



Beyond On-Time Performance: A Dignity- and Justice-Oriented Punctuality Index for Airline Disruption Governance

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Abstract

Airline punctuality is still governed mainly through on-time performance (OTP), yet flight-centred threshold metrics cannot fully explain how delay is experienced by passengers whose journeys involve cancellations, missed connections, vulnerability, uncertainty, information asymmetry or loss of institutional trust. This article develops a dignity- and justice-oriented Human-Centred Punctuality Index (HCPI) as a design-science and conceptual measurement artefact for reframing punctuality as a socio-technical governance construct. The study synthesizes passenger-delay literature, service quality and recovery justice theory, trust and public-value perspectives, consumer-protection principles, Islamic ethical sources on dignity and justice, and airline KPI-governance work to construct a four-dimensional index: operational time reliability, dignity preservation, justice-oriented trust recovery and social value protection. As a conceptual design-science contribution, the article specifies a reproducible measurement architecture, construct logic, candidate indicators, normalization principles, governance ownership and a validation pathway; empirical weighting, predictive validity and cross-carrier benchmarking remain necessary tasks for future research. The proposed model advances air transport management by distinguishing delay occurrence from delay consequence and by treating communication, fairness, care, recovery speed, vulnerability-sensitive support and integrity-oriented professionalism as governable performance domains. Practically, HCPI provides airlines, airports, regulators and policymakers with a dashboard-ready framework for moving from punctuality reporting toward auditable disruption governance. Its principal limitation is that empirical weights, thresholds, predictive validity and cross-carrier comparability require future validation using linked operational, passenger-experience, complaint and service-recovery datasets.

Key words: Airline punctuality, on-time performance, passenger delay, service recovery, passenger dignity, justice, KPI governance, aviation management.

1. Introduction



Punctuality is among the most visible and operationally consequential indicators in commercial aviation. It shapes aircraft rotation, crew legality, gate allocation, connection integrity, baggage recovery, airport coordination, passenger satisfaction, disruption cost and brand credibility. In most airline and regulatory performance systems, punctuality is operationalized through OTP, commonly expressed as the proportion of flights departing or arriving within a fixed tolerance such as the widely used 15-minute reporting threshold [1]. This metric is necessary because airlines, airports and regulators need a stable measure for schedule control, network planning and public accountability. However, necessity is not sufficiency. A metric can be operationally useful and still fail to describe the passenger-centred reality of disruption.

The central problem is that conventional punctuality measures are usually flight-centred whereas disruption is experienced at journey level. Passenger-delay studies have repeatedly shown that flight-leg delay statistics may underestimate passenger harm because they do not fully capture cancellations, diversions, missed connections, rebooking delay, itinerary delay and the magnitude of passenger-level loss [2-5]. A network can therefore display acceptable flight-level punctuality while a materially affected subset of passengers experiences severe journey disruption. Conversely, a delayed flight may preserve passenger trust when the airline communicates transparently, provides realistic recovery options, protects vulnerable travellers and delivers care consistently. This tension makes punctuality a governance problem, not only an operations-control problem.

The issue has become more acute because airlines are increasingly data-rich but experience-fragile. Schedule padding, tactical turnaround decisions and operational buffers can improve apparent punctuality while increasing block time, resource consumption or passenger journey duration [6]. At the same time, airport experience research has moved beyond narrow efficiency indicators toward the interaction of spatial, digital, human and economic factors in shaping passenger perception [7]. Consumer-protection regimes and public dashboards also increasingly treat disruption as a bundle of information, care, rebooking, accommodation, compensation and complaint-handling obligations rather than only elapsed minutes [8-10]. The practical question is therefore not only whether the aircraft moved on time, but whether passenger time, dignity and trust were governed responsibly during disruption.

This article therefore positions human-centred punctuality as a post-digital service-governance agenda rather than an anti-digital argument. Digital tools, artificial intelligence, disruption dashboards, customer data platforms and operational control systems are necessary enablers, but they are not sufficient indicators of excellence. In a mature airline, digital capability should be judged by whether it protects human dignity, improves fairness, supports vulnerable passengers, strengthens truthful communication and disciplines workplace conduct through integrity-oriented professionalism. The proposed index translates this ethical ambition into a measurable governance architecture without treating religious or moral meaning as a reducible KPI.

