text versions of the articles were assessed against the inclusion criteria based on abstract, introduction, findings, and conclusion, and—if necessary—the entire text. As illustrated in Figure 1 this led to 104 articles being included in the analysis.

Data analysis

The selected articles were initially coded via application of an open list of codes describing both possible elements of AADM or of digital government akin to AADM, and approximate values of good governance. If applicable, articles were further coded for contextual factors just as each article was registered with key properties (see Appendix C for full code book). All coding was done by the first author who discussed doubts with the second author.

In the next step, a consecutive round of coding took place based on a refinement of the open codes of the first round (Saldaña, 2013). Codes of elements of AADM required simple systematization that aimed at comparison and parsimony. For codes of good governance, we primarily relied on values stressed by Fukuyama, Hood, Rothstein, and Rotberg as discussed previously.

We identified and categorized relations of AADM and good governance inspired by the technique of axial coding (Bernard et al., 2017). This led to the identification and

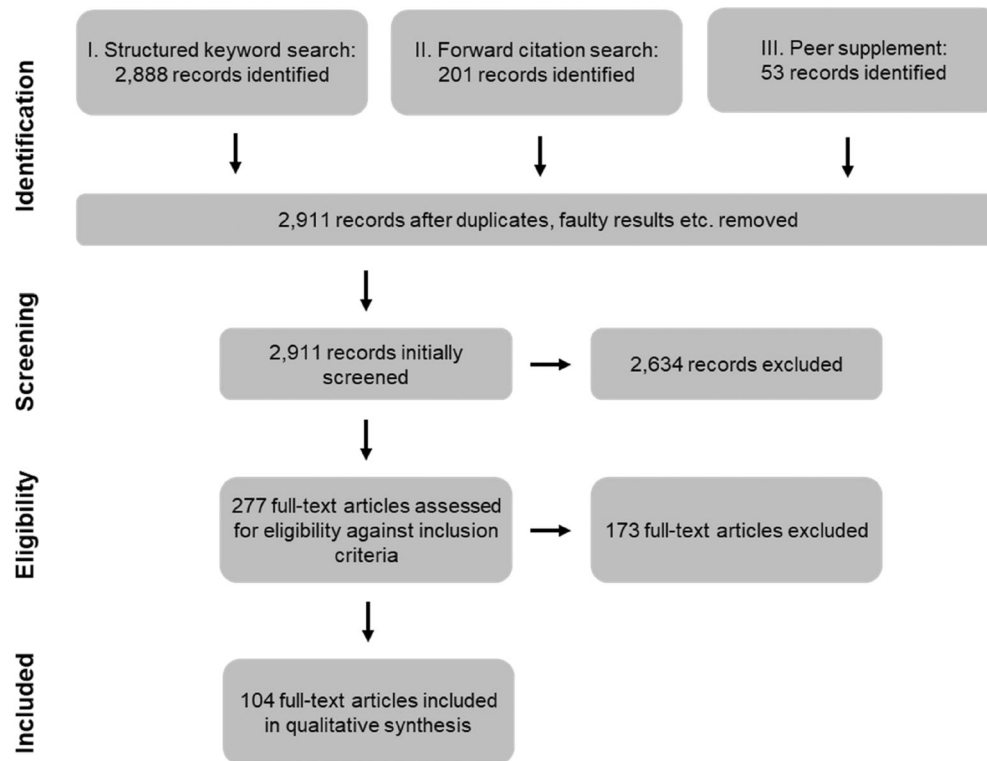


FIGURE 1 Data collection flow chart; inspired by Moher et al. (2009).

refinement of the trade-offs, synergies, and limits described and discussed in the next sections. Each of those served as a top-level code and was assigned a higher-level value of good governance thereby ending the coding process.

FINDINGS

In this section, we analyze the main characteristics of the reviewed literature (Appendix A contains detailed relation matrixes of synergies, trade-offs, and limits)⁷.

Of the 104 articles reviewed, 83 are journal articles, and 21 are books or book chapters. A complete list is given in Appendix B. The journal articles are distributed across 58 journals with *Government Information Quarterly* being the most frequent. The academic disciplines of public administration, law, and information systems are most dominant. 39 of the articles is empirical in the sense of relying on collected data, and of those approx. two-thirds employ qualitative research methods. The number of articles varies over the reviewed period and shows an increase towards the end of the period as illustrated in Figure 2.

Synergies

Table 2 describes six overall synergies identified in the reviewed literature and listed with exemplary articles and

number of associated articles. These are relations where increased use of AADM is argued to support good governance. The synergies tend to revolve around use of AADM and four values of good governance: Equality, rule-of-law, transparency, and efficiency.

Two synergies are associated with *equality*. Authors argue that AADM may increase impartiality (SYN-1A) and prevent corruption (SYN-1B) due to reduced involvement of public servants in the decision-making process.

The basic argument related to both synergies SYN-1A and SYN-1B in the literature is the one put forward by Twizeyimana and Andersson (2019, 171): semi and fully AADM is seen as having the potential to reduce or remove the role of public servants in the decision-making process, by "...embedding rules in the software, thus, reducing or eliminating the risk of corruption and abuse of the law by public servants...". Other scholars stress the same element of AADM pointing to equal treatment of comparable cases and impartiality of public authorities as advantages (e.g., Borry & Getha-Taylor, 2019). Solely related to SYN-1B, authors also discuss how increased managerial control mechanisms prevalent in many automated decision systems (i.e., log files, user patterns) may reduce corruption (e.g., Shim & Eom, 2008).

