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From Data to Decisions: The Impact of Automated Decision-Making Systems on India's Welfare Schemes

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ABSTRACT

As India adopts algorithmic governance in social protection, its promises efficiency in welfare delivery. This study deals with how automated decision-making systems reshape welfare distribution and marginalised communities. The research investigates the transition from traditional welfare delivery to algorithmic rationality in social protection, focusing on efficiency gains versus potential exclusion risks. Using a qualitative research design with case study methodology, the study analyses two cases : Telangana's Samagra Vedika system and Haryana's Parivar Pehchan Patra initiative. The study identifies critical challenges, including privacy concerns, algorithmic bias, exclusion errors, lack of transparency, and inadequate accountability mechanisms. These systems disproportionately affect marginalised groups, creating new forms of digital exclusion while failing to address existing socio-economic disadvantages. The research concludes with recommendations for democratising data governance, including establishing minimum datasets, improving transparency, enhancing official training, implementing regular audits, and appointing district-level welfare data officers.

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Keywords : Automated Decision-Making Systems, Digital Welfare State Algorithmic Governance and Social Protection Schemes

Introduction

The transition from a welfare state rooted in distributive justice to one governed by algorithmic rationality marks a structural break in the politics of social protection. Several states have adopted automated decision-making (ADM) systems to determine eligibility, track compliance, and distribute benefits more efficiently. ADM systems have emerged as a crucial tool for enhancing efficiency, easing administrative processes, and providing targeted assistance. Traditional welfare delivery in India has long struggled with targeting accuracy and administrative efficiency. (Khera, 2011; Drèze and Khera, 2015). Manual processing application and verification are time-consuming and more prone to error in the distribution of welfare scheme benefits to the people(Narayan, 2022; Centre for Policy (Research, 2023).In this context, several states implemented schemes such as Samagra Vedika(Telangana), Parivar Pehchan Patra(Haryana), and various Family ID schemes to reduce shortfalls due to human intervention and associated errors.

ADM systems promise greater efficiency but simultaneously reinforce biases, exclusion errors, and large-scale data collection raises questions about privacy consent, security, and surveillance(Babbar et al., 2023). Moreover, the lack of transparency and accountability in algorithmic decision-making has been criticised for leading to social inequalities (Khera, 2019). The purpose of the research articles is to study how ADM can disadvantage marginalised groups and how it impacts their privacy, constitutional rights, and social justice outcomes. This paper addresses ADM's ethical and constitutional challenges in India's welfare schemes. It analyses how algorithmic governance affects vulnerable populations and what safeguards are required to protect their rights, with a detailed examination of case study analysis of various welfare schemes. The study aims to contribute by providing policy recommendations for better implementation of welfare schemes and enhancing algorithmic accountability, ensuring data protection.

Literature Review

Theoretical Foundations of an Automated Decision-Making System

The use of ADM in the public administration represents how the government has changed its interaction with citizens. Bovens and Zouridis (2002) identify three evolutionary stages of bureaucratic interaction with its citizens: street-level bureaucracies involving face-to-face interactions between citizens and government officials, screen-level bureaucracies, where citizens

primarily interact with computerised systems and system-level bureaucracies where decisions are fully automated without human intervention (Bovens & Zouridis, 2002). In India, for example, systems like Aadhaar, a biometric authentication platform, are now an essential part of welfare schemes for accessing government services.

Automated decision-making has become central to targeted social policies, such as cash transfers and subsidies in health, education, housing, energy, and food security, which are crucial for ensuring the welfare of the people. ADM systems in welfare administration serve multiple functions beyond simple automation.ADM systems in social welfare schemes means the use of computational systems to process people's data and make decisions. These systems follow set rules or models to decide who is eligible to get a benefit based on available data, often with little or no human involvement (Gillespie et al., 2014, pp. 196–220).These systems can be categorised based on their role in decision-making processes: "supportive" tools that assist human decision-makers by providing data analysis and recommendations, "replacement" systems that automate previously human-made decisions using predetermined rules and criteria, and "disruptive" innovations that introduce entirely new administrative models and transform existing governance structures(Dwivedi et al., 2021).In welfare schemes, algorithms function as replacement systems, for example, deciding a person's eligibility to receive social benefits and compliance monitoring, which humans previously handled. Algorithms help decision-makers by analysing historical data, finding patterns, and predicting future outcomes. These predictions are generated from large datasets and facilitate decision-making at a speed and scale that surpass human capabilities (Dowding & Taylor, 2024).