The research gap is not that OTP is useless. OTP remains indispensable for operational discipline. The gap is that OTP is insufficient as a passenger-centred and governance-level measure because it weakly captures delay consequence, disruption recovery quality, perceived fairness, vulnerability-sensitive support, trust restoration and social harm. Existing passenger-delay metrics improve journey-level measurement but do not fully integrate dignity, trust and public value. Service-recovery theory explains fairness and complaint experience but is rarely embedded into punctuality dashboards. Consumer-protection frameworks specify rights and care obligations but do not provide a composite performance architecture. Aviation KPI literature offers dashboard logic but often treats punctuality, customer experience, recovery justice and social accountability as separate domains.[۲۰-۲۶]



This article asks: How can airline punctuality be reconceptualized and measured as a multidimensional construct integrating operational time reliability, passenger dignity, justice-oriented trust recovery and social value protection? The purpose is to develop a defensible measurement artefact rather than to report completed empirical validation. The article contributes by (1) reframing punctuality as a socio-technical governance construct beyond flight-leg OTP, (2) operationalizing dignity, trust and social value into a composite KPI architecture, and (3) specifying an evidence-bounded validation pathway through linked operational, service-recovery, complaint and passenger-experience data. The unit of analysis is the disrupted passenger journey, not the aircraft movement alone. Causal effects, completed survey findings and universal weights remain outside the present scope.

2. Literature Review and Research Gap

The literature most directly challenging traditional OTP begins with the distinction between flight delay and passenger delay. Bratu and Barnhart demonstrated that conventional flight-based delay metrics can misrepresent passenger outcomes because cancelled flights and missed connections often generate longer passenger delays than the delayed flight legs captured by standard operational statistics [2]. Sherry, Wang and Donohue developed the consumer-protection critique further by arguing that passenger-facing performance information should account not only for the probability of delay but also for its expected magnitude and itinerary consequence [3]. Wang and colleagues similarly showed that flight delay is an incomplete proxy for passenger trip delay because cancelled, diverted and missed-connection journeys create rebooking delay not visible in simple flight-leg OTP [4]. Cook and colleagues argued for passenger-oriented enhanced metrics because the average delayed flight and the average delayed passenger are analytically different objects [5]. The implication for HCPI is foundational: punctuality must be evaluated not only at flight-leg level but also at passenger-journey level.

A second stream concerns schedule construction and operational efficiency. Malighetti and colleagues highlighted that airlines can influence apparent punctuality through turnaround tactics and schedule padding, creating a possible divergence between reported on-time performance and resource efficiency [6]. This matters because a punctuality metric can incentivize behaviour that improves a threshold while worsening passenger journey time, fleet productivity or connectivity. The emerging airport-experience literature reinforces this concern by showing that passenger satisfaction in complex hubs cannot be reduced to a single operational metric; it is shaped by the balance between technology, human contact, spatial burden, price-value perception and service support [7]. The implication is that punctuality measurement should avoid rewarding narrow threshold compliance when the broader passenger experience deteriorates.

A third stream is service quality. SERVQUAL identifies reliability, responsiveness, assurance, empathy and tangibles as core dimensions of perceived service quality [11]. Although developed outside aviation, these dimensions are directly relevant to disruption because passengers evaluate not only the delay itself but also whether the airline responds reliably, provides credible assurance, demonstrates empathy and maintains adequate service conditions. Zeithaml, Berry and Parasuraman further linked service quality to behavioural consequences such as loyalty, recommendation, complaint behaviour and willingness to remain with a provider [12]. For airlines, this means that a punctuality failure can become a loyalty failure if recovery is poorly managed. HCPI therefore treats service response as an integral component of punctuality governance rather than as a separate customer-service afterthought.