One synergy (SYN-2A) is associated with *rule-of-law*. Scholars argue that AADM may increase the consistency and quality of administrative decisions due to the confinement of administrative discretion traditionally enjoyed by public servants.

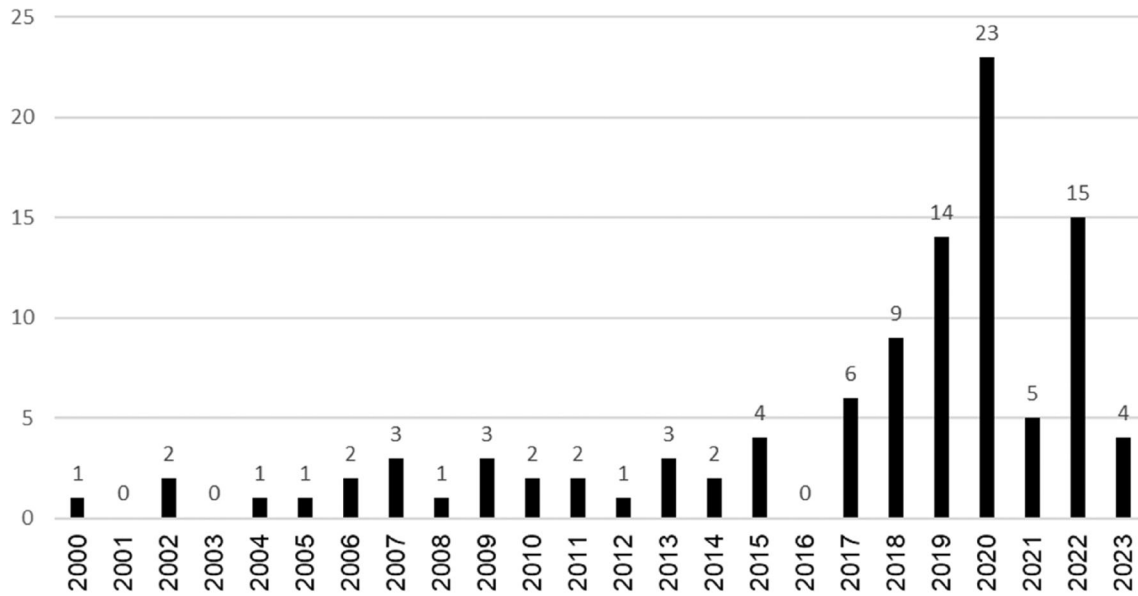


FIGURE 2 Distribution of reviewed articles across year of publication ($N = 104$); data for 2023 represents first 6 months.

TABLE 2 Summary relation matrix; synergies (SYN) of automated, administrative decision-making (AADM) and values of good governance including exemplary articles and number of related articles. Synergies are further detailed in Appendix A.

Value	#	Synergy	Exemplary article	Number of articles
Equality	SYN-1A	Reduced human involvement due to AADM increases impartiality.	Borry & Getha-Taylor, 2019	5
	SYN-1B	Reduced human involvement due to AADM prevents corruption.	Twizeyimana & Andersson, 2019	16
Rule-of-law	SYN-2A	Confinement of discretion due to AADM increases consistency.	Carnis, 2007	23
Transparency	SYN-3A	Improved access to information due to AADM increases transparency.	Gupta et al., 2018	3
	SYN-3B	Codification of service standards due to AADM informs addressees' expectations.	Kettani et al., 2009	7
Efficiency	SYN-4A	Reduced costs of operation due to AADM increases efficient administration.	Pūraitė et al., 2020	26

In the reviewed literature, focus is on how automation of some or all elements of administrative decision-making—that is, collecting relevant information regarding the case in question, identifying relevant legal rules, evaluating information vis-à-vis legal rules, and choosing a course of action—based on pre-defined algorithmic rules reduces room for administrative discretion. This reduces the scope for errors, personal mood, and biases as well as other mistakes and irrelevant considerations and thereby supports consistent, high-quality, and predictable decision-making (e.g., Carnis, 2007).

Two synergies are associated with *transparency*. Scholars argue that AADM may improve addressees' access to information and serve as a basis of administrative decisions (SYN-3A). AADM may additionally give rise to the codification of manifest service standards by administrative bodies (SYN-3B).

Use of AADM does not in itself improve addressees' access to information (data) serving as the basis of decisions, but articles pooled under SYN-3A see it as logical for administrative bodies to provide addressees access to highly structured information stored in governmental databases, possible choices and so forth, on which automated decisions are often based (e.g., Gupta et al., 2018).

Articles pooled under SYN-3B argue authorities' publication of manifest service standards (e.g., maximum processing deadline) is a likely consequence of AADM (e.g., Kettani et al., 2009) and thus improves transparency for addressees.

The final synergy (SYN-4A) is associated with *efficiency*. Scholars argue that AADM may reduce operational costs of public administration just as it makes it possible to up and down scale operations in a flexible manner according to changing societal demands.

