DIGITAL WORK STRAIN AND HUMAN SUSTAINABILITY IN E-GOVERNANCE: A MANAGEMENT PERSPECTIVE FROM PUBLIC SECTOR DIGITAL TRANSFORMATION IN MAHARASHTRA, INDIA

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Abstract

Digital transformation has become central to contemporary public-sector reform strategies, with governments increasingly deploying information systems to enhance service delivery, transparency, and accountability. Yet managerial evaluations of such initiatives continue to privilege technical and citizen-centric performance indicators, often neglecting their implications for employee well-being and organizational sustainability. Drawing on the literatures on technostress, human sustainability, and public-sector change management, this study introduces the construct of **Digital Work Strain (DWS)**—defined as the cumulative cognitive, temporal, procedural, and emotional pressures generated by digitally mediated governance systems.

Using a large-scale survey dataset originally collected for an empirical study of e-governance implementation in Maharashtra, India, the paper undertakes a secondary analytical re-examination of organizational and human-resource variables through a sustainability-oriented lens. DWS is operationalized as a second-order latent construct composed of process duplication, system complexity, monitoring intensity, training inadequacy, workload escalation, and work–home boundary intrusion. Structural equation modelling is employed to test the antecedents and consequences of DWS, with particular attention to its mediating role between organizational design features and work–life balance as well as perceived service-quality outcomes.

The findings demonstrate that deficiencies in process redesign and human-resource support significantly intensify Digital Work Strain, while system reliability and participatory design mitigate its effects. DWS exerts a strong negative influence on both work–life balance and perceptions of service effectiveness, thereby posing a substantive risk to the long-term human sustainability of digital-government programmes. By advancing Digital Work Strain as a higher-order management construct and empirically situating it within a sustainability-oriented public-administration framework, the study contributes to debates on responsible digital transformation and offers actionable guidance for managers seeking to balance technological ambition with workforce resilience.

1. Introduction

Digital technologies now permeate almost every aspect of public administration. Governments rely increasingly on enterprise information systems, digital service portals, real-time monitoring dashboards, and automated workflow engines to improve transparency, accountability, and citizen convenience. In India, national and state-level initiatives under the National e-Governance Plan and subsequent Mission Mode Projects have institutionalized online platforms across revenue administration, transport services, land-records management, district service centres, and judicial support systems.

While these reforms have delivered measurable gains in transaction speed and service accessibility, they have simultaneously transformed the everyday labour of public officials. Frontline employees are now required to operate multiple digital platforms, meet continuously updated performance targets generated by centralized systems, respond to citizens through online channels beyond conventional office hours, and comply with detailed audit trails embedded in software architectures. In many departments, these demands coexist with the persistence of paper-based registers mandated by legal or procedural requirements, producing hybrid workflows that amplify cognitive load and time pressure.

These developments raise critical managerial questions about the human sustainability of digital-government reforms—namely, whether public organizations can preserve employee well-being, morale, and adaptive capacity while pursuing aggressive technological agendas. Although information-systems research has long documented the phenomenon of technostress and its adverse

effects on employee attitudes and performance, the majority of such studies focus on private-sector contexts where technology adoption is often discretionary and work arrangements are more flexible. Public organizations differ in several important respects: digital systems are frequently mandatory, staffing ratios are constrained by statutory norms, political scrutiny heightens accountability pressures, and employees operate within rigid procedural frameworks.

Management scholarship has only recently begun to grapple with how these distinctive conditions shape employee experiences of digital transformation in government, leaving significant empirical and theoretical gaps. In particular, digital-government evaluations rarely integrate employee well-being into formal analytical models of reform sustainability. Human-resource challenges are often treated as peripheral implementation issues rather than systemic determinants of long-term organizational resilience.

This study addresses that lacuna by advancing the concept of **Digital Work Strain (DWS)** as an integrative construct capturing the cumulative pressures generated by digitally mediated work systems in public organizations. Drawing on technostress theory, sustainable-management perspectives, and public-sector change-management research, the paper reconceptualizes organizational and HRM impediments as drivers of a broader sustainability risk borne by employees.