A fourth stream is service recovery justice. Tax, Brown and Chandrashekar conceptualized complaint experience as a relationship-management process shaped by fairness, interaction quality and procedural treatment [13]. Smith, Bolton and Wagner showed that satisfaction after service failure depends on recovery attributes, not merely on the existence of a failure [14]. Airline service-recovery research similarly indicates that recovery quality may shape passenger behavioural intention after disruption [15]. This stream helps separate disruption cause from recovery accountability. A technical defect, weather event or air traffic restriction may be operationally unavoidable, but opaque communication, slow rebooking, inconsistent care and disrespectful treatment are managerial failures. HCPI therefore measures whether the airline's recovery process preserves procedural, interactional and outcome fairness.

Trust theory adds a fifth lens. Mayer, Davis and Schoorman define organizational trust through perceptions of ability, benevolence and integrity [16]. During disruption, passengers test all three dimensions. Ability is visible in operational competence and rebooking capability. Benevolence is visible in care, empathy and prioritization of vulnerable passengers. Integrity is visible in truthful communication, consistent rules and fair compensation. Delay itself may damage satisfaction, but trust loss often arises from perceived opacity, neglect, broken promises or unequal treatment. HCPI therefore includes trust recovery as a distinct dimension because operational recovery and relational recovery are not identical.

Public value and capability perspectives broaden the discussion beyond individual satisfaction. Moore's public-value approach emphasizes legitimacy, accountability and the creation of value for citizens and service users [17]. Sen's capability approach and Nussbaum's human-development framework clarify why disruption can restrict practical agency, social participation and access to important life opportunities [18,19]. A passenger delayed en route to a funeral, examination, medical appointment, court hearing, pilgrimage connection or essential work obligation experiences punctuality as more than lost minutes. The same elapsed delay may have very different social consequences across passengers. The implication is not that airlines must perfectly know every passenger's private purpose, but that a governance index should recognize vulnerability, criticality, fairness and avoidable social harm.

Service-dominant logic provides a sixth lens because it interprets value as co-created through service interactions rather than embedded solely in the transport product [20]. In disruption, value is co-destroyed when the passenger is left uninformed, unsupported or humiliated; it is partially restored when the airline enables informed choice, continuity of care and feasible recovery. Airport Service Quality practice and aviation KPI work reinforce the need for measurable, comparable and decision-relevant experience indicators [21-26]. Prior aviation KPI-governance studies show that airport services, lounge management, AI-enabled passenger experience and consumer behaviour, AI-enabled passenger experience and airline analytics can be structured through operational, customer, digital, financial, sustainability and governance indicators [22-26]. HCPI builds on this KPI-governance orientation but narrows it to the specific theoretical problem of human-centred punctuality.

The synthesis reveals a precise gap. Passenger-delay literature improves the measurement of journey disruption but does not sufficiently integrate dignity, trust and social value. Service-quality and service-recovery literatures explain why treatment matters but do not provide an airline punctuality index. Trust and public-value theories explain legitimacy and agency but require operationalization for airline disruption management. Aviation KPI literature supplies dashboard discipline but often lacks a construct-level integration of passenger-delay severity, recovery justice and social accountability. HCPI addresses this gap by designing a composite measurement architecture that preserves the operational value of OTP while adding human-centred dimensions that can be governed, audited and empirically validated.



A complementary normative lens strengthens the conceptual basis of dignity-sensitive disruption governance. The Qur'an presents human honour as attached to the children of Adam, not as a privilege of class, nationality, religion, ticket value or operational category [27]. It also rejects social distinction as a basis of superiority by linking nobility to taqwa, which is used here not as a measurable spiritual state but as a managerial translation of moral accountability, restraint, fairness and integrity in work [28]. Other Qur'anic passages command justice even under antagonism, require standing firmly for justice even when inconvenient, and connect justice with ihsan, or beneficent excellence beyond minimum compliance [29-31]. Nahj al-Balagha's instruction to Malik al-Ashtar further articulates a universal governance ethic by describing people as either brothers in religion or equals in creation [32]. In this article, these sources do not replace service science, consumer-protection law or aviation operations research. They provide a disciplined ethical vocabulary for explaining why passenger dignity, non-discrimination, care and fair recovery can be treated as elements of airline service excellence and social legitimacy.