Evolution of Digital Governance in Welfare Systems

The digitalisation of welfare systems represents the latest phase, which Flora and Heidenheimer (1982) describe as the ongoing evolution of state capacity for social protection. This transformation builds upon earlier waves of computerisation in government that began in the 1970s. Initially focused on internal administrative efficiency through basic data processing and record-keeping, these systems gradually expanded to include citizen-facing services through e-government initiatives in the 1990s. (Grönlund & Horan, 2005). The welfare state in the 20th century was driven by the expansion of government bureaucracy, record-keeping, and identification systems, enabling closer monitoring of individuals and populations(Collington, 2021; Zajko, 2023). With the emergence of computer systems in the late 20th century, personal data became even more critical, increasing the power imbalance between individuals and government institutions (Zajko, 2023). The 21st century has

witnessed the emergence of "digital welfare states" - governance systems that rely heavily on algorithmic processing of citizen data for service delivery and benefit allocation(Alston, 2019).

Governments worldwide are increasingly adopting digitalisation, automation, and datafication in their public service schemes (van Toorn, Henman and Soldatiæ, 2024). Today, it is challenging to find any aspect of the welfare state untouched by digital transformation (McCully, 2020). This has given rise to the digital welfare state, which refers to governments leveraging technology to deliver public services, such as social welfare programs, and provide benefits in areas like health and education (Alston, 2019). A digital welfare state involves the use of various digital technologies, including automated decision-making systems, algorithms, Artificial intelligence(AI) and big data analytics (AI), in the administration and implementation of social protection schemes by government agencies (van Toorn, Henman and Soldatiæ, 2024).

India's Journey: Towards Algorithmic Governance

India's post-independence period (1947-1991) was characterised by what Jayal (1994) describes as a "charitable" approach to welfare, where governments viewed social protection as an act of benevolence rather than a citizen's entitlement. Welfare programs were often discretionary and focused on crisis response rather than systematic social protection, for example, in policies like famine relief, which provided temporary assistance instead of structural guarantees (Jayal, 1994).A significant shift occurred in 1991 as India transitioned from a state-centric model to a market-driven approach to governance (Biju & Gayathri, 2023). This transformation reflects a shift in the state's approach to welfare, from a charity model to principles of rights. (Tillin & Duckett, 2017). The early 2000s witnessed a significant expansion of social protection measures, mainly in response to the rising economic inequalities and market vulnerability increased by globalisation (Kapur & Nangia, 2015). The implementation of major programs like the National Rural Employment Guarantee Act and the National Food Security Act for addressing fundamental issues of people, like the right to food and the right to work. In the 2000s, India focused on e-governance with initiatives like the National e-Governance Plan (2006) to provide government services digitally(Government of India, 2006).

The Digital India initiative in 2015 represents a fundamental shift toward algorithmic governance of welfare systems.. One of the key objectives of Digital India is the "optimal utilisation of ICT infrastructure" for identification and authentication in delivering benefits. (Athique & Baulch, 2019, pp. 156 to 171)

.Aadhaar revolutionised service delivery by linking services to a digital identity, enhancing efficiency and reducing fraud. (Unique Identification Authority of India, 2021). Mobile governance expanded with apps like MyGov, DigiLocker, and UMANG for citizen engagement. Although the Supreme Court ruled that linking Aadhaar to welfare programs should be voluntary, concerns over data privacy and excluding marginalised groups from essential services persist.

Methodology

This study uses a qualitative research design and a descriptive analytical approach to examine the impact of ADM systems on welfare schemes. The research uses case study methods to analyse various states' interventions in ADM and how they integrated ADM into social welfare schemes and implementation challenges. Telangana's Samagra Vedika system and Haryana's Parivar Pehchan Patra are the primary cases examined. The research relies on secondary data sources. The study is limited because it had limited access to internal system documentation and performance metrics, restricted information about algorithmic designs, and mainly depended on reported rather than directly observed data.

Case Study

This paper analyses the implementation of automated decision-making (ADM) systems across various Indian states, with a primary focus on the Samagra Vedika system in Telangana and the Parivar Pehchan Patra initiative in Haryana.

Samagra Vedika: Telengana's Automated decision-making systems

Samagra Vedika System is an algorithmic system that creates a digital profile of over 30 million residents by collecting data from more than 30 government databases, including electricity connections,water bills, property records, vehicle ownership, pension schemes and tax information(Rao, 2019). Initially, this digital profiling aimed to identify criminals, but it later expanded to determine eligibility for welfare benefits. The Samagra Vedika System operates through data mining and an entity resolution process by Posidex Technologies Private Limited(Amnesty International, 2024). When an official assesses a welfare application, they must review the algorithmic predictions before making their own decisions. Government officials can override the algorithm's prediction but must provide a written justification. Officials often favour the system's automated decision over human judgment. This reflects what Bucher(2017) terms the Algorithmic imaginary", the tendency to

overestimate technological solutions while underestimating their social and political implications.