Empirically, the study undertakes a secondary analysis of a large-scale survey conducted among officials in Maharashtra to examine human and process dimensions of e-governance implementation. By reframing previously measured indicators under the Digital Work Strain construct, the paper examines how People–Process–Technology (PPT) design characteristics shape employee strain and how such strain, in turn, influences work–life balance and perceived service effectiveness.

2. Literature Review

2.1 Digital Transformation and Public-Sector Management

Research on digital government has traditionally focused on service efficiency, transparency, accountability, and citizen participation (Heeks, 2006; Gil-Garcia, Dawes, & Pardo, 2018; OECD, 2020). Stage-based maturity models and IS-success frameworks dominate evaluations of public-sector ICT projects, often privileging system functionality and user uptake over organizational consequences. Early reform narratives framed technology primarily as a neutral instrument for rationalizing bureaucratic processes and reducing discretion. Subsequent scholarship, however, demonstrated that information systems are socially embedded artefacts whose effects depend heavily on institutional context, organizational culture, and managerial practices.

Comparative public-management research has shown that digital reforms frequently coexist with legacy structures, legal mandates, and professional norms that constrain radical process redesign (Pollitt & Bouckaert, 2017). As a result, many administrations experience incremental layering rather than wholesale transformation, producing hybrid arrangements in which digital platforms operate alongside manual registers, wet signatures, and physical verification requirements. These hybrid regimes complicate workflow coordination and generate new accountability relationships that frontline staff must navigate.

More recent studies recognize that digital transformation reshapes bureaucratic hierarchies, managerial control systems, and professional identities (Cordella & Iannacci, 2010). Algorithmic monitoring, performance dashboards, and centralized analytics enable senior officials to exercise real-time oversight over dispersed offices, potentially enhancing transparency but also intensifying perceptions of surveillance and loss of discretion. Scholars argue that such developments can alter motivation structures, redefine professional autonomy, and create compliance-oriented organizational climates.

In emerging economies, these dynamics are further shaped by infrastructural constraints, skill shortages, political pressures for rapid rollout, and ambitious service-coverage targets. Digital-government programmes are often implemented under tight timelines, leaving limited scope for participatory design or gradual capability building. These contextual features render employee experiences particularly salient for understanding the sustainability of reform trajectories.

2.2 Technostress and Digital Work

The technostress literature conceptualizes technology-related strain as arising from multiple sources, including techno-overload, techno-complexity, techno-invasion, techno-uncertainty, and technology-related job insecurity (Ragu-Nathan et al., 2008; Tarafdar et al., 2011; Ayyagari et al., 2011). Techno-overload refers to situations in which digital systems increase work volume or accelerate work pace; techno-complexity captures steep learning curves and interface difficulties; techno-invasion reflects the erosion of temporal and spatial work boundaries through mobile connectivity; techno-uncertainty arises from continuous system upgrades; and techno-insecurity relates to fears of deskilling or displacement.

Empirical studies across organizational contexts have linked these stressors to emotional exhaustion, burnout, reduced job satisfaction, diminished organizational commitment, and resistance to technological change. Physiological symptoms, absenteeism, and turnover intentions have also been documented. Moderating factors such as organizational support, user participation, autonomy, and digital literacy can buffer these negative effects, highlighting the managerial levers available to mitigate digitally induced strain.

Systematic reviews and meta-analyses confirm that technostress constitutes a significant occupational-health risk in digitally intensive workplaces (La Torre et al., 2019). However, most extant studies focus on corporate environments, knowledge workers, or voluntary technology adoption scenarios. Public-sector contexts—characterized by compulsory system use, statutory accountability regimes, political oversight, and standardized service mandates—remain comparatively under-represented in empirical investigations, particularly in developing and transitional economies.

2.3 Human Sustainability and Responsible Digitalization

Sustainability debates in management increasingly emphasize human and social dimensions alongside financial and environmental considerations (Pfeffer, 2010; United Nations, 2022). Human sustainability refers to organizational practices that preserve employee health, capability, engagement, and employability over time, thereby enabling institutions to deliver public value in a durable manner. Within public administration, this perspective aligns with emerging interest in resilient bureaucracies, learning organizations, and adaptive governance.