TABLE 3 Summary relation matrix; trade-offs (TRA) and limits (LIM) of automated, administrative decision-making (AADM) and values of good governance including exemplary articles and number of related articles. Trade-offs and limits are further detailed in Appendix A.

Value	#	Trade-off/limit	Exemplary article	Number of articles
Fairness	TRA-1A	Confinement of discretion due to AADM undermines the principle of equity.	Bovens & Zouridis, 2002	25
Equality	TRA-2A	Data bias due to AADM undermines equal treatment.	Eubanks, 2018	24
	TRA-2B	De facto restrictions in access to public services due to AADM undermines equal access.	Helbig et al., 2009	12
Rule-of-law	LIM-3A	Fettering of discretion due to AADM undermines legality of decisions.	Cobbe, 2019	9
	LIM-3B	Reliance on irrelevant considerations due to AADM undermines lawfulness of decisions.	Oswald, 2018	8
Accountability	TRA-4A	Opacity due to AADM undermines systemic arrangements of accountability.	Smith et al. 2010	35
	LIM-4B	Opacity due to AADM undermines ability to provide reasons for decisions.	Cobbe, 2019	31
Responsiveness	TRA-5A	Simplification of communication and so forth due to AADM undermines avenues for feedback.	Lindgren et al., 2019	6
	TRA-5B	Intertwined and opaque government ICT networks underlying AADM undermines addressees' ability to contest decisions and their underlying data.	Widlak & Peeters, 2020	17
Right-to-privacy	TRA-6A	Reliance on "big data" due to AADM undermines citizens' privacy.	Hardy, 2020	16
Resilience	TRA-7A	Reliance on high-volume data and automated processes undermines administrative bodies' ability to protect administrative decision-making processes against cyber-security threats.	Cuéllar, 2017	6

Although not undisputed, the basic notion is that the marginal cost (the cost added by "producing" one additional decision) is close to zero when applying AADM. While costs of procuring and implementing automated decision systems might be considerable, the articles thus argue that operational costs of AADM usage are low and the decision-making process is fast compared to manual forms of administrative decision-making (e.g., Pūraitė et al., 2020).

Trade-offs and limits

Trade-offs are relations where use of AADM is argued to undermine one or more values of good governance. Some trade-offs represent the crossing of a limit (identified with the prefix "LIM") beyond which the use of AADM is argued to change the relation to good governance substantially. Table 3 describes the 11 trade-offs and limits identified in the literature. The identified trade-offs and limits revolve around the use of AADM and six values of good governance: Fairness, equality, rule-of-law, accountability, responsiveness, right-to-privacy, and resilience.

One trade-off is associated with *fairness* as authors argue that AADM may undermine equity due to confinement of discretion (TRA-1A).

Articles discussing TRA-1B cover a stream of literature increasingly known as "digital discretion". Many of these

articles depart from Bovens and Zouridis (2002), who were among the first to describe the emerging shift from "street-level" via "screen-level" to "system-level" bureaucracies. The two authors argued that the replacement of professional workers (public servants) for ICT "expert" systems, which handle routine cases without human interference, would lead to a radical reduction in the discretion of public servants (Bovens & Zouridis, 2002). A broad consensus emerges on the confining elements of AADM across the articles in this pool while disagreement exists on the "remaining" level of administrative discretion. Reviewing the digital discretion literature, Busch and Henriksen (2018) conclude ICT in particular reduces room for professional judgment and assessment of specific aspects of cases. In contrast to SYN-2A, articles pooled here represent a rather positive view of discretion emphasizing the importance of flexible applications of regulations to particularities of specific cases thereby emphasizing the importance of equity.

Two trade-offs are associated with *equality*. Authors argue that AADM may undermine equal treatment due to data bias (TRA-2A) and equal access of citizens and firms to public goods (TRA-2B).

The issue of data bias is discussed both in popular media and academia and goes beyond use of AADM. Articles pooled under TRA-2A are based on the specific assumption that AADM implies administrative decisions being based on high-volume data in governmental

databases. The articles argue that data tend to be biased, faulty, or disproportionately detailed which affects underprivileged groups unfavorably thereby undermining equal treatment across cases and addressees (e.g., Eubanks, 2018). The authors in this pool indirectly point to correct and non-biased data as a necessity for the use of AADM.

The second trade-off associated with equality is TRA-2B which stresses how AADM is often based on digital communication channels. AADM thereby de facto risks restricting access to public goods due to the unequal distribution of ICT resources, skills, and motivations including lack of internet access leading to a “digital divide” (e.g., Helbig et al., 2009). Some authors, though, also point to AADM improving access in, for example, rural areas (e.g., Das & Chandrashekar, 2007).

Two limits are associated with *rule-of-law*. Particularly within the discipline of law, authors argue that AADM undermines the legality of decisions due to so-called “fettering” of discretion (LIM-3A) and the lawfulness of decisions due to reliance on irrelevant considerations (LIM-3B). Both can be understood as limits as they represent situations where increased use of AADM risks crossing unacceptable legal limits under most national jurisdictions.