3. Methodology

This article uses a conceptual design-science research logic. The aim is to construct a measurement artefact that responds to an identified managerial and theoretical problem: OTP is necessary for operational control but insufficient for passenger-centred punctuality governance. The artefact is the Human-Centred Punctuality Index, consisting of constructs, dimensions, candidate indicators, normalization logic, governance ownership and a future validation pathway. The research design is not causal and does not report new primary data. Accordingly, the article avoids causal claims such as asserting that HCPI improves loyalty or reduces complaints. It claims only that HCPI offers a structured architecture for measuring and governing punctuality as a multidimensional construct.

The evidence base for the conceptual design draws on passenger-delay studies, service quality and recovery justice literature, organizational trust theory, public-value and capability perspectives, consumer-protection sources, normative ethical sources on dignity and justice, and prior aviation KPI-governance work. These sources were synthesized to define the construct domain, specify the dimensions of the proposed index and develop a future validation pathway. The study is therefore designed as a conceptual design-science article: it develops and specifies the index architecture, while empirical testing, weighting and cross-carrier validation are reserved for subsequent research.

The unit of analysis is the disrupted passenger journey. The operational flight leg remains necessary for airline control but is insufficient for human-centred analysis because passenger harm can arise from itinerary disruption, missed connections, rebooking delay, service uncertainty, baggage delay, care failure or communication breakdown. The model therefore assumes that future empirical implementation would link passenger service system data, departure control system events, airport operational data, disruption-control decisions, rebooking records, customer relationship management contacts, complaint outcomes, voucher or care records and post-disruption feedback. This linkage must be privacy-preserving, purpose-limited and auditable.

The artefact was constructed through five design steps. First, the problem was specified from the gap between flight-level punctuality and passenger-level disruption. Second, the construct domain was defined from passenger-delay, service-quality, recovery-justice, trust, public-value and KPI-governance literatures. Third, each construct was translated into an operational dimension: operational time reliability, dignity preservation, trust recovery and social value



protection. Fourth, candidate indicators were selected according to measurability, relevance, auditability and decision usefulness. Fifth, the index was specified as a normalized composite score that can be weighted and validated through future empirical research.

The proposed validation pathway is mixed-methods, but it is not claimed as completed in this manuscript. Quantitative validation should test internal consistency, dimensionality, convergent and discriminant validity, sensitivity to alternative weights, predictive validity for complaints and trust outcomes, and incremental explanatory power beyond OTP. Qualitative validation should examine passenger narratives, frontline staff interpretation, vulnerable-passenger cases, complaint files and management decision logs to test whether the four dimensions capture meaningful disruption harm. Expert validation could use Delphi panels or analytic hierarchy process to calibrate weights before statistical estimation. Cross-carrier validation should compare business models, airport types, route structures and jurisdictions. Ethics and governance are embedded in the method. Passenger-level disruption data can be sensitive because it may reveal disability assistance, medical travel, minors, family emergencies or financially vulnerable passengers. HCPI should therefore be implemented through pseudonymization, role-based access, data-minimization, retention limits, purpose limitation and bias review. The index must not be used to discriminate among passengers or to allocate care only to commercially valuable travellers. Its governance purpose is to detect harm, improve recovery and create accountability. A future empirical study must provide ethics approval or a clear institutional determination, a data-protection impact assessment where applicable and a reproducible codebook.

4. Human-Centred Punctuality Index

The proposed HCPI is a composite governance index designed to complement, not replace, OTP. OTP answers the operational question: did the flight meet the threshold? HCPI answers the passenger-governance question: did the airline manage the disrupted journey in a way that protected time, dignity, trust and social value? The index contains four dimensions. Operational time reliability measures journey-level time consequence beyond flight-leg punctuality. Dignity preservation measures whether passengers received transparent information, respectful treatment, care and vulnerability-sensitive assistance. Trust recovery measures whether the airline restored credibility after disruption through competence, benevolence and integrity. Social value protection measures whether disruption governance minimized avoidable harm, unequal burden and legitimacy loss.