Digital transformation introduces new sustainability dilemmas. Continuous connectivity blurs work–home boundaries; data-driven performance management intensifies output pressures; rapid technological change renders skills obsolete; and algorithmic decision-support systems reshape professional judgement. Ethical debates concerning digital surveillance, privacy, and fairness further complicate the managerial landscape.

Despite these developments, dominant evaluation frameworks for e-governance initiatives continue to privilege service metrics, transaction volumes, and cost savings. Employee well-being is rarely incorporated as a core dimension of reform success, creating analytical blind spots. Scholars increasingly call for responsible digitalization approaches that embed human-centred design principles, participatory governance, and occupational-health safeguards into digital strategies.

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3. Conceptual Framework and Hypotheses

This study conceptualizes Digital Work Strain as a second-order latent construct emerging from People–Process–Technology design characteristics and shaping both employee and organizational outcomes. Process redesign quality, training adequacy, system reliability, and monitoring regimes are expected to influence the level of strain experienced by officials. In turn, Digital Work Strain is hypothesized to affect work–life balance and perceived service effectiveness.

Building on socio-technical systems theory, the framework assumes that misalignment between technical artefacts and organizational arrangements generates strain that accumulates over time. From a human-sustainability perspective, persistent strain erodes physical and psychological resources, undermines motivation, and constrains learning capacity, thereby threatening the durability of digital reforms.

H1: Process duplication positively influences Digital Work Strain.
H2: Inadequate ICT training positively influences Digital Work Strain.
H3: System reliability negatively influences Digital Work Strain.
H4: Monitoring intensity positively influences Digital Work Strain.
H5: Digital Work Strain negatively affects work–life balance.
H6: Digital Work Strain negatively affects perceived service quality.
H7: Digital Work Strain mediates the relationship between HRM impediments and governance outcomes.

4. Methodology

4.1 Research Design and Context

The study adopts a cross-sectional explanatory design using survey data originally collected as part of a doctoral investigation into e-governance implementation in Maharashtra. The research setting is particularly suitable for examining Digital Work Strain because the selected departments—Revenue and Transport—operate high-volume citizen-facing services, rely extensively on transaction-processing systems, and function under strict statutory timelines. Employees in these units routinely interact with multiple portals, biometric authentication devices, centralized dashboards, and audit systems, making them ideal cases for exploring digitally induced strain in public administration.

The research was guided by a socio-technical perspective, which assumes that outcomes of digital transformation emerge from the interaction between technological artefacts, organizational arrangements, and human capabilities. Accordingly, the questionnaire captured not only individual reactions to technology but also perceptions of process redesign, managerial practices, monitoring regimes, and training infrastructures.

4.2 Sampling Strategy and Data Collection

A purposive sampling approach was employed to reach officials directly involved in operating or supervising digital service platforms. Departmental heads were requested to nominate offices where Mission Mode Projects had been fully operational for at least two years, ensuring that respondents had sufficient exposure to stabilized systems rather than pilot implementations.

Questionnaires were distributed in both physical and electronic formats to accommodate varied access conditions across districts. Participation was voluntary and anonymous, and respondents were assured that their answers would be used solely for academic research. Of the 300 officials approached, 191 returned usable questionnaires, yielding a response rate of 63.7 percent. This level is considered acceptable for organizational survey research in public-sector settings where participation is constrained by workload and hierarchical approval processes.

4.3 Instrument Development

Survey items were adapted from established technostress and organizational-change scales and supplemented with context-specific statements derived from interviews conducted during the earlier doctoral fieldwork. Items were phrased to reflect public-sector realities such as mandatory system use, dual paper–digital processes, audit inspections, and training through government academies.

The questionnaire consisted of four main blocks: (a) process and system design characteristics; (b) human-resource support mechanisms; (c) Digital Work Strain indicators; and (d) outcome variables including work–life balance and perceived service quality. Demographic variables such as age, tenure, role, and level of digital experience were included as controls.

A pilot test with twenty officials was undertaken to ensure clarity and contextual relevance. Minor wording adjustments were made based on feedback, particularly to differentiate between workload arising from citizen demand and workload generated by system requirements.