The implementation of the Samagra Vedika system resulted in exclusion from welfare programmes. Between 2014 and 2019, the Telangana government canceled more than 1.88 million existing food security cards. It rejected 142,086 new applications without notifying the affected individuals(Al Jazeera, 2024). The govt initially defended these actions, but later various reports revealed that thousands of these exclusions were wrongful, due to inadequate data and poor algorithmic decisions. One of the most documented cases involves Bismillah Bee, a 67-year-old widow living in a three-room house in a Hyderabad slum with 12 family members. The algorithm incorrectly identified her deceased husband, Syed Ali (a rickshaw puller), as owning a car by confusing him with Syed Hyder Ali, an actual car owner. This data error led to the cancellation of food security benefits despite being classified below the poverty line in census records.(Al Jazeera, 2024)[1].

Amnesty International criticised the implementation of the Samagra Vedika scheme due to minimal transparency, making it extremely difficult to audit or understand its decision-making processes. The scheme faces issues such as Name variations and misspellings across different databases, Inconsistent address formats, Data entry errors in government records, and Identity confusion between individuals with similar names(Amnesty International, 2024). Senior Advocate of the Supreme Court Colin Gonsalves stated that the government canceled 21.94 lakh ration cards using an algorithm with 17 parameters without issuing any notice to the beneficiaries. (Indian Express, 2022).

Parivar Pehchan Patra

The Parivar Pehchan Patra (PPP), or Family Identity Data Repository, was introduced by the Haryana government in 2019 to determine eligibility for various welfare benefits. Each family is assigned a PPP containing detailed demographic and socioeconomic information. Government agencies use this data to assess eligibility for welfare schemes(Haryana Parivar Pehchan Authority, n.d.). However, Implementation of PPP resulted in the discontinuation of pension benefits for elderly citizens and widows. The mandatory requirement for PPP registration has further compounded the problem (Al Jazeera, 2024).

[1] Al Jazeera, in partnership with the Pulitzer Center's Artificial Intelligence (AI) Accountability Network, conducted a study on the ADM system in the Samagra Vedika scheme

Barriers to Fairness: Challenges of Using ADM Systems in Welfare Schemes

The ADM system in social welfare schemes facilitates benefits distribution and management policies (Niklas, 2020). This spectrum of algorithmic governance influences various aspects of governance, including accountability, transparency, and responsibility, in different ways (Niklas, 2020). Adopting the ADM system within welfare agencies is driven by the goal of properly allocating resources and standardising decision-making processes(Niklas, 2020). Yet its implementation can pose challenges such as privacy concerns, Algorithmic bias exclusion, etc.

Privacy Concerns

Trust between citizens and the government is a multifaceted issue, influenced by several factors. One prominent concern is information privacy. Citizens worry about how their data is handled and processed (Cullen & Reilly,2007). Citizens' trust depends on the government's ability to use data responsibly while ensuring individual privacy (Sexton et al., 2017). So, welfare policies are one of the tools for shaping political trust; they can strengthen or weaken trust, depending on how effective these schemes are. Trust in government hinges on its perceived ability to protect citizens' privacy and deliver timely welfare promises. Citizens are often required to provide personal information to access the benefits of welfare schemes. This process includes multiple government agencies collecting, handling, and distributing citizens' data. So, safe data handling and clear communication on its use are essential for maintaining trust in the government's e-governance initiatives. Without this trust, even the most efficient technological solutions may fail to gain acceptance and achieve their intended impact.

Algorithmic Bias and Exclusion

According to the International Organisation for Standardisation, Bias means "the degree to which a reference value deviates from the truth".In an algorithmic system, bias means the outcome of ADM systems moves from impartiality and shows consistently erroneous behaviour (Sood, 2023). Since humans create algorithms, they are inevitably susceptible to bias, particularly cognitive bias, which is a pattern of deviance from reason when making decisions. This prejudice frequently results in inaccurate assessment, misrepresentation, or misinterpretation. "Algorithmic bias" describes organised, systematic mistakes in ADM systems that lead to biased outcomes and disparities. (Shin & Shin, 2023).ADM systems are criticised for their tendency to reinforce or replicate biases, exacerbate information asymmetry,

distort facts, and create opaque decision-making processes. They also contribute to systemic prejudice and unclear accountability.

Addressing algorithmic bias requires understanding the nature and mechanisms of AI systems. One major issue is the "black box" problem, where it is difficult to comprehend how AI systems make decisions or predictions—even developers themselves may lack complete insight into how these systems function(Awati & Yasar, 2023). In practice, an automated welfare-eligibility decision (e.g. inclusion or exclusion from a subsidy program) can happen without any clear rationale. If beneficiaries are denied support, they often have no insight into why or how to challenge the decision. Fairness and transparency must be central when using algorithms to make decisions in welfare assistance programs(Shin & Park, 2019).

In the Indian context, it is crucial to consider the society's unique socio-cultural and economic dynamics. Need to address the attitudes of government officials, as there is often a misplaced belief that technology cannot go wrong. A notable example is the case of Dhuli Chand, a resident of Haryana, who was removed from the state's Old Age Samman Allowance Scheme due to an algorithm error. Despite repeated attempts to prove he was alive, he was forced to organise a public procession to the office to demonstrate his living status. This incident reminds us of ensuring proper accountability and human oversight in such systems.(Al Jazeera, 2024).

Studies have shown that targeting algorithms for conditional cash transfers can disadvantage specific subgroups, leading to higher exclusion errors for urban and elderly households (Noriega & Pentland, 2018). In healthcare, decision-based algorithm systems can exacerbate existing health inequities for marginalised populations due to inadequate and limited datasets. (Bhatia et al., 2024). Some methods can be adopted to tackle this issue, such as diversifying training data, conducting institutional audits, and forming interdisciplinary teams (Bhatia et al., 2024).

Recommendations for Democratising Data and Mitigating Exclusion

To minimise errors in automated decision-making systems within welfare schemes, some of the measures are:

- Define a minimum dataset for each welfare scheme and publish it in the public domain, along with eligibility criteria for each social welfare scheme in plain language.
- Ensure that the data used in algorithms is comprehensive, accurate, and representative, with clear guidelines on what is included and excluded to reduce biases.

- In case of rejected applications, ensure communication with beneficiaries about why their application was rejected and how to apply again to access welfare scheme benefits.
- Ensure training for government officials who handle cases related to ADMs, for example, on how the system works.
- Improve the accuracy of predictions by regularly updating algorithms with real-time user data and ensuring that predictions are transparent and accountable.
- A collaborative approach to decision-making is essential, ensuring that algorithms do not operate in isolation when making critical decisions. There should be proper mechanisms of accountability in case ADMs go wrong.
- Educate users on how algorithms work and encourage feedback, allowing users to flag errors and contribute to improving the system's accuracy.
- Appoint a welfare data officer in each district to handle privacy complaints and publish how the case was resolved and the steps for complaint redressal.
- Publish a transparent data-flow map for each welfare programme, detailing what data is collected, who accesses it, and for what purpose.
- Conduct regular third-party audits to detect gaps in beneficiary data. Actively supplement training datasets with field surveys in underserved areas to ensure representation of all demographic groups.

Conclusion

The relationship between citizens and the state in India has changed with the introduction of digital technologies and AI-enabled services. Previously, interactions between the state and citizens were largely confined to physical spaces and material media. Gradually the state's presence has expanded into the digital realm (Athique & Baulch, 2019, pp. 156 to 171). Automated decision-making systems in welfare schemes have improved beneficiary identification and entitlement allocation. However, significant challenges continue, including informational gaps, the exclusion of entitled households, and the restriction of universal rights (Das & Masiero, 2019). Automated systems often fail to address all citizens equally, especially socio-economically disadvantaged groups.(Larsson, 2020). For example, fingerprint readability problems, connectivity issues with biometric point-of-sale machines, and high levels of illiteracy. (Athique & Baulch, 2019, pp. 156 to 171). Studies suggest that digital

services can reinforce inequalities and create new forms of exclusion (Park & Humphry, 2019). These issues must be resolved before fully implementing automated decision-making in welfare schemes.

A distributed governance approach can strengthen fairness in automated systems by decentralising three critical design choices: (a) identifying relevant population subgroups, (b) determining fairness criteria (e.g., parity or positive discrimination), and (c) selecting prioritisation criteria (such as income or multidimensional poverty). Raising awareness among stakeholders about the trade-offs in targeting rules is essential, as is fostering inclusiveness and transparency through broader discussions on targeting options.there is need to empower social institutions to design fair and accurate targeting rules tailored to their needs, operating under a distributed governance framework with enhanced transparency. In addition, efforts should focus on improving civil society participation, providing digital rights training, and fostering trust within India's digital identity ecosystem. This ensures that digital benefits are realised without worsening existing social disadvantages (Park & Humphry, 2019).

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