LIM-3A covers articles discussing the risk of unlawfully “fettering” of mandated discretion: Specifically, where an administrative body is entrusted with discretionary power by law, public servants must take the specific aspects of each case into account and be ready to depart from rules, guidance, and procedures where appropriate (Oswald, 2018).⁸

Authors point to two primary reasons for the risk. Firstly, it is argued that AADM—whether based on rule-based or machine learning techniques—risks “squeezing out” exercises of mandated discretion including its possible gray zones (Veale & Brass, 2019). This broadly reflects articles pooled under trade-off TRA-1A which stress the risk to equity. Secondly, authors point to “automation bias”, that is, the tendency for human beings to increasingly remain alert and reflective when faced with routine suggestions of automated decision systems (e.g., Koulu, 2020). This leads to the risk of “fettering” even in cases of use of semi automated AADM—implying the final decision is made by a human—as public servants unthinkingly rely on automatically generated suggestions (e.g., Cobbe, 2019).

LIM-3B covers articles that argue that AADM—if fueled by unsupervised machine learning techniques where no human assesses the relevance of underlying patterns (correlations) in data—risks including so-called irrelevant considerations of information which are mistakenly assessed as relevant (e.g., Oswald, 2018).

One trade-off and one limit are associated with *accountability*. Scholars point to the likely algorithmic opacity of AADM arguing that this undermines both effective arrangements of accountability (TRA-4A) and the

obligation to provide reasons for administrative decisions (LIM-4B). The latter represents the risk of crossing unacceptable legal limits under most national jurisdictions.

Articles pooled under TRA-4A can be roughly divided into three sub-arguments. Firstly, authors highlight issues related to the potential lack of transparency of algorithms (program code) of increasingly complex automated decision systems. This weakens the ability of public servants to understand why a certain administrative decision has been made (Smith et al., 2010). The potential incomprehensibility further undermines the functioning of oversight and complaint mechanisms (Cobbe, 2019). Secondly, authors point to the role of ICT specialists and high-tech companies that have considerable discretion in the modeling and programming of systems and in effect influence the outcome of decision-making although operating outside accountability arrangements (e.g., Bovens & Zouridis, 2002). Thirdly, some authors focus on consequences for accountability of automated decision systems which often rely on shared data and technical infrastructure across formal organizational borders. This in turn often serves as “ingredients” for decision-making without further control by the formally responsible body undermining accountability including the principle of improper delegation⁹ (e.g., Motzfeldt & Naesborg-Andersen, 2018).

LIM-4B specifically focuses on the obligation of administrative bodies to outline and convey the specific reasons of administrative decisions to addressees¹⁰. The obligation has historically been related to ambitions of improved quality of decision-making as well as a necessary requirement for legal control of administrative decisions (Harlow & Rawlings, 2020). The literature relates LIM-4B to AADM based on unsupervised AI techniques relying on patterns (correlations) in data rather than a priori programmed cause-effect relations. An automated administrative decision or an automated suggestion of one cannot necessarily be bound to underlying causes making it difficult to provide a firm explanation to the addressee (e.g., Cobbe, 2019).

Two trade-offs are associated with *responsiveness*. Authors argue that AADM may undermine “avenues” for feedback to administrative bodies as it often restricts and simplifies communications channels (TRA-5A). Additionally, AADM may undermine addressees’ ability to contest decisions due to intertwined IT networks (TRA-5B).

Authors pooled under TRA-5A argue that AADM often includes a simplification and physical distancing of relations between addressees and administrative bodies based on use of standardized web-forms, emails, apps and so forth (e.g., Lindgren et al., 2019). This undermines feedback and criticism of administrative bodies’ thereby weakening their organizational learning.

TRA-5B focuses on the principle of contradiction: The ability of addressees to correct information (data) serving as basis of administrative decisions as well as the ability to effectively contest decisions as an important due process principle. For example, authors point to the

increased intertwinement of government ICT networks underlying AADM (e.g., one administrative body relying on information from other administrative bodies). This decreases addressees' de facto ability to contest decisions or request correction of faulty information "at its roots" (e.g., Widlak & Peeters, 2020).

One trade-off (TRA-6A) is associated with *right-to-privacy*. In this pool of articles, authors argue that AADM risks being based on disproportionate volumes or sensitivity of data and thus does not satisfactorily shield citizens from undue interest and interference from administrative bodies.

As part of a broader debate on privacy and big data in general (e.g., Zuboff, 2019), articles in this pool are based on the assumption that AADM often relies on high-volume sensitive data of addressees regarding administrative decisions which are disproportionate to purposes of much of the administrative decision-making (e.g., Hardy, 2020). Remarkably, none of the reviewed articles directly discussed the European Union's General Data Protection Regulation (GDPR) of 2016 in relation to use of AADM. Therefore, we have categorized TRA-6A as a trade-off rather than as a limit.

One trade-off is associated with *resilience*. Authors argue that AADM entails systemic exposure to cybersecurity risks (hacking, malware, data leaks, and so forth, resulting from negligence or ill-will) and technical breakdowns as it relies on high-volume data and automated processes (TRA-7A).

The literature on cyber-security in relation to public administration is diverse (e.g., Norris et al., 2019), but authors pooled under TRA-7A discuss such exposure as a more systemic element of use of AADM: "...it would be a serious mistake to consider the benefits of automation without considering the associated security problem." (Cuéllar, 2017, 153).