4.4 Measurement Model

All substantive items were measured using five-point Likert scales ranging from strongly disagree to strongly agree. Process duplication items captured the extent to which manual registers and physical verification continued alongside digital workflows. Training adequacy assessed access to refresher courses, helpdesk support, and on-the-job guidance. Monitoring intensity measured perceptions of dashboard-based oversight, automated alerts, and inspection-triggered system logs.

Digital Work Strain indicators included statements on cognitive overload, learning pressure, emotional anxiety, time compression, and intrusion into non-work hours. Work–life balance items assessed difficulty disengaging from work, family disruption due to after-hours calls or portal alerts, and perceived exhaustion at the end of the working day. Perceived service quality captured respondents' assessments of responsiveness, error rates, and citizen satisfaction.

4.5 Data Analysis Procedures

Data screening was undertaken to identify missing values, outliers, and distributional anomalies. Exploratory factor analysis was first employed to examine dimensionality and to confirm whether items loaded on the theoretically expected constructs. Confirmatory factor analysis was subsequently conducted to test the measurement model and to assess convergent and discriminant validity.

Structural equation modelling was used to test the hypothesized relationships among antecedents, Digital Work Strain, and outcome variables. Bootstrapping procedures with 5,000 resamples generated confidence intervals for indirect effects, enabling mediation tests. Model fit was evaluated using multiple indices rather than relying on a single statistic, reflecting best practice in covariance-based modelling.

Checks for common-method variance included procedural remedies at the design stage—such as assuring anonymity and separating predictor and criterion blocks—as well as statistical diagnostics based on factor structure. Sensitivity analyses were also performed by estimating alternative models in which outcome variables were directly regressed on HRM and process factors without the mediating construct.

5. Results

Table 1. Respondent Profile

Parameter	Value
Targeted respondents	300
Valid responses	191
Departments	Revenue, Transport
Survey period	Apr–Jul 2025

Table 2. Descriptive Statistics for Digital Work Strain Dimensions

Dimension	Mean Range	SD Range
Process Load	4.42–4.78	0.41–0.50
Cognitive Strain	4.42–4.84	0.37–0.50
Temporal / Boundary Intrusion	3.89–4.73	0.41–0.89
Capability Strain	3.89–4.68	0.47–0.89

Table 3. Reliability Estimates

Construct	Cronbach's α
Process Load	0.85
Cognitive Strain	0.87
Capability Strain	0.84
Digital Work Strain	0.86
Work–Life Balance	0.85

Table 4. Structural-Model Path Estimates

Path	β	p
Process Duplication → DWS	0.32	<0.01
Training Deficit → DWS	0.28	<0.01
Monitoring Intensity → DWS	0.30	<0.01
System Reliability → DWS	−0.22	<0.05
DWS → Work–Life Balance	−0.45	<0.01
DWS → Service Quality	−0.37	<0.01

Model-fit indices indicated acceptable fit (CFI = 0.88; RMSEA = 0.07).

6. Discussion

The empirical findings provide strong support for the central proposition that Digital Work Strain constitutes a critical mediating mechanism linking organizational design choices to employee and service outcomes in public-sector digital transformation. Process duplication, inadequate training infrastructures, and intensive monitoring regimes emerged as particularly powerful drivers of strain, while system reliability exerted a mitigating effect.

6.1 Interpreting the Antecedents of Digital Work Strain

The positive association between process duplication and DWS underscores the unintended consequences of incremental digitalization strategies that layer new platforms atop legacy procedures. Instead of simplifying work, such arrangements compel employees to perform parallel documentation, reconcile inconsistencies between registers, and manage citizen expectations across channels. This finding resonates with broader public-management research on reform layering and institutional inertia, suggesting that partial process redesign can undermine both efficiency and employee well-being.

Training deficits also significantly increased DWS, highlighting the limits of one-off induction programmes in environments characterized by frequent software updates and evolving regulatory requirements. Respondents' narratives indicated that learning responsibilities were often shifted to individuals, who relied on informal peer support or trial-and-error approaches, thereby intensifying anxiety and cognitive overload.

Monitoring intensity exerted a strong positive influence on strain, pointing to the ambivalent consequences of data-driven oversight. While dashboards and automated alerts enhance managerial visibility, they can also foster climates of continuous surveillance and

perceived mistrust. Such environments may discourage experimentation and learning, replacing them with compliance-oriented behaviours that exacerbate emotional exhaustion.

6.2 Consequences for Human Sustainability

Digital Work Strain was found to exert a substantial negative effect on work–life balance, confirming concerns that digital connectivity and performance pressures extend bureaucratic labour beyond formal office hours. Officials reported difficulties disengaging from portals that generate real-time alerts and citizen grievances, eroding recovery opportunities essential for long-term health and motivation.

The negative association between DWS and perceived service quality suggests that strained employees may struggle to maintain attentiveness, empathy, and accuracy in citizen interactions. This finding challenges reform narratives that treat employee well-being and service performance as separate domains; instead, it indicates that sustainability of digital governance depends fundamentally on the condition of the workforce implementing it.

6.3 Theoretical Contributions

By integrating technostress research with public-sector management and sustainability perspectives, the study advances Digital Work Strain as a higher-order construct capturing systemic rather than merely individual sources of pressure. Unlike conventional stress models that emphasize personal coping styles, the DWS framework foregrounds organizational design, managerial controls, and institutional arrangements as root causes.

The mediation results contribute to digital-government scholarship by demonstrating that HRM and process variables influence outcomes primarily through their effects on employee strain. This insight suggests that reform evaluations focusing solely on system functionality or citizen uptake risk overlooking critical pathways through which digital initiatives succeed or fail.

7. Managerial and Policy Implications

The findings carry significant implications for managers responsible for designing and implementing digital-government programmes. First, process reengineering must accompany technological rollouts. Eliminating redundant registers, clarifying legal mandates for digital records, and streamlining approval chains can substantially reduce procedural overload.

Second, capacity-building strategies should be reconceptualized as continuous learning ecosystems rather than episodic training events. Regular refresher modules, peer-mentor systems, on-demand helpdesks, and certification pathways can mitigate capability strain and enhance employee confidence in navigating evolving platforms.

Third, monitoring systems require careful calibration. Performance dashboards should be complemented by developmental feedback mechanisms that emphasize problem-solving rather than punitive control. Transparent communication about how data are used can reduce perceptions of surveillance and rebuild trust.

Fourth, formal policies governing after-hours digital communication and escalation protocols are essential for protecting work–life boundaries. Rotational on-call arrangements and automated response systems can prevent chronic connectivity from becoming normalized.

At the policy level, governments should incorporate human-sustainability indicators into evaluation frameworks for e-governance initiatives. Regular staff well-being surveys, workload audits, and digital-ethics assessments can provide early-warning signals of emerging strain. Public-service commissions and training academies may play a crucial role in institutionalizing such practices across departments.

8. Limitations and Future Research

Several limitations should be acknowledged. The cross-sectional design restricts causal inference, and longitudinal studies are needed to track how Digital Work Strain evolves over successive waves of digital reform. Reliance on self-reported measures raises the possibility of common-method bias, although procedural and statistical remedies were employed to mitigate this risk.

Future research could extend the DWS framework to other sectors such as health, policing, and judicial administration, where digital platforms are rapidly transforming professional practice. Comparative studies across Indian states or between countries would illuminate how institutional environments condition experiences of digital strain.

Methodologically, integrating survey data with objective indicators—such as system downtime logs, transaction volumes, or absenteeism records—could strengthen causal claims. Qualitative approaches, including ethnographic observation and diary studies, may also uncover micro-level coping strategies and informal workarounds that remain invisible in structured questionnaires.

Finally, intervention-oriented research evaluating the effectiveness of training programmes, participatory design initiatives, or boundary-management policies would move the field from diagnosis toward evidence-based solutions.

9. Conclusion

Digital Work Strain constitutes a critical but under-examined dimension of public-sector digital transformation. By empirically demonstrating its mediating role between organizational design features and governance outcomes, this study calls for management frameworks that prioritize workforce sustainability alongside technological innovation.

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