The generic index can be specified as follows:

$$HCPI_i = w_{OTR}OTR_i + w_{DPP}DPP_i + w_{TRP}TRP_i + w_{SVP}SVP_i$$

$$w_{OTR} + w_{DPP} + w_{TRP} + w_{SVP} = 1, \quad w_k \geq 0; \quad k \in \{OTR, DPP, TRP, SVP\}$$

where OTR denotes operational time reliability, DPP denotes dignity preservation performance, TRP denotes trust recovery performance, and SVP denotes social value protection. Each sub-score should be normalized to a common 0–100 scale before aggregation; therefore, the composite HCPI_i also ranges from 0 to 100, with higher values indicating stronger dignity- and justice-oriented disruption governance. Normalization rules should be explicit. Positive indicators such as timely information delivery, rebooking completion rate, assistance continuity and complaint closure within service-level agreement can be scaled upward. Negative indicators such as journey delay severity, unassisted waiting time, missed



critical connections, unresolved complaints and repeated communication failure can be reverse-scaled.

Operational time reliability should include indicators that move beyond flight-leg arrival delay. Candidate measures include passenger itinerary delay, missed-connection recovery time, cancellation recovery time, delay severity band, baggage arrival reliability, connection protection rate and recovery completion factor. The key design principle is that a disrupted passenger's total journey experience should not disappear because the affected flight leg is treated as only one operational event. This dimension draws directly from passenger-delay literature showing that the passenger journey is the more appropriate unit for consumer-centred punctuality assessment.[۲-۵]

Dignity preservation should include information timeliness, explanation clarity, special-assistance continuity, access to food or accommodation where applicable, queue exposure, staff-respect indicators, family and minor protection, and complaint-handling accessibility. Dignity is not treated as a metaphysical quantity; it is operationalized through observable service conditions that either preserve or undermine respectful treatment. This dimension is grounded in service quality and recovery justice because passengers evaluate disruption through responsiveness, empathy, assurance, fairness and interaction quality.[۱۱-۱۵]

Within HCPI, dignity preservation is therefore not a rhetorical value added to a digital dashboard; it is a measurable service-governance duty. The dimension should test whether disruption management treats every passenger as a bearer of dignity, whether priority care is justified by vulnerability and journey criticality rather than commercial status alone, whether communication avoids humiliation and opacity, and whether frontline conduct reflects justice-oriented professionalism. This framing is compatible with both service-recovery justice and the normative concepts of human honour, justice, ihsan and equality in creation.[۱۳-۱۵,۲۷-۳۲]

Trust recovery should include recovery promise accuracy, rebooking turnaround time, consistency of compensation and care, transparency of cause communication, complaint resolution service-level agreement, post-disruption trust score and repeat-contact burden. Trust recovery is distinct from satisfaction because it concerns whether the passenger believes the airline remains competent, honest and caring after service failure [16]. Social value protection should include essential-journey sensitivity, vulnerable-passenger protection, fairness across passenger segments, public accountability, community-impact escalation and regulatory complaint risk. This dimension translates public value and capability reasoning into decision-relevant airline governance.[۱۷-۱۹]

Weighting must be evidence-bounded. An airline may initially use equal weights for a pilot dashboard, but formal benchmarking, regulatory reporting or cross-carrier comparison requires empirical calibration. Delphi panels can estimate normative importance; analytic hierarchy process can structure expert trade-offs; regression or structural equation modelling can test associations with trust, loyalty, complaints and perceived fairness; and sensitivity analysis can show whether conclusions are robust to alternative weights. The index should be reported with sub-scores, not only a single composite. A high total score should never be allowed to hide a severe failure in vulnerable-passenger care, complaint accessibility or communication integrity. Implementation requires ownership. Operations control should own operational time reliability; customer experience and airport services should own dignity preservation; service recovery and CRM should own trust recovery; compliance, passenger rights and executive governance should own social value protection. Data governance should own definitions, lineage, access rules and quality controls. The executive committee should review HCPI monthly, while operational control and disruption teams should use selected indicators daily during irregular



operations. The index becomes useful only when each indicator has an owner, threshold, data source, cadence, escalation rule and corrective-action pathway.

5. Propositions and Validation Pathway

Because the current article is design-science and conceptual, it presents propositions rather than empirical findings. Proposition 1 is that passenger-journey delay severity is expected to explain passenger harm more effectively than flight-leg OTP alone in disruption contexts involving cancellations, diversions, missed connections and rebooking. This proposition follows from passenger-delay studies showing that flight metrics can underrepresent passenger trip delay [2-5]. Proposition 2 is that dignity preservation will be positively associated with perceived fairness after disruption, even when elapsed delay is substantial. This proposition follows from service-quality and recovery-justice theory [11-15]. Proposition 3 is that trust recovery is expected to mediate the relationship between disruption-management quality and post-disruption behavioural intention. This proposition follows from organizational trust and service-recovery logic. [15, 16]

Proposition 4 is that social value protection will be most visible in heterogeneous passenger contexts where the same delay creates unequal harm across passenger groups, journey purposes and vulnerability categories. This proposition draws on public-value and capability perspectives [17-19]. Proposition 5 is that HCPI is expected to provide incremental managerial value over OTP when integrated into a governance cadence that connects indicators to owners, service-level agreements, escalation rules and corrective action. This proposition draws on KPI-governance and aviation performance-management work [20-26]. These propositions are deliberately framed as testable expectations, not as completed results.

A robust validation study should proceed in stages. The first stage should establish construct validity through expert review and passenger interviews. The second stage should pilot data linkage across flight events, passenger itineraries, rebooking records, care delivery, complaints and survey responses. The third stage should estimate reliability and dimensionality, comparing alternative factor structures and weights. The fourth stage should test predictive and incremental validity by examining whether HCPI explains complaint escalation, trust loss, repeat travel intention or regulatory complaint risk beyond OTP. The fifth stage should conduct cross-airline, cross-airport and cross-jurisdiction benchmarking. A final stage should evaluate governance impact by observing whether HCPI review cycles change recovery decisions, resource allocation and policy learning.

The validation pathway must also protect against measurement failure. Common-method bias may arise if all dignity and trust variables are collected from the same post-disruption survey. Survivorship bias may occur if only passengers who respond to surveys are included. Data-linkage bias may occur if passengers with irregular itineraries or disrupted rebookings are poorly matched across systems. Incentive bias may occur if managers manipulate visible indicators. Ethical risk may occur if passenger vulnerability is inferred without consent or used commercially. These risks require multi-source data, transparent lineage, independent audit, bias testing, privacy controls and explicit separation between care allocation and commercial prioritization.

6. Discussion

The proposed HCPI changes the scholarly framing of punctuality in three ways. First, it shifts the unit of analysis from aircraft movement to passenger journey without denying the



operational necessity of flight-leg OTP. Second, it integrates time reliability with service recovery, trust and social value, thereby converting punctuality from a narrow threshold statistic into a governance construct. Third, it embeds measurement within executive accountability by requiring data ownership, cadence, escalation and correction. This is important because many airlines already possess large volumes of operational and customer data but lack a coherent architecture that converts those data into auditable disruption-governance decisions.

The ethically significant move is that HCPI raises the benchmark of airline excellence above digitalization alone. A carrier may deploy advanced applications, automated notifications, biometric identity, artificial intelligence, customer data platforms and real-time disruption tools, yet still fail at excellence if passengers are left confused, unequally treated, unsupported or humiliated. Conversely, a digitally enabled airline reaches a higher maturity level when technology becomes the infrastructure for justice, truthful communication, care, inclusion and accountable recovery. This is the sense in which human-centred punctuality can be understood as a dignity-and-justice layer above the digital layer, not as a substitute for it.

The model also clarifies the difference between operational disruption and moralized blame. HCPI does not assume that every delay is avoidable or that airlines should be punished for safety, security, weather or air-traffic constraints. It distinguishes the cause of disruption from the quality of recovery. This distinction is essential in aviation because safety-critical decisions must never be subordinated to customer-satisfaction metrics. A safety-driven delay may be operationally correct and ethically necessary. The governance question is whether the subsequent passenger experience was transparent, fair, respectful and recoverable.

For theory, HCPI integrates previously separate conversations. Passenger-delay research explains why flight metrics are incomplete [2-5]. Service-quality and service-recovery theory explain why treatment and fairness shape post-failure evaluation [11-15]. Trust theory explains why competence, benevolence and integrity matter during uncertainty [16]. Public-value and capability perspectives explain why equal elapsed delay can create unequal social harm [17-19]. KPI-governance work explains how indicators become decision systems rather than passive dashboards [20-26]. The contribution is therefore not a claim that dignity and trust are new topics; it is the integration of those constructs into the specific measurement architecture of airline punctuality.

For practice, airlines can use HCPI as a control-tower extension. During irregular operations, selected indicators can support prioritization of high-risk passengers, vulnerable travellers, missed-connection clusters and severe itinerary delays. After disruption, the full index can support executive review of recovery performance, complaint drivers, communication quality and policy failures. Airports can use related indicators to coordinate queue management, information provision, special assistance and terminal care. Regulators can use the architecture to complement compensation-focused rules with governance-sensitive monitoring of information, care and complaint handling. The dashboard should not be used as a public-relations score; it should be used as a learning and accountability mechanism.

The model has risks. Composite indices can obscure failures if sub-scores are hidden. KPI systems can be gamed if incentives reward the score rather than the underlying passenger outcome. Passenger-level data can create privacy and discrimination risks if vulnerability or journey purpose is inferred without safeguards. Premium-passenger bias can occur if commercial value dominates social value. Frontline teams can be burdened if new indicators are introduced without staffing, authority and training. These risks require transparent formulae, mandatory sub-score reporting, independent data-quality audit, bias review, privacy-by-design, balanced incentives and governance oversight.



The main limitation of this article lies in the maturity of its evidence base. The article is intentionally positioned as a conceptual design-science contribution rather than as a completed empirical validation. It therefore does not provide airline-level operational datasets, passenger survey coefficients, structural model estimates, expert-panel weights or cross-carrier benchmarks. Future research should test the proposed index through pilot implementation, passenger-level disruption data, expert weighting procedures and comparative validation across different airline business models and regulatory contexts. Accordingly, the present contribution should be read as a theoretically grounded and methodologically structured design artefact whose empirical refinement remains a necessary next step.

7. Conclusion

This article has argued that airline punctuality should not be measured only as aircraft movement against a fixed threshold. OTP remains operationally necessary, but it is insufficient for understanding the human consequences of delay, cancellation, missed connection and service disruption. A passenger-centred approach must ask whether the airline preserved dignity, restored trust and protected social value while recovering the journey.

The Human-Centred Punctuality Index provides a measurement architecture for this broader view. It integrates operational time reliability, dignity preservation, trust recovery and social value protection into a normalized index that can be linked to airline systems, dashboard routines and executive governance. The framework is deliberately evidence-bounded: it specifies constructs, indicators, ownership and validation logic, while empirical testing remains a subsequent research task. Its future strength depends on passenger-level data linkage, mixed-methods validation, weight calibration, privacy safeguards and cross-carrier benchmarking.

For airline leaders, the implication is direct. The future of punctuality governance is not merely to make flights appear on time, nor merely to digitize disruption management. It is to make passenger time accountable, recoverable, dignified and fair. In that sense, HCPI proposes a higher standard of airline excellence: digital capability disciplined by human dignity, justice-oriented recovery and integrity in professional conduct. This paper contributes to shifting the scholarly conversation on punctuality from flight-threshold reporting toward human-centred disruption governance and enables airlines, airports and regulators to design more accountable recovery decisions in practice and policy.

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