DISCUSSION

The findings show that relations of AADM and good governance are multiple, complex, and treated with varying frequency in the existing literature. At one end, the synergies between the use of AADM and the values of rule-of-law and efficiency as well as the trade-off between the use of AADM and accountability are the most frequently discussed. Two trade-offs between the use of AADM and fairness and right-to-privacy are not "top scorers" in the literature but are well-known from broader debates regarding data bias, discrimination, surveillance and so forth.

At the opposite end, the two synergies between the use of AADM and transparency as well as the trade-offs between the use of AADM and responsiveness and resilience are only discussed to a limited extent. Synthesizing is necessarily a question of interpretation, but the

numbers indicate gaps in current research calling for both empirical and conceptual development.

Assessing understanding of good governance, we initially identified eight values of good governance particularly relevant to AADM which we categorized in five broad groups. Interestingly, the nine values of good governance identified in the reviewed literature largely match those initially identified eight values. Only the identified value of right-to-privacy is not discussed by Fukuyama, Hood, Rotberg and Rothstein. In that way, the review indicates a blind spot in the good governance literature that does not fully allow for more recent discussions of privacy, surveillance, and advanced technology. That said, the high level of overlap indicates a rather comprehensive and mature body of literature although the literature is characterized by the mentioned imbalances of depth.

Analyzing the identified *synergies*, all five groups of initially identified values except resilience are represented, illustrating how use of AADM is found not only to support efficiency but also values of equality, rule-of-law, and transparency.

The identified *trade-offs and limits* show that the range of affected values is broader than in the case of synergies. While the synergies revolve around use of AADM and four values; trade-offs and limits revolve around use of AADM and seven values drawn from all five groups of values of good governance.

The identified synergies and trade-offs might seem one-dimensional when individually assessed but taken together several represent each other's approximate opposites. The review thus also serves as a warning against searching for one-sided solutions to use of AADM within public administration and point to the importance of practitioners and scholars not losing sight of the inherent complexity of such use.

For example, use of AADM is argued to support equality via increased impartiality and reduced corruption while at the same time undermining equality and fairness through risks to equity, equal treatment, and equal access. The same is the case when we observe other resembling values: AADM is shown to support transparency, but also to undermine accountability and responsiveness. Here we see an opposition between relatively tangible transparency gains in the form of improved access to own data for addressees and the codification of manifest service standards versus risks to more abstract undermining effects on accountability.

The clearest case of opposites is the value of rule-of-law which we find to be both supported due to the consistency and predictability of AADM but also undermined in the form of risks of unlawful "fettering" of administrative discretion or reliance on considerations not relevant to the case in question. While AADM reduces the scope for errors, undue personal biases and so forth, thereby supporting rule-of-law, it also—at the same time—undermines rule-of-law as its use risks unlawfully

confines mandated discretion as well as the reliance on irrelevant considerations of information.

The two trade-offs between the use of AADM and right-to-privacy and resilience stand out as they are not countered by any resembling synergies. The reviewed literature thus points to dangers of undermining citizens' privacy as well as administrative bodies' ability to protect and adapt administrative decision-making processes in time of crisis without pointing to any adjacent advantages.

Following this and comparing the identified synergies, trade-offs, and limits, fragments of a contingency theory of administrative bodies' use of AADM appear. Employing a "contingency" perspective implies that use of AADM seldomly, if ever, will meet all 9 identified values of good governance. Thus, criteria for handling the complex value-system of public administration in relation to AADM are needed. Three simple principles seem a useful starting point with the review pointing to the first as the most principal and the latter two most likely representing rare instances of use: (I) Application of AADM should be carefully considered if at least one value is supported while one or more values are undermined; (II) AADM should be applied if at least one value is supported while other values are not undermined; and (III) AADM should not be applied if one value is undermined while other values are not supported.

Considered in its entirety, the review points to the significance of the decision-making context as a key contingency for relations of AADM and good governance. Several authors point to *the complexity* of administrative decisions (availability and quality of underlying data, ambiguity of regulation, formal and informal room for administrative discretion, etc.). Authors further point to *the level of automation* and the resulting patterns of interaction between public servants and automated decision systems. Surprisingly, only few authors (e.g., Bannister & Connolly, 2020) hint to *the criticality* of administrative decisions (the impact of decisions on addressees) as an important criterion for use of AADM.

The reviewed authors tend to agree that most trade-offs and synergies increase gradually as levels of automation increase from semi to fully-automated decision-making. A high proportion of the reviewed articles focus on AADM based on artificial intelligence often equating this with *unsupervised machine learning* and, to a lesser extent, predictive modeling. Use of those techniques is argued to specifically increase the trade-offs between the use of AADM and fairness and accountability, as well as risks reaching limits revolving around rule-of-law and accountability.

Mirroring authors' focus on unsupervised machine learning, another key contingency for relations of AADM and good governance are automated decision systems and the inherent dynamic nature of advanced technology. Apart from the emergence of unsupervised machine learning, the identified synergies, trade-offs, and limits

have been surprisingly stable despite the ongoing technological development. But developments in automated decision systems may change important trade-offs involving values of, for example, resilience and right-to-privacy. On one hand, today's trade-offs may, due to technological change, overcome important limits and become the synergies of tomorrow's public administration. On the other hand, and as we have continuously stressed, public administration is characterized by balances and contradictions (Pollitt & Bouckaert, 2017) pointing to the continued importance of the said contingency perspective regarding use of AADM and good governance.

CONCLUSION

The ambition of this article was to examine relations between the increasing use of AADM in public administration and the values of good governance as depicted in the literature within social sciences over more than 20 years. As administrative decision-making is a tangible manifestation of public authority, its automation is particularly relevant to discuss through the prism of good governance. Via a systematic, critical-integrative review, we identified synergies, trade-offs and limits in the literature drawing on Fukuyama's, Hood's, Rothstein's, and Rotberg's understandings of good governance.

The review offers an important contribution by broadening the understanding of AADM to a wider array of values of good governance beyond existing praise of efficiency, consistency, and prevention of corruption (e.g., Young et al., 2019) and existing critique of data bias, threats to equity and lack of accountability (e.g., Peeters, 2020). In total, we identified six synergies, 11 trade-offs and three limits revolving around nine values of good governance: Accountability, efficiency, equality, fairness, resilience, responsiveness, right-to-privacy, rule-of-law, and transparency.

This article confirms the Janus-faced nature of advanced technology use in public administration: the literature clearly suggests that AADM deserves both praise—as represented by synergies—and critique—as represented by trade-offs and limits—in relation to good governance.

The synergies can be perceived as "low-hanging fruits" while trade-offs and limits are "hard cases" reflecting the inherent rivalry of values of public administration. Practitioners and scholars alike should ideally attempt to nurture the "fruits" and lessen the tensions of the "hard-cases" without losing sight of the bigger picture of all nine values of good governance. Only then can we avoid searching in vain for one-sided solutions and develop societally acceptable uses of AADM.

Providing a holistic overview, the review indicates an imbalance in current research that gives impetus for more detailed research. Specifically, some synergies, trade-offs, and limits are relatively well covered, while others are

much less so. We recommend that scholarly interest focus on less covered issues supplementing current interest in data bias, transparency, and accountability. This review shows a clear need for research in relation to synergies between the use of AADM and transparency as well as trade-offs between the use of AADM and responsiveness and resilience.

There are few empirical studies regarding the use of AADM. There is a need for studies regarding how government decision-makers and ordinary public servants perceive, prioritize, and undertake use of AADM in terms of good governance. This will expand the knowledge of less researched synergies and trade-offs but should ideally also cast light on how the full set of synergies, trade-offs and limits are balanced in real-life public administration.

Following this and pointing towards a possible contingency theory for the use of AADM, the need to understand the decision-making context is critical for the relation to good governance. Across the literature, we have identified the complexity of administrative decisions, level of automation (ranging from semi to fully), the criticality of administrative decisions for addressees and the application of unsupervised machine learning as important criteria. Without an accurate understanding of specific decision-making contexts, administrative bodies are less likely to successfully reap advantages of synergies, balance trade-offs, and respect limits.

ORCID

Ulrik B. U. Roehl  <https://orcid.org/0000-0003-1242-0902>
Morten Balle Hansen  <https://orcid.org/0000-0003-1144-2747>

ENDNOTES

- ¹ The concept of values employed in this article relates to values of the desirable held explicitly or implicitly by individuals and groups of individuals (Kluckhohn, 1952).
- ² Although traditions of public administration vary across countries and legal traditions, the concept of administrative decisions is generic and known as “adjudication” (American tradition); “acte administratif individuel” (Napoleonic tradition); “Verwaltungsakte” (Germanic tradition); and “förvaltningsbeslut”/“forvaltningsafgørelse” (Nordic tradition).
- ³ The four authors have all published extensively on good governance. Our suggestion is based on Fukuyama (2013, 2014), Hood (1991), Hood and Dixon (2016), Rothstein (2011), Rothstein and Teorell (2008, 2015) and Rotberg (2004, 2007, 2014). Rothstein and associates prefer “Quality of Government” which is treated here as interchangeable with good governance.
- ⁴ The understanding of “synergy” varies considerably within economic theory and policy reform studies (Capello & Rietveld, 1998). Here, the absence of negative correlations between AADM and good governance is accepted as a synergy. The authors acknowledge that this definition may include border-cases not involving *mutually reinforcing mechanisms* between AADM and good governance.
- ⁵ “Articles” and “literature” refer to articles, book chapters, books and editorials.
- ⁶ Searches were finalized by November 27, 2023.
- ⁷ Following the research question, we do not discuss theoretical background, empirical settings etc. of the reviewed literature.

- ⁸ The precise understanding of the principle varies. The mentioned authors all discuss the principle within an Anglo-American tradition, but the principle also exists under other traditions.
- ⁹ The precise understanding of the principle varies but generally covers the principle that powers – including powers to administratively decide given by law to a public authority – cannot freely be forwarded to another party.
- ¹⁰ The precise understanding of this principle varies but is recognizable across most of the “Western” world. Illustratively, Cobbe (2019, 648), lays out English case-law as “...the more serious the decision and its effects, the greater the need to give reasons for it” even though an outright obligation of reason-giving does not exist.

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AUTHOR BIOGRAPHIES

Ulrik B.U. Roehl is a Post Doctoral Researcher at the Department of Digitalization at Copenhagen Business School in Denmark. He holds a PhD in digital government from Aalborg University in Denmark. In his research, he focuses on digital government, automated decision-making, good administration and public management. He previously worked in Danish local and central government, and is also a research fellow at the Public Governance Institute at Katholieke Universiteit Leuven in Belgium.

Morten Balle Hansen is a Professor at the Department of Political Science and Public Management at the University of Southern Denmark. He is also Director of the Management Research Program at UCL University College, Denmark. His research interests include public leadership, evaluation and performance management, administrative reform, innovation and digitalization in the public sector.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A: DETAILED RELATION MATRIXES

This appendix contains detailed relation matrixes describing the identified synergies, trade-offs and limits.

AI: Synergies

TABLE A 1 Detailed relation matrix; synergies (SYN) of AADM and values of good governance including associated articles from review. Identification of associated articles refer to Appendix B.

Value	#	Synergy	Exemplary article	Number of articles	Possible element(s) of Automated decision-making	Element(s) of good governance	Associated articles
Equality	SYN-1A	Reduced human involvement due to AADM increases impartiality	Borry and Getha-Taylor 2019	5	<i>Reduced involvement of public servant:</i> AADM may reduce human involvement in the decision-making process	<i>Impartiality:</i> Use of AADM may enhance equal treatment of cases and impartial operation of public authorities	6; 9; 15; 29; 89
	SYN-1B	Reduced human involvement due to AADM prevents corruption	Twizeyimana and Andersson 2019	16	<i>Reduced involvement of public servant:</i> AADM may reduce human involvement in and increase managerial control with the decision-making process	<i>Corruption prevention:</i> Use of AADM may enhance prevention and control of corruption, patronage, clientelism etc	3; 9; 10; 14; 20; 21; 28; 40; 51; 52; 78; 82; 83; 85; 93; 102
Rule-of-law	SYN-2A	Confinement of discretion due to AADM increases consistency	Carnis 2007	23	<i>Confined administrative discretion:</i> AADM may reduce unintended mistakes as well as public authorities' ability to discriminate, ration access or in other ways control citizens in relation to specific decisions	<i>Consistency and predictability:</i> Use of AADM may enhance the consistent, predictable and systematic application of relevant procedures and regulations	9; 14; 16; 19; 22; 24; 30; 31; 32; 33; 39; 48; 51; 71; 73; 74; 75; 76; 78; 89; 90; 101; 103
Transparency	SYN-3A	Improved access to information due to AADM increases transparency	Gupta, Singh, and Bhaskar 2018	3	<i>Access to (own) data:</i> AADM may include easy access for addressees to information (data) serving as basis of administrative decisions as well as possible choices among options etc	<i>Transparency:</i> Use of AADM may enhance transparent decision-making processes based on access to information, legislation etc	47; 62; 71
	SYN-3B	Codification of service standards due to AADM informs addressees' expectations	Kettani, Gurstein, and El Mahdi 2009	7	<i>Manifest service standards etc.:</i> AADM may give rise to manifest standards, pledges of quality and predictable processes in relation to administrative decisions	<i>User expectations:</i> Use of AADM may inform and support qualified user expectations thereby improving transparency of the decision-making process. decisions	3; 26; 28; 36; 38; 40; 51
Efficiency	SYN-4A	Reduced costs of operation due to AADM increases efficient administration	Almunawar et al. 2011	26	<i>Reduced costs etc.:</i> AADM may reduce the operational costs of public authorities just as it may make it possible to up and down scale public authorities' operations in a flexible manner according to societal demands	<i>Effectiveness and efficiency:</i> Use of AADM may support, speedy, effective and efficient public administration	3; 7; 18; 19; 24; 28; 37; 44; 50; 51; 52; 62; 64; 71; 73; 74; 75; 83; 86; 90; 91; 92; 93; 96; 100; 101

All: Trade-offs and limits**TABLE A2** Detailed relation matrix; trade-offs (TRA) and limits (LIM) of AADM and values of good governance including associated articles from review. Identification of associated articles refer to Appendix B.

Value	#	Trade-off / limit	Exemplary article	Number of articles	Possible element(s) of Automated decision-making	Element(s) of good governance	Associated articles
Fairness	TRA-1A	Confinement of discretion due to AADM undermines the principle of equity	Bovens and Zouridis 2002	25	<i>Confined administrative discretion:</i> AADM risks confining the ability to flexibly apply regulations and professional expertise to specific aspects of each case	<i>Equity:</i> Use of AADM may undermine public authorities' ability to apply norms of equity (rather than equality) in decision-making as well as the assessment of specific aspects of each case	5; 7; 15; 16; 17; 25; 29; 34; 37; 45; 48; 49; 54; 67; 68; 70; 73; 75; 79; 86; 87; 91; 95; 99; 101
Equality	TRA-2A	Data bias due to AADM undermines equal treatment	Eubanks 2017	24	<i>Data bias:</i> AADM risks being based on biased data, skewed data, misrepresented data and unintended feedback loops	<i>Equal treatment:</i> Use of AADM may undermine equal treatment of all citizens including the consistent application of rules to likeminded cases	2; 4; 22; 23; 24; 28; 30; 31; 32; 33; 34; 37; 47; 51; 72; 77; 81; 89; 90; 92; 94; 100; 101; 102
	TRA-2B	De facto restrictions in access to public services due to AADM undermines equal access	Helbig, Gil-García, and Ferro 2009	12	<i>Unequal access:</i> As AADM is often based on digital communication with citizens, access to public goods risk being restricted due to unequal distribution of ICT resources and skills	<i>Equal access:</i> Use of AADM may undermine equal access of all citizens to public services (as services may be dependent on administrative decisions by public authorities)	12; 21; 26; 40; 42; 48; 58; 62; 64; 87; 90; 92;
Rule-of-law	LIM-3A	Fettering of discretion due to AADM undermines legality of decisions	Cobbe 2019	9	<i>Fettering of administrative discretion:</i> AADM risks confining the ability to apply professional expertise and judgement to the particularities of each case due to the rule-based nature of algorithms and/or automation bias	<i>Legality:</i> Use of AADM may undermine the ability of public authorities to make decisions on their merits and depart from guidelines etc. when relevant. If such discretion is granted by law, major neglect of this may represent crossing an unacceptable limit under most national jurisdictions	23; 37; 39; 44; 54; 59; 60; 65; 94
	LIM-3B	Reliance on irrelevant considerations due to AADM undermines lawfulness of decisions	Oswald 2018	8	<i>Irrelevant considerations:</i> AADM particularly based on unsupervised AI techniques and possibly including predictive algorithms risks relying on considerations not relevant to the case or incorrect interpretations of relevant regulation	<i>Lawfulness:</i> Use of AADM may undermine the consistency of decisions with relevant regulations as well as public authorities' obligation to exclude irrelevant considerations and improper purposes. Major neglect of this may represent crossing an unacceptable limit under most national jurisdictions	11; 35; 44; 79; 84; 88; 91; 102

(Continues)

TABLE A2 (Continued)

Value	#	Trade-off / limit	Exemplary article	Number of articles	Possible element(s) of Automated decision-making	Element(s) of good governance	Associated articles
Account-ability	TRA-4A	Opacity due to AADM undermines systemic arrangements of accountability	Smith, Martin, and Noorman 2010	35	<i>Vague accountability:</i> AADM risks leading to vague or diffused forms of accountability as former political, professional, legal and bureaucratic responsibilities are blurred and de facto transferred to algorithms, ICT specialists and external organizations	<i>Systemic accountability:</i> Use of AADM may undermine systemic arrangements of accountability including oversight mechanisms and the principle of improper delegation	1; 4; 6; 8; 13; 16; 18; 22; 23; 24; 25; 31; 34; 37; 44; 46; 54; 56; 58; 59; 61; 66; 69; 70; 73; 77; 80; 89; 90; 92; 94; 99; 100; 102; 103
	LIM-4B	Opacity due to AADM undermines ability to provide reasons for decisions	Cobbe 2019	31	<i>Algorithmic opacity:</i> AADM risks hampering the ability to trace and explain reasons for specific decisions due to the use of complex (possible unsupervised) "black-box" algorithms	<i>Reason-giving and transparency:</i> Use of AADM may undermine the ability of public authorities to provide intelligible, transparent and adequate reasons for decisions. Neglect of this may represent crossing an unacceptable limit under some national jurisdictions	1; 6; 8; 11; 22; 23; 24; 25; 27; 29; 32; 37; 39; 44; 46; 53; 60; 61; 62; 65; 66; 70; 74; 81; 84; 88; 91; 92; 99; 102; 104
Respon-iveness	TRA-5A	Simplification of communication etc. due to AADM undermines avenues for feedback	Lindgren et al. 2019	6	<i>Simplification and physical distancing:</i> AADM often include a simplification and physical distancing of the relation between addressees and public authorities	<i>Feedback mechanisms:</i> Use of AADM may undermine public authorities' opportunities to obtain feedback and criticism from the citizens they serve	16; 48; 54; 58; 73; 90
	TRA-5B	Intertwined and opaque government ICT networks underlying AADM undermines addressees' ability to contest decisions and their underlying data	Widlak and Peeters 2020	17	<i>Intertwined ICT networks:</i> AADM often relies on advanced algorithms and shared data across formal organisational borders thereby obscuring responsibility for management and quality of data regarding addressees as well as decision-making processes	<i>Principle of contradiction:</i> Use of AADM may undermine addressees' ability to understand and correct data serving as basis of decisions, as well as their ability to contest decisions	4; 6; 11; 22; 24; 31; 32; 35; 44; 46; 58; 63; 67; 88; 98; 102; 103
Right-to-privacy	TRA-6A	Reliance on "big data" due to AADM undermines citizens' privacy	Hardy 2020	16	<i>Volume, velocity and variety of data:</i> AADM risks being based on disproportionate volumes or sensitivity of data regarding individuals	<i>Privacy:</i> Use of AADM may undermine citizens' personal business and pursuits without undue interference from public authorities	2; 4; 7; 30; 37; 41; 43; 44; 56; 58; 63; 77; 86; 96; 97; 100;
Resilience	TRA-7A	Reliance on high-volume data and automated processes undermines administrative bodies' ability to protect administrative decision-making processes against cyber-security threats	Cuéllar 2017	6	<i>Cybersecurity risks:</i> AADM entails systemic exposure to risks of technical break-downs, manipulation, hacking, malware, unintended data leaks etc. as it relies on high-volume data and automated processes	<i>Protection and adaption:</i> Use of AADM may undermine the ability to protect and adapt administrative decision-making processes particularly in time of crisis	25; 44; 90; 91; 92; 100