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User-Centered Mobile Application Design for Standards, Compliance, and Regulatory Services in Saudi Arabia under Vision 2030

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Abstract- ***Background: Saudi Arabia's digital transformation has shifted many public interactions from office-based transactions to mobile and integrated digital services. Standards, compliance, licensing and regulatory services are especially demanding because users must interpret formal requirements, submit evidence, understand status changes and act within prescribed time limits. A technically functional application can therefore fail if its information architecture, language, error handling or trust cues do not match the user's decision process. Objective: This review synthesises recent evidence on user-centred mobile government, accessibility, digital trust, regulatory technology and citizen-centric service design to identify design principles for mobile standards and compliance services in Saudi Arabia under Vision 2030.***

Methods: A structured integrative review was undertaken using 30 peer-reviewed, DOI-verified sources published from 2020 to 2025. Evidence was coded across usability, regulatory clarity, accessibility, trust, service integration and continuous improvement, then translated into a design framework for high-consequence public service journeys. Results: The synthesis indicates that effective regulatory applications require more than simplified screens. They should convert rules into task-based pathways, make obligations and consequences visible at the point of action, support Arabic-first and accessible interaction, provide traceable status and evidence handling, minimise avoidable data entry, and expose clear routes for correction and human support. Conclusions: User-centred design can operate as a governance mechanism as well as an interface discipline. When regulatory logic, accessibility, trust and service orchestration are designed together, mobile services can reduce administrative burden while strengthening consistency, transparency and compliance outcomes.

Keywords: user-centred design; mobile government; regulatory services; compliance; Saudi Arabia; Vision 2030

I. INTRODUCTION

Saudi Vision 2030 has made digital government a strategic instrument for improving service quality, institutional efficiency and accessibility. Recent research on emerging technologies in Saudi public organisations shows that strategic alignment, accessibility and operational efficiency are important adoption drivers, while legacy integration, interoperability and organisational resistance remain material constraints [1]. These conditions matter directly for standards and regulatory services. Unlike low-risk informational applications, regulatory journeys require citizens, professionals and businesses to understand authoritative rules, satisfy eligibility criteria, upload documentary evidence, respond to deficiencies and retain confidence that a digital decision is procedurally valid. The mobile interface is therefore not a cosmetic layer over regulation; it is where formal policy is translated into user action. Poor translation can generate repeated submissions, avoidable support contacts, missed obligations and distrust even when the underlying rule is correct.

Evidence from Saudi mobile government already identifies usability and accessibility as persistent determinants of service quality [2]. Adoption studies further show that perceived usefulness, awareness, self-efficacy, information quality and trust influence whether citizens engage with public digital services [3-5]. Research focused on older Saudi users is particularly instructive because it demonstrates that age, culture and context alter the meaning of an otherwise acceptable interface [6]. These findings challenge a common implementation assumption: once a paper process has been digitised, the service is considered transformed. User-centred digital government instead requires reconstruction of the

service around what users are trying to accomplish, what they need to understand at each stage, and where the state must provide evidence, explanation or reassurance.

The distinction becomes sharper in standards, compliance and regulatory domains. These services often combine dense terminology, conditional logic, recurring obligations, payment, inspection, certification and appeals. The user may be uncertain not only about how to operate the application but also about what a requirement means, whether it applies, what evidence is sufficient, and what happens if an action is late or incorrect. A user-centred approach must therefore address interaction usability and regulatory comprehension simultaneously. Studies of government application redesign show that observation of user pain points, task performance and perceived experience can reveal problems that conventional feature checklists miss [7,8]. Broader reviews of mobile government similarly identify efficiency, learnability, satisfaction, error management and accessibility as interdependent quality attributes rather than separate interface concerns [9].

This review treats a mobile regulatory service as a socio-technical service system in which interface design, rule representation, identity, evidence, notifications, organisