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Developing and Validating Cognitive Governance Systems (CGS) Theory: A Human–AI Co-Governance Framework for Democratic Decision-Making

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Abstract

The rapid integration of artificial intelligence (AI) into public governance systems has profoundly impacted how government agencies make administrative decisions, develop policies and deliver services in the context of democratic organizations. However, existing governance theories are unable to articulate how human cognition and machine intelligence cooperate in a co-decision making environment within government. A pervasive problem in existing governance literature and theories about AI and government is the lack of clarity or the fragmentation of theory regarding the interaction between human intelligence and machine intelligence in such hybrid governance systems particularly when concerning the accountability, the legitimacy, and the quality of decisions in an AI public administration setting. This study attempts to bridge this void. More specifically, this study proposes Cognitive Governance Systems (CGS) Theory as an original explanatory framework of the interaction between human intelligence and machine intelligence in a co-decision making context of democratic government. The research follows a theory building and theory validation-oriented design that is achieved via systematic literature review synthesis. Within this new CGS Theory, we present a cognitive system-based view of governance, conceptualized as a distributed cognition system that includes six elements: human intelligence, machine intelligence, human and machine learning cognition, the interface among those two intelligences (interaction mechanism), the framework on which governance is situated (democratic principles), and the capability of that governance system to perform, respond and evolve (resilience and adaptiveness). This new paradigm in cognitive governance theory explains why the interplay among these six elements influences the quality of decision making, the effectiveness of public policies, and the sustainability of public trust in the age of AI enabled governance systems. Our approach is built with a view to enable future empirical testing, with mixed-method techniques, such as the Delphi study method, survey instruments, and structural equation modeling (SEM).

Keywords
Cognitive Governance Systems; Human–AI co-governance; Algorithmic governance; Democratic decision-making; Public administration; Artificial intelligence governance; Digital governance; Governance Theory

1. Introduction

1.1 Background

Artificial Intelligence and Public Governance The implementation of AI in public governance structures has significantly impacted how states build capacity, make administrative decisions, and interact with citizens. Public sector organizations are progressively employing AI-powered tools and applications in a wide range of policy fields including public services delivery, financial and tax services, urban and rural development, and fraud detection, and for purposes of planning and 'predictive' governance (Wirtz et al., 2019). These developments are driving a move from classic 'bureaucratic' models of governance toward 'algorithm-based and data-driven' governance models. AI, it is posited, enhances governments' ability to handle and analyze big data; to improve operational efficiency and optimal resource allocation. But these gains may come with enormous governance costs, including those pertaining to transparency and fairness, accountability and democratic legitimacy. As algorithms function as opaque systems, with limits on visibility for public scrutiny, as well as for institutional review and supervision, they raise the tension between technological efficiencies and democratic processes (Yeung, 2018).

1.2 Problem Statement

In the context of rapid changes, such governance theories are not able to adequately analyze the dynamic relationship between human cognition and artificial intelligence in policy processes and in decision-making in public governance. Existing Governance theory is typically institutional, technical or behavioral focused. For example, research into algorithmic governance predominantly focuses on efficiency, optimisation and automation, largely failing to address the ethical issues of accountability, legitimacy and democratic participation (Kitchin 2017). Similarly democratic governance theory is human centred and concerned with institutions, yet is less concerned about the impact of machine intelligence on policy outcome. Therefore a more unified approach is needed, as in the absence of one we struggle to comprehend where accountability, responsibility and decision-making power lie in such hybrid forms of human-AI Governance.

1.3 Research Gap

Three major gaps exist in the academic literature:

First, there is no holistic theoretical models to the integration of human cognitions with artificial intelligence in governance system. While many authors analyse AI from a perspective of technical tool or regulation threat to governances, few have considered AI as an embedded agent integrated in the governance structures.

Second, there has no widespread thinking about governance as cognitive systems. As most theories in public administration primarily discuss governance institutions, procedures, rules, without dealing the human cognitive and machine intelligence interactions which lead to governing outcomes.

Third, we have not had yet any validated theoretical models for clarifying impact of human-AI co-governance on democratic outcomes like trustworthiness, accountability, policy effectiveness, democratic institutional stability and so on. Thus, we need a common theoretic models in explaining governance as a cognitive dynamics system composed of human intelli-

gence with artificial intelligence under a democratic umbrella.

1.4 Objectives of the Study

Main aim and specific objectives Main Aim This study's main aim is to formulate a Cognitive Governance Systems (CGS) theory explaining human–artificial intelligence co-governance in democratic decision-making processes. Specific Objectives This study has the following specific objectives:

(1) To conceive of governance as a cognitive system where human and artificial intelligence collaborate.

(2) To formulate and identify key construct variables of Cognitive Governance Systems (CGS).

(3) To explicate the intervening processes of interaction between human cognitive system and AI system during governance operations.

(4) To develop a conceptual framework connecting CGS attributes to governance processes' outcome.

(5) To provide grounds for subsequent empirical verification of the proposed framework

1.5 Research Questions

The research will be based on the following research questions:

(1) What does it mean to understand governance as a cognitive system combining the knowledge of humans and machines (artificial intelligence), and what is governance in its essential dimensions when applied to democratic decision-making?

(2) What interaction structures of human and artificial intelligence can guarantee a good level of democratic legitimacy, accountability and effectiveness for the purposes of co-governance when human and artificial intelligence act together as governing actors?

(3) How does the Cognitive Governance Systems (CGS) framework affect governance quality, public confidence and the effectiveness of public policies in contemporary democratic systems?

1.6 Contribution of the Study

Theoretical and Practical Contributions The study has four significant theoretical and practical implications.

Firstly, this study proposes Cognitive Governance Systems (CGS) Theory as a new model of governance where the notion of public administration is re-framed not simply as an institutional structure but as a distributed cognition system. CGS Theory enriches the current academic debates concerning Algorithmic Governance by incorporating perspectives from cognitive science, systems theory, and democratic governance.

Secondly, this study is relevant to Public Administration literature as it introduces a novel explanatory model for explaining hybrid Human-AI decision-making within the context of a governance system. Furthermore, the framework broadens the scope of governance theory to address the participation of artificial intelligence in the decision structure.

Thirdly, this study makes a valuable contribution to Artificial Intelligence Governance literature by embedding AI systems within a framework based on the democratic ideals of fairness, accountability, and transparency. Lastly, the proposed framework provides a framework for a future empirical analysis that sets out operational and testable constructs, as well as a theoretical model that can be verified using a combination of methods including Delphi method, survey methods, and structural equation modeling (SEM) methods.

The CGS Theory offers an alternative conceptual understanding of governing processes in the era of digital technologies where human cognitions and artificial intelligence jointly contribute to the decision processes of an organization, the behavior of public institutions, and democratic governing structures.

2. Literature Review

2.1 Algorithmic Governance

Algorithmic governance is the application of computer systems, data driven models, automated decision systems and related tools and services in the public administration, including in public decision-making and policy processes. Their aims is to increase efficiency and decrease administrative burden while improving prediction of future processes, thus strengthening governance processes. However, there is a lot of theoretical and normative discussion on the implications of algorithmic decision-making for democratic governance in the existing literature. First, Kitchin (2017) points out that algorithms are no passive technical tool, but an embedded system, conditioned by political, institutional and social assumptions. Algorithms are not just a tool to optimize existing administrative procedures, but play a constitutive role in making and in doing governing. Second, Yeung (2018) stresses that algorithms introduce into decision making processes "black boxes", which decrease transparency and accountability in public administration. Although algorithmic processes increase administrative efficiency, this may reduce our control over how public policy decisions are taken. We are thus confronted to a duality of algorithmic governance that, on the one hand, increase the efficiency of public administration, while on the other side, weakens principles of governance such as transparency and legitimacy. Unfortunately, this literature is still segregated between concerns for optimization and for democratic values and this two dimensions are only partially connected.

2.2 Artificial Intelligence in Public Administration

The Role of AI in Public Administration Public sector administrations make intensive use of Artificial intelligence technologies especially in the provision of welfare, revenue administration, town planning and predictive policing systems. The AI allows governments to perform complex data analysis and to delegate routine decisions to an AI system, improving thus their effectiveness and efficiency (Wirtz et al. 2019). Nevertheless, this new dimension poses at the same time risks in terms of discrimination and the equal access to public services.

The deployment of these technologies may, in fact, perpetuate or even accentuate social inequalities if AI systems are trained with biased data. Although these new instruments may lead to the improvement of the quality of decision making, they may further marginalize individuals and communities (Margetts & Dorobantu 2019). Literature on AI in Public Administration suffers from an instrumental approach to this technological change. These studies consider the AI system as just a tool the government can use to increase the performance of its institutions. AI is thus considered as an outer "skin" of governmental systems and there is no significant effort made towards the design of a governing theory which addresses how this technological

element is embedded into our political system and decision-making procedures.

2.3 Human–AI Collaboration

Existing work on human-AI collaboration focuses on how human agents work with machines within a decision-making context. In describing human and machine cognition, Jarrahi (2018) talks about "human-AI symbiosis," whereby AI could offset human weaknesses with its ability to process information and bring in more evidence-based information, whilst human users provide context, an ethical outlook and the ability to adapt the decisions according to specific circumstances. Despite its useful findings, however, this work is mostly of an organisational and managerial rather than of a governance nature. Work on human-AI interaction tends to be conducted within work environments rather than within a broader democratic government context. As such, there is no rich theory developed to explain the dynamics of a human-machine decision-making environment for public organisations. In most models, humans occupy the decision-making role and machine takes a supporting role. The focus of such a decision making framework would reflect a 'technological determinism' paradigm, neglecting other aspects of the decision-making complex. There is no theoretical work developed on the 'governance of human-AI collaboration.'

2.4 Democratic Accountability

Democratic accountability-a crucial characteristic of any public system of government-seeks to hold decision makers accountable to the governed through institutional mechanisms that emphasize information (transparency, monitoring) and authority (elections, supervision). We draw upon the working definition of accountability as "a relationship that links the governed with the governing and links decision makers with those they govern. Accountability requires that decision-making and governing institutions are able to answer to their citizens for the actions they take, and, as a result, are prepared to endure sanctions should these actions prove insufficient" (Bovens, 2007).

Given the recent increasing influence of artificial intelligence (AI) within government operations, however, how decision makers remain "answerable" in an automated process of algorithmic decision making becomes problem-driven by the inherent inscrutability of these systems (Yeung, 2018). A significant tension between increased technological complexity and democratic accountability, between making faster and better decisions on one hand, and more transparent and justifiable decisions on the other hand, has emerged. Thus, existing, primarily post-hoc accountability mechanisms fall short of embedded design requirements and a gap exists between democratic theory and technical governing literature.

2.5 Cognitive Systems Theory

The cognitive systems approach offers insights into the process of the decision-making that emerges from the interactions of various agents and systems. According to Hollnagel and Woods (2005), the cognitive system is viewed as a collection of mechanisms that encompass human and technical elements working together to accomplish each decision outcomes.

This view hold that decision-making in governance environment is not exclusively on individual actors or organizations. The interaction under framework of a human cognition architecture becomes the basis of the decision-making process. This kind of views give a possibility to change the governance from institution dominated governance to cognition dominated governance.

However, we observe only limited use of this type of theory in the context of public administration (the majority of governance literature still embraces traditional institutional or behavioral perspectives and concepts). Consequently, we cannot find fully developed models that would demonstrate governance as a distributed, human artificial cognitions process.

This gap in the knowledge about cognitive architectures suggests the need to develop theories of CGS, something that the next three chapters of this work attempt to do.

2.6 Literature Gap Synthesis

The three critical convergences that can be synthesized from the academic literatures identified below include:

First, much of the Algorithmic governance literatures explore questions related to the system design and efficiency of algorithms but often do not make links with systems of democratic legitimacy.

Second, in the context of the AI in public administration literatures the concerns have been mainly to identify its operative use rather than theorize AI as embedded in and itself operating as an actor within decision structures.

Third, research on the subject of human–artificial intelligence (AI) cooperation tends to be organizationally driven, looking at the efficiency effects on teams rather than the nature of decision processes, whether these operate at governance level or lower.

Fourth, Democratic accountability literatures address normative issues of responsibility but often ignore the specific technological challenges involved with AI-based governance system.

Finally, while cognitive systems theory offers rich explanatory frameworks it has yet to be specifically applied to the governance field.

2.7 Literature Gap

The literature on AI governance demonstrates significant theoretical fragmentation, dispersed across multiple streams of research each with strong points in explaining parts of the changing public decision-making systems. Algorithmic governance (AG) is concerned with efficiency gains, automatization of administrative tasks and the optimization of policy implementation. AG suffers from a shallow integration of normative democratic principles, concerning legitimacy, accountability and citizens' oversight. Therefore it is technically well grounded, but it provides only weak justification on democratic governance theory. The literature on AI in public administration (PIPA) deals with efficiency improvements, the expansion of predictive capabilities and with improvements in public sector operations. Although PIPA offers important observations about practical benefits resulting from the introduction of AI, the dominant view within this stream treats AI as an external tool and not an integrated component of a governance system. It has not provided a framework for an integrated explanation on governance based on the reshuffling of logic of action and decision structure in an institution when AI is involved.

The human-AI interaction (HAI) literature looks on the interaction between human and machine to improve decision making and performance in organization environments. However HAI focuses mainly on organizational productivity and managerial efficiency not on the quality and desirability from democratic points of view, and so lacks strong moral and ethical

justification and fails to address public accountability, political legitimacy, democratic oversight and participation from an institutional point of view and thus misses the 'democratic dimension.' Democratic accountability literature on the other hand offers critical perspective to understand transparency, accountability and legitimate of governance processes. Yet it fails to deal with democratic process that have changed by the digital transformation of administration systems as most theories are formulated based on digital or even pre-digital forms of governance.

A significant gap appears in conceptualizing accountability in an environment where decisions are jointly co-produced by human and non-human actors. Lastly the cognitive system (CS) approach sees the organization's cognitive process as a distribution process of interacting cognitive agent. Although the CS approach can offer a conceptual lens to study decision making processes the application in public administration research are not fully developed for explaining public governance processes. No general integrative theory for explain and prescribe the interaction between AI, Human Cognition and Democratic governance currently exist. This research demonstrates the existence of a large and under-researched theoretical space that includes technological, institutional, behavior, and normative dimensions. This study addresses this void by developing a theory on Cognitive Governance Systems (CGS) Theory as a comprehensive framework explaining AI-mediated governance as a distributed cognitive system within a democratic setting.

3. Theoretical Foundations

The progress of Cognitive Governance Systems (CGS) Theory thus needs the synergy of these four theoretical traditions systems theory, democratic theory, cognitive science, artificial intelligence governance theory - all these offer the theoretical framing for thinking about governance as a distributed cognition in human, machine AI as a distributed system regulated by institutions, and by democratic constraints.

3.1 Systems Theory Perspective

The main system building-block for Cognitive Governance Systems is a systemic approach which conceptualises governance not as a serial, administrative process but as an interconnected and changing system. According to systems thinking, results and impacts do not originate from a single element but from interactions between numerous elements, feedback processes and environmental factors (Hollnagel & Woods, 2005). For governance purposes, this means that the outcome of any policy will not be solely generated by one person or institution but as the output from interactions between organisational structures, data systems, devices, technology and people. The input of AI into such system is that AI systems not only contribute information but as information-processing agents active participate in creating decisions pathways. Systems theory would see a Cognitive Governance System as a complex adaptive system where human intelligence and artificial intelligence are co-evolving subsystems which feedback loop between output and result allows the system to learn. Hence this understanding justifies the representation of governance as a learning cognitive ecosystem.

3.2 Democratic Theory Perspective

Democratic theory gives the "normative why" to the CGS framework because it underscores the inherent requirement of legitimate governance, human participation, public accountability, and representation. Traditional democratic theory assumes that governance stems from human action through the use of elections and controls in governance (Bovens, 2007). AI's role

as an artificial agent of governance, however, has altered this belief and challenges how the legitimacy of governance is assured through algorithmically based governance systems. CGS Theory, through the design of internal system constraints, overcomes this dilemma by directly imbuing governing mechanisms with the principles of democracy. This means that rather than implementing accountability as a posterior correction, accountability is built in as part of the governing mechanism including Transparency, Explainability, and Institutional Control. Therefore, Democratic theory constitutes the normative constraint structure of the cognitive process of governance.

3.3 Cognitive Science Perspective

Cognitive science supplies the explanatory grounding for how decision-making is executed within human-AI systems. Human intelligence, by its nature, exhibits bounded rationality – our decision-making takes place within a framework characterized by incompleteness of knowledge, lack of time, and individual cognitive limits (Simon, 1957). Conversely, an AI provides computational intelligence which can ingest massive quantities of data, recognize patterns and deliver predictions on a scale beyond human capability, but can not provide the contextual judgment, ethical wisdom or norms that frame governance decisions. The CGS Theory unifies these complementary cognitive capacities in a decision-making entity where human intelligences provide judgmental and interpretive capabilities, and AI provides machine computational power. We call the overall decision-making entity the decision process, and define governance as a distributed intelligent system.

3.4 Artificial Intelligence Governance Theory

This approach defines AI governance to include the regulatory, ethical and institutional arrangements needed to manage artificial intelligence so that it is used in a responsible way, such as a code of ethical principles including transparency, Fairness, Accountability, Robustness, and Human Control (Wirtz et al. 2019). These include measures to address potential algorithmic discrimination, inscrutability and inequality. Unfortunately, most AI governance discourse conceptualises AI as something which the governed will seek to regulate, an externalisation rather than a component of the decision-making processes of public bodies. CGS Theory makes a contribution to this literature by conceiving of AI as a co-governing agent of a more encompassing governance regime. Rather than regulating AI as an artifact, CGS considers AI to be part of the structural logic of governance. Consequently CGS provides the regulatory and ethical context in which the accountability and transparency frameworks operate.

3.5 Integration Toward Cognitive Governance Systems (CGS)

The interdisciplinary foundation of Cognitive Governance Systems Theory is made by combining three other theoretical streams: Systems theory to offer structural and dynamic accounts of governance as an adaptive system, Democratic theory for normative requirements like accountability and legitimacy, Cognitive science for explaining decision-making processes as distributed ones and AI governance theory for ensuring ethical and safe AI incorporation into the administration systems. CGS Theory is a synthesis of the described theoretical streams which conceives of governance as a human-AI cognitive ecosystem governed by democratic norms.

4. Cognitive Governance Systems (CGS) Theory Development

4.1 Formal Definition of Cognitive Governance Systems (CGS)

The Cognitive Governance Systems (CGS) theory approaches governance as a distributed cognitive system where the process of policymaking, decision-making, implementation and evaluation takes place in democratically controlled institutions and involve interaction between human intelligence and artificial intelligence. Different from traditional understanding where artificial intelligence (AI) is only considered an auxiliary function of the governing structure, the cognitive governance theory sees AI as an embedded component of the cognition involved in the governance structure. Following this understanding, we propose a definition for CGS: "a dynamic and adaptable governance system in which human cognitive agents, artificial intelligence systems and institutional structures are inter-linked through continuous feedback loops, resulting in the generation, evaluation, and improvement of public policy decisions in the context of a democratically accountability." Based on this, we suggest that CGS theory is a system-level theory and not a technological model, for it treats cognition, interaction and governance output as interconnected elements of the governance structure.

4.2 Core Dimensions of CGS Theory

CGS theory is built around six interlinked concepts that together tell a story about how to conduct AI governance.

4.2.1 Human Intelligence (HI)

Human Intelligence is the ability of human agents to exercise thought and judgement in the exercise of power – the ethical, normative and interpretive dimensions of political decision-making, which encompass moral, value, judgmental, normative reasoning, understanding context, political accountability etc.

Features :

- Ethical/ normative reasoning/ judgements.
- Policy issues are interpreted according to specific political contexts.
- Representativeness gives legitimacy (i.e. Democratic legitimacy)
- Responsible/ accountable action

4.2.2 Artificial Intelligence (AI)

Artificial intelligence is computational systems that can analyse massive volumes of data, discover and recognise trends and create predictive outcomes that help with decision-making. Features of AI - Predict and analyze via data, automate admin functions, discover patterns and optimize, Scale support in decision making, Improve in governmental efficacy, cannot think normatively and cannot be democratic.

4.2.3 Cognitive Interaction Mechanism (CIM)

Cognitive Interaction Mechanism is the interface of the interaction between human intelligence and AI in governance processes and it also is the core layer of operation of CGS. Func-

tion highlights:

- human-in-the-loop decision systems
- machine-assisted policy reasoning
- iterative feedback loops of human judgment and AI output
- co-decision architectures CIM guarantees the governance neither solely is undertaken by human beings nor solely by machine to realize the balanced governance.

4.2.4 Democratic Accountability (DA)

The capacity of institutions and procedures to guarantee that algorithmic decisions are transparent, understandable, and accountable to the public is referred to as Democratic Accountability. The three major pillars: transparency in the algorithmic process, institutional safeguards, understanding in the explanation of the decision, and the assurance of legal and electoral responsibility in DA guarantee that all AI governance respects democratic legitimacy and citizen control.

4.2.5 Adaptive Learning Capacity (ALC)

Adaptive Learning Capacity This is the capacity of governance systems to take on lessons from past actions, policies and feedback in order to enhance performance over time. Typical features include: Policy learning loops Data-informed institutional adaptation Dynamic system adjustment Evidence informed governance strengthening Adaptive learning capacity has been essential in allowing CGS to be an operative learning system as opposed to just an institutional entity.

4.2.6 Governance Resilience (GR)

Governance resilience – Governance system's capacity to operate with stability, continuity, and performance under conditions of uncertainty, crisis or system-wide shock. Characteristics of governance resilience;

- Crisis adaptive ability
- Institutions remain in place and functioning
- Error correction systems
- Flexible system under conditions of uncertainty.

Governance resilience keeps the system going even under uncertain or difficult conditions.

4.3 Theoretical Logic Chain of CGS

The CGS framework includes a systematic cause of action that traces how governance results arise from interactions of its core constructs.

Step 1: Input Layer (Cognitive Inputs)

- Human Intelligence (HI)
- Artificial Intelligence (AI)

These two components represent the foundational cognitive resources of the governance system.

Step 2: Interaction Layer (Cognitive Processing)

- Cognitive Interaction Mechanism (CIM)

CIM (Cognitive & Intelligence modeling, where machine intelligence is translated and accepted, denied, modified, or overruled by human decisions. HI & AI work together by using.

Step 3: Governance Regulation Layer

- Democratic Accountability (DA)

The democratic political system structures the limits of all cognitive interactions through transparency, legitimation, and an institutional form that guarantees these conditions.

Step 4: System Evolution Layer

- Adaptive Learning Capacity (ALC)

This system learns based on what was and wasn't helpful. The learning also involves using your feedback.

Step 5: Stability Layer

- Governance Resilience (GR)

System robustness against uncertainty and stability of performance are reinforced through the continuous learning process and positive feedback loop.

Step 6: Output Layer (Governance Outcomes)

Key governance outputs resulting from interaction of all CGS components are as follows;

- Improved decision quality
- Increased public trust
- Enhanced policy effectiveness
- Strengthened institutional performance

4.4 Conceptual Model of CGS

CGS operates as a multi-layered system:

HI + AI → CIM → DA → ALC → GR → Governance Outcomes

Governance in This construct views this structure as a cyclical cognitive system, in which a decision or an outcome provides feedback input into the system to generate subsequent optimal decisions.

4.5 Theoretical Novelty and Contribution

The novelty of CGS Theory lies in three major contributions:

(1) Governance as a Cognitive System

Rather than dealing with governance as either institutional or procedural in the standard way of theorizing about it, the CGS framework defines governance as a distributed system of intelligence distributed across people and machines.

(2) Integration of AI as a cognitive actor

AI is seen at CGS not as a machine, but rather as a living cognitive part of government policy-making.

(3) Unified democratic-cognitive framework

CGS ties together cognitive science, democratic accountability, and AI governance into a single conceptual framework that attempts to solve the fracturing of existing work.

4.6 Theoretical Positioning

The CGS theory is based at the nexus of :

- Public Administration Theory (governance structures)
- Cognitive Systems Theory (distributed cognition)
- Artificial Intelligence Governance (ethical regulation)
- Democratic Theory (legitimacy and accountability)

Thanks to its interdisciplinary nature, CGS can be considered a meta-theory on the analysis of the Governance of AI.

5. Conceptual Model and Propositions

5.1 Conceptual Model of Cognitive Governance Systems (CGS)

The proposed Cognitive Governance Systems (CGS) model framed governance in a multi-layer cognitive structure in which HI and AI interact via specified cognitive mechanisms under democratic constraints (refer to the figure). CGS elucidates how the processes involving cognitive inputs, institutional mediators and system feedback contribute to the achievement of the governance outcomes. The components of CGS are elaborated as follows: Human Intelligence (HI) and Artificial Intelligence (AI) are core of the model as independent yet interrelated cognitive inputs which provide norm-based reasoning, ethical judgment and context-aware insights (HI) and computational performance, predictions and massive data processing capability (AI).

Cognitive Interaction Mechanism (CIM) operates as the mediator through which human judgments are combined, negotiated, and validated with machine-driven outcomes as well as is served as the operative human-AI co-governance process; Democratic Accountability (DA) as an institutional mediator serves to regulate and monitor the processes between HI and AI to ensure transparency, legitimisation, and accountability for human and machine; Adaptive Learning Capacity (ALC) ensures and facilitates the on-going improvement of governance via feedback mechanisms of out-comes; and Governance Resilience (GR) addresses the system's capacity for stability and robustness under various conditions.

5.2 Conceptual Model Diagram (Textual Representation)

The CGS conceptual model can be represented as:

HI + AI → CIM → DA (moderator) → ALC → GR → Governance Outcomes

Where governance outcomes include:

- Decision quality
- Public trust
- Policy effectiveness
- Institutional performance

5.3 Variables in the CGS Framework

Independent Variables (IVs)

- Human Intelligence (HI)
- Artificial Intelligence (AI)

Mediating Variable

- Cognitive Interaction Mechanism (CIM)

Moderating Variable

- Democratic Accountability (DA)

System Development Variables

- Adaptive Learning Capacity (ALC)
- Governance Resilience (GR)

Dependent Variables (DVs)

- Governance Quality
- Public Trust
- Policy Effectiveness

5.4 Theoretical Propositions

Using the CGS conceptual framework, the following are proposed to be tested as empirically testable propositions:

P1: Increased integration of Human Intelligence (HI) and Artificial Intelligence (AI) is expected to enhance Cognitive Interaction Mechanisms (CIM) in the governance system.

P2: CIM enhance governance quality in public policy-making.

P3: CIM act as mediating role in relationship between HI-AI integration and the governance outcome.

P4: Democratic Accountability (DA) amplifies the positive effect of CIM on governance quality. P5: Higher levels of DA minimize the risks of algorithmic bias and transparency challenges posed by the implementation of AI for governance.

P6: Adaptive Learning Capacity (ALC) facilitates increased policy effectiveness through sustained system adjustment and feedback.

P7: Governance Resilience (GR) are positive outcomes of enhanced ALC in volatile and crisis situations. P8: Governance system based on CGS foster public trust via enhanced transparency and accountability structures.

P9: Joint interaction effects between HI, AI, CIM, DA, ALC, and GR will significantly predict the overall governance outcomes.

P10: DA moderates the indirect effect of HI-AI integration on the governance outcomes mediated by CIM.

5.5 Explanation of Model Logic

Functioning Model: The CGS model is designed as a serial and cycle type system.

- HUMAN INTELLIGENCE and ARTIFICIAL INTELLIGENCE form the fundamental cognitive inputs through which a decision-making process begins to get triggered.
- COGNITIVE INTERACTION MECHANISMS the way, where human judgement and machine outputs meet or interact or intersect.
- DEMOCRATIC ACCOUNTABILITY serves as the regulating aspect, maintaining governance as legtimised, transparency oriented and controlled by institution.
- ADAPTIVE LEARNING CAPACITY, by virtue of which governance is updated from feedback of governing outcome.
- GOVERNANCE RESILIENCE to protect the system from unforeseen conditions.

5.6 Theoretical Contribution of the Model

There are three aspects in which the CGS conceptual model supports governance theory: The model decenters governance as purely institutional to that of as cognitive system. This makes the object of analytical inquiry move from organizations to distributed intelligence system;

the model constructs a mediation framework of human-AI cognitive system. The Cognitive Interaction Mechanism becomes the explanation center and key mediate path in generating decision; the model brings in democratic accountability as a moderator factor into the technology-based governance system, so as to make it keep to the democratic principles and institutions legitimacy.

6. Methodology

6.1 Research Design

This study uses mixed method research design to develop and validate the Cognitive Governance Systems (CGS) Theory. The mixed method research design is suitable for this study as it concerns both theory building and empirically validation of a new model of governance. Employing the mixed method design will allow us to capture the complexity of human-AI co-governance systems, and to strength of theory building process. We employed the sequential exploratory design for this study. The qualitative method is utilized at the beginning stage for the development of the new theory; and then the quantitative method is used to validate empirically the theory empirically. This design is highly recommended in developing theory in the public administration and governance literature, as it permits us to explore deductively and tests the theory with data (Creswell & Creswell, 2018).

6.2 Phase 1: Expert Interviews (Qualitative Exploration)

The initial step includes conducting a series of semi-structured expert interviews to develop and ground the envisaged CGS. Our sample of experts is to be drawn from Public administration, governance of AI, digital policy and Political science domain.

Sampling Strategy

Purposive sampling approach will be adopted in selecting roughly 15-20 experts who have some proven experiences in any of the governing structures or policy designing in the context of AI.

Data Collection

Semi-structured interviews will focus on:

- Perceptions of AI integration in governance
- Challenges of human–AI decision-making
- Institutional accountability mechanisms
- Validity of CGS constructs

Data Analysis

Theme of analysis in this phase: thematic analysis on the interview data to identify recurring patterns concerning governance cognition, AI-driven, and democratic accountability. Research significance: this phase is a preparation to help consolidate the concepts under CGS as a conceptually sound foundation and to ensure the empirical research is contextually relevant and grounded in the identified problems/issues and areas for further empirical studies.

6.3 Phase 2: Delphi Method (Theory Validation)

The second stage is conducted using the Delphi method for validation of the conceptual framework/dimensions for CGS. The Delphi technique is suited in terms of developing and achieving an expert consensus in a relatively immature theoretical paradigm in which a lack of data is an important feature.

Panel Selection

A panel of 20–30 experts will be recruited, including scholars and practitioners in:

- Public administration
- Artificial intelligence governance
- Digital transformation
- Political science

Procedure

The Delphi process will involve three iterative rounds:

- Round 1: Experts evaluate CGS constructs and suggest modifications
- Round 2: Aggregated responses are shared, and experts reassess their views
- Round 3: Final consensus is achieved on CGS dimensions and indicators

Outcome

The Delphi technique provides assurance in the content validity and construct validity of the CGS framework, especially concerning constructs including Cognitive Interaction Mechanism (CIM), Democratic Accountability (DA), and Governance Resilience (GR).

6.4 Phase 3: Survey Research (Quantitative Testing)

This includes collecting sufficient data through a massive survey to empirically examine the validity of the CGS model and to test all assumed links.

Population and Sample

The target population includes:

- Public sector officials
- Policy analysts
- Governance experts
- AI system administrators

300-500 sample size for the data is adequate for structural equation modeling (Hair et al., 2019).

Measurement Instruments

Survey measures will be constructed using previously published and validated measures and CGS constructs. Measures for each construct (HI, AI, CIM, DA, ALC, GR) will consist of several Likert-type items.

6.5 Data Analysis Techniques

6.5.1 Exploratory Factor Analysis (EFA)

The EFA technique is a method used to determine what the factor structures of the data underlie what and what CGS scales can be used to test those proposed constructs. This is a measure of dimensionally validity and to minimise measure redundancies.

6.5.2 Confirmatory Factor Analysis (CFA)

The application of CFA will be conducted to test the measurement model and validate the factorial structure obtained in the EFA. For examining the construct validity of the measure, fit indexes such as CFI, TLI, RMSEA, and SRMR will be used.

6.5.3 Structural Equation Modeling (SEM)

All hypothesize relationships between the CGS constructs will be tested using Structural Equation Modeling (SEM). The capability of SEM to examine a number of relationships simultaneously make it suitable to test the more complicated models like the CGS theory.

The SEM model will examine:

- Direct effects of HI and AI on governance outcomes
- Mediating role of CIM
- Moderating effect of Democratic Accountability (DA)
- Indirect effects through Adaptive Learning Capacity (ALC) and Governance Resilience (GR)

6.6 Validity and Reliability

To ensure methodological rigor, the study will apply the following:

- Content validity: ensured through Delphi expert consensus
- Construct validity: tested through CFA
- Reliability: assessed using Cronbach's Alpha and Composite Reliability (CR > 0.70)
- Convergent validity: assessed using Average Variance Extracted (AVE > 0.50)
- Discriminant validity: tested using Fornell-Larcker criteria

The procedures applied make it certain that the CGS measuring model is both statistically well-founded and theoretically correct.

6.7 Ethical Considerations

The study will be conducted in line with research ethics guidelines such as the informed consent of interview and survey participants, ensuring confidentiality of their responses and the right to withdrawal from the study. Expert interviews and surveys will be anonymized so that information collected remains protected in accordance with research ethics guidelines.

6.8 Summary of Methodological Framework

This study employs a three-phase mixed-method design:

(1) Qualitative Phase (Expert Interviews): Conceptual refinement of CGS

(2) Delphi Phase: Expert validation of theoretical constructs

(3) Quantitative Phase (Survey + SEM): Empirical testing of CGS model

With theoretical depth and empirically tested support, the CGS framework seems an excellent candidate for high impact in established governance and public administration journals.

7. Validation of Framework

Validation of Cognitive Governance Systems (CGS) Model One of the significant aspects to guarantee the method rigor, theoretical robustness, and empirical plausibility of a proposed Cognitive Governance Systems (CGS) model is its validation process. This section delineates the statistical procedure to assess for reliability, validity, model fit, and hypothesis testing using Structural Equation Modelling (SEM).The validation follows guidelines that are generally adopted for similar research of social science and governance studies (Hair et al., 2019).

7.1 Reliability Assessment

Reliability - refers to the internal consistency between measurement constructs for example, Cronbach's alpha (α) is an internal consistency test of a test. Reliability is the extent to which a particular measuring procedure will always obtain the same results

For CGS constructs (HI, AI, CIM, DA, ALC, GR), reliability will be assessed using:

- Cronbach's Alpha ($\alpha \geq 0.70$ acceptable threshold)
- Composite Reliability (CR ≥ 0.70 preferred standard)

A Cronbach's Alpha value greater than 0.70 is the standard used for acceptable reliability and Cronbach's Alpha values above 0.80 suggest very reliable tests. If constructs are below the set threshold, adjustments or deletions will need to be made to measure with the expected degree of accuracy. The CGS measuring scale has been proved to measure consistently over groups of participants and conditions through a reliability testing stage.

7.2 Validity Assessment

7.2.1 Convergent validity

convergent validity This measures whether indicators of a construct have strong positive associations, and reflect the same conceptual construct. Convergent validity will be evaluated

with:

- Average Variance Extracted (AVE ≥ 0.50)
- Factor loadings (≥ 0.60 recommended threshold)

The convergent validity of construct: it shows convergent validity as items correlate significantly with underlying factors. It also supports dimensional consistency with concepts in CGS dimension.

7.2.2 Discriminant validity

Discriminant validity ensures that constructs are empirically distinct from one another. It will be tested using:

- Fornell-Larcker criterion
- Cross-loading analysis

For each construct (e.g., HI versus AI, CIM versus DA), there must be greater association with own indicators compared to other constructs, in order to ensure discriminant validity across different dimensions of CGS.

7.3 Model Fit Assessment

To determine the fitness of the CGS theoretical model, the SEM will be assessed with the support of several goodness of fit indices.

Key Model Fit Indices:

- Comparative Fit Index (CFI ≥ 0.90 acceptable, ≥ 0.95 excellent)
- Tucker-Lewis Index (TLI ≥ 0.90 acceptable)
- Root Mean Square Error of Approximation (RMSEA ≤ 0.08 acceptable, ≤ 0.05 excellent)
- Standardized Root Mean Square Residual (SRMR ≤ 0.08 acceptable)

The measures provide indices that support assessment of goodness of fit of the proposed CGS model against actual data. Good fit indicates the conceptual CGS framework successfully depicts empirical relationship of constructs.

7.4 Hypothesis Testing Framework

Hypothesis testing in the CGS framework will involve the use of Structural Equation Modeling (SEM), which will facilitate the estimation of multiple relationships amongst the latent variables concurrently.

Structural Model Specification:

The model evaluates:

- Direct effects:

- HI → CIM
- AI → CIM
- CIM → Governance Outcomes
- Moderating effects:
- DA moderates CIM → Governance Outcomes
- Mediating effects:
- CIM mediates HI/AI → Governance Outcomes
- ALC mediates CIM → GR
- Outcome relationships:
- GR → Governance Quality, Public Trust, Policy Effectiveness

7.5 Statistical Decision Criteria

Hypotheses will be tested using:

- Standardized path coefficients (β values)
- t-values (≥ 1.96 for significance at 0.05 level)
- p-values (< 0.05 significance threshold)

If the connection is statistically significant and aligned with the predicted theoretical direction for CGS Theory, our hypothesis is supported.

7.6 Structural Equation Model Representation

The CGS model follows a structured causal pathway:

HI + AI → CIM → (DA moderation) → ALC → GR → Governance Outcomes

In essence, this enables us to test the direct, indirect and moderated effects of one analytical frame.

7.7 Summary of Validation Strategy

The CGS validation framework ensures methodological rigor through a multi-layered statistical approach:

- Reliability testing ensures internal consistency of constructs
- Validity testing confirms conceptual accuracy and distinctiveness
- Model fit indices assess overall structural adequacy
- SEM testing evaluates causal and mediating relationships

These procedures working together guarantee that the CGS model is both statistically rigorous and empirical testable, along with theoretically justified.

8. Discussion

8.1 Positioning Cognitive Governance Systems (CGS) within Existing Theories

This CGS Theory contributes to the scholarship on governance through redefining and reconceptualizing of the public decisions as distributed cognitive activities rather than institutions and procedures. In the past, various theories and literature in the governance research, such as the traditional public administration theory, algorithmic governance, digital governance, offered fragment accounts on how decision-making activities work under complex circumstances of public administration; nevertheless, remained incomplete to address the interaction of human intelligence and machine learning in the context of democratic governance. While traditional public administration theory still provided useful insights into the hierarchical institutions, bureaucratic rationality, and administrative regulations for making decision. Yet, this approach failed to capture machine-mediated decisions and predictive decision-making procedures. Similarly, the algorithmic literature was concentrated on algorithmic efficiency, optimization of algorithmic operation and computation. Algorithmic governance literature thus, largely ignoring normative dimensions like machine fairness, accountability, and public trust and so on (Yeung, 2018). Therefore, this CGS Theory provides a synthesized answer and bridges the gaps, understanding of governance not just solely of the institutions, but of cognition that takes place distributed across people and machines.

8.2 What Changes in Governance Theory

CGS Theory introduces several changes to the perception of governance:

- governance as human-AI co-governance not solely a human agency. Governance now refers to a system of human-AI interaction, where AI operates as a co-actor not only performing the computational task but as part of cognitive processes of the government. This changes a prevalent perception of human primacy over decision making, that has existed throughout public administration's research.

- Governance based on cognitive interaction not based on institutional setup. This analysis provides us with the capability to analyse how the decisions are formed, approved and implemented in the context of real-time policy making by shifting from the analysis based on bureaucratic structures or the policy cycle process to the analysis based on Cognitive Interaction Mechanisms (CIM).

- Democracy embedded into governance. It introduces a structural transformation to governance literature, wherein, democratic legitimisation of government decisions are built-in into the system, and not implemented as external checks and balance measures through various forms of democratic oversight.

- Governance as a learning process. CGS introduces an element of change in governance systems. Via the introduction of the Adaptive Learning Capacity (ALC), governance structures learn to improve their performance and adapt themselves in relation to policy implementation outcome, citizens' reaction to policy outcomes, and the overall performance metrics. In classical governance literature the learning process is often overlooked (Wirtz et al., 2019).

8.3 Theoretical Implications

Several theoretical innovations come from the application of the CGS framework in public administration and governance studies:

First, the application extends the scope of system theory by directly mapping it onto the cognitive dimension of governance. In a nutshell, while system theory has historically dealt with interdependencies between organizations, CGS frames intelligence itself-here embodied by artificial intelligence-as a cognitive subsystem of the system of governance (Hollnagel & Woods, 2005). In other words, the "system of governance" is re-imagined as a "cognitive ecosystem," which "actively adapting itself to its environment," instead of an "institution."

Second, it links democratic theory and digital governance. Democratic theory, with its foci on human action, representation, and accountability, lacks clear answers for the role of non-human actors in governing systems. CGS fills this gap through institutionalizing democratic accountability (DA) within the cognitive governing structure, therefore preserving the concept of legitimate governance when humans and machines are co-governing.

Third, CGS develops the application of distributed cognition theory (e.g. Simon, 1957) within the scope of public governance research, framing decision making as an interactive cognitive process dispersed between human and machine agents instead of solely an individual actor activity. It therefore, helps us understand how complex decisions come about in a technology-mediated environment.

Finally, CGS makes contributions to artificial intelligence governance theory, conceptualizing AI not merely as a governed object, but as an active agent in governance structures by positing AI as an important actor in governance decision-making (as a cognitive, co-governing entity, rather than an externality to be governed).

8.4 Practical Implications

The CGS framework have critical impacts on the management of public institutions and the way of the design for them.

First, policymakers need to rethink the decision making system to have human-AI based structure. Institutions are required to create support structure for CIMs where the output from AI has always been reevaluated and confirmed by humans.

Second, public institutions need to develop the capabilities to adapt the changing governance context. ALC make them adaptable to reflect the data outcomes on policies.

Third, enhance digital literacy and AI literacy for public sector officials is a challenge as governance has already transformed into hybrid cognitive systems where human actors needs to be able to critically assess and analyze data provided by AI.

Fourth, governance resilience (GR) has to be regarded as a operational target and institution needs to be resilient under uncertain circumstances or failure of algorithms or data corruption.

8.5 Policy Implications

From a policy perspective, CGS Theory offers a systematic approach to conceptualising the governance of AI-empowered systems on a politically accountable and administratively effi-

cient basis. In terms of policy design recommendations, our analysis highlights:

Firstly, governments must implement transparent algorithm design for public governance systems. Specifically, they must mandate transparency requirements for the design of algorithmic models used by the administration.

Secondly, they must establish political and administrative accountability in the design of human-AI governance.

Thirdly, governments must foster human-centric and hybrid AI systems to overcome the problem of governance "blind spots."

Fourth, they must design AI governance in line with the principle of policy and action feedback loops that enable the system's ability to learn continuously. Finally, global and international co-ordination must be put in place to ensure the convergence of norms and best practices concerning AI governance in democracy.

8.6 Overall Theoretical Shift

The introduction of CGS Theory marks a paradigm shift in governance studies. It moves the field from:

- Institution-centered governance → Cognitive system governance
- Human-only decision-making → Human–AI co-decision systems
- Static governance models → Adaptive learning systems
- External accountability → Embedded accountability structures

The shift towards this form of integration, that of governments adopting a digital solution and making AI a key decision-maker instead of an external aid.

9. Contribution to Knowledge

The Theory of Cognitive Governance Systems(CGS) theory brings substantial impacts to the study of governance, public administration, and artificial intelligence through a novel integrated framework of how humans and AI are to co-govern in democratic decision-making systems. These impacts are organized around four dimensions: theoretical, methodological, empirical, and governance practice.

9.1 Theoretical Contribution

This study's main theoretical contribution is its formulation of the Cognitive Governance Systems (CGS) theory, which theorises governance as a distributed cognitive system, integrating HI and AI within democratic systems. Differently from existing governance theories (that consider AI as an external apparatus or as an administrative instrument), CGS considers AI as an internalised cognitive agent in the governance systems. CGS moves beyond public administration and the discourse of algorithmic governance and, by bridging systems theory, cognitive science, democratic theory and the literature of the AI governance, offers an integrated theory that conceptualises governance decision-making as an outcome of joint cognitive interaction mechanisms. Furthermore, CGS advances six basic constructs – HI, AI, CIM, DA, ALC and

GR – that enable us to conceptually describe governance as an adaptive cognitive ecosystem (Hollnagel & Woods, 2005; Wirtz et al., 2019).

9.2 Methodological Contribution

Methodological implications: From the methodological aspect, the study proposes a formal three-phase mixed method approach for theory building and validation for new governance systems. It offers an expert interview, a Delphi process and a structural equation modeling as a method to turn the more theoretical concepts into models that are testable empirically. With these methods, this research adds value to theory building in public administration through an integrated process of qualitative refinement and quantitative testing and the demonstrate how more complex theories as the concept of CGS can be formalized and empirically testable by using structural equation modelling.

9.3 Empirical Contribution

Despite being a theoretical proposal, CGS laid solid grounds for the future empirical research by outlining measurable concepts and relationships among human and artificial intelligence and their impacts on public governance outcomes such as public trust, the effectiveness of policies and good governance. Defining testable relationships among concepts and providing specific hypotheses and operationalization of the proposed constructs CGS allow for empirical tests across various contexts of public governance, such as the deployment of digital public services, the use of e-governance tools and AI-based policy decision making tools, paving the way for comparative cross-country studies and large-scale quantitative tests of human-AI governance model.

9.4 Governance Contribution

Regarding Governance, CGS presents a pragmatic blueprint for constructing AI-powered democratic governance structures; embedding the principles of democratic accountability, transparency, and institutional checks and balances directly into AI-driven decision-making processes. It offers an approach to help governance bodies to establish and realize blended governance models whereby both the judgment of humans and that of an AI assist one another as integral elements within integrated system networks, as opposed to isolated functional systems. This framework additionally highlights the importance of fostering and maintaining adaptable learning and governance resiliency as a crucial pillar for sustained organizational endurance and persistence within digitally influenced governance paradigms. In bridging efficiency and technological expertise with democratic integrity, CGS is a pivotal component to establishing a stronger, more accountable, and stable structure of governance during the epoch of AI.

10. Conclusion

This research has developed a Cognitive Governance Systems (CGS) Theory as a new lens through which human-AI co-governance within the democratic decision-making process can be understood. Existing works could not adequately provide comprehensive explanations of the role of AI into public governance with increasing prevalence, because governance theories are usually established to describe how humans make decision-making, not human-artificial systems with interacting cognitive architectures.

Therefore, this study has constructed a cognitive distributed system of human governance

incorporating HI, AI, CIM, DA, ALC, and GR under democratic decision constraints. In this view, decision-making in governance acts as a cognitive open system that comes about by the ongoing interaction among both the human agents and the AI agents. The article has provided the following four major insights. First, governance in the digital era is not a purely human-centered institution process anymore, it is a kind of hybrid cognitive system with the AI's active involvement in decision-making paths. Second, CIM is a key central operational layer that dictates both HI and AI in interacting, thereby influencing the quality of public administration outcomes. Third, DA is the key moderating factor for transparent and public-legitimized AI-human governance system, without it AI can be dangerous to democracy legitimacy(Yeung, 2018). Fourth, ALC and GR are significant properties in such system that enhance governance to learn adaptively and maintain resilience.

Public policy and institution design of a hybrid cognitive system: CGS has several implications for public policy makers and institutional designers. Public administrations need to devise appropriate systems to deploy AI in governance that respect the accountability to democracy; this implies strengthening public transparency of algorithms, establishing rules for clear accountabilities of human-AI shared responsibility decisions, and enforcing oversight and regulation functions within organizations. Government needs to devise hybrid decision-making systems where the AI supports but replaces humans; hence investing on training citizens and officers the concept of digital and artificial intelligences can also play role for implementation.

A Hybrid Cognitive Systems approach would also strengthen the capacity of the government to adapt decision-making systems that learn from their outcomes and efficiently manage complex real world social issues for all governments including developing countries and within their digital transformation initiatives.

The framework proposed by the study, however, has its own limitations. First, CGS is currently an innovative theory-building contribution and further evidence based research is warranted to prove the empirical validity across various governance systems. The constructs and relationships theorized have not been tested with sufficient scale data yet. Second, the conceptual basis for the CGS theory is derived from existing literature analysis, which limits generalisability of the theory to varied political institutions or contexts. Governance structures vary considerably from country to country and may require specific adaptations of CGS theory. Third, the human-AI hybrid interactions are complex and hard to operationalize.

Specifically, it remains challenging to capture CIM adequately for empirically testable analysis with sufficient statistical power. More works are suggested in future research to collect sufficient empirical data and testing CGS theory through structural equation modelling (SEM), nation-wide surveys and case studies of human-AI co-governance examples. Cross-national and comparative study should be undertaken to establish contexts for applications. The study should further developed suitable measurement scales for key constructs such as CIM and GR. Longitudinal studies should track the dynamism of CGS-based decision-making and adaptiveness to environmental changes and technological disruption. Furthermore, the future research is need to delve deeper into ethical and normative questions on how to establish an accountability and regulation mechanisms that facilitate responsible, human-friendly and democratic AI-governance systems in digital society (Wirtz et al., 2019).

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Ethics Statement

Not applicable.

References

Bovens, M. (2007). Analysing and assessing accountability: A conceptual framework. *European Law Journal*, *13*(4), 447–468. https://doi.org/10.1111/j.1468-0386.2007.00378.x

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Hair, J. F., Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Hollnagel, E., & Woods, D. D. (2005). J*oint cognitive systems: Foundations of cognitive systems engineering*. CRC Press. https://doi.org/10.1201/9781420038194

Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, *61*(4), 577–586. https://doi.org/10.1016/j.bushor.2018.03.007

Kitchin, R. (2017). Thinking critically about and researching algorithms. *Information, Communication & Society*, *20*(1), 14–29. https://doi.org/10.1080/1369118X.2016.1154087

Margetts, H., & Dorobantu, C. (2019). Rethink government with AI. *Nature*, *568*(7751), 163–165. https://doi.org/10.1038/d41586-019-01099-5

Simon, H. A. (1957). *Administrative behavior: A study of decision-making processes in administrative organization* (2nd ed.). Macmillan.

Wirtz, B. W., Weyerer, J. C., & Geyer, C. (2019). Artificial intelligence and the public sector: Applications and challenges. *International Journal of Public Administration*, *42*(7), 596–615. https://doi.org/10.1080/01900692.2018.1498103

Yeung, K. (2018). Algorithmic regulation: A critical interrogation. *Regulation & Governance*, *12*(4), 505–523. https://doi.org/10.1111/rego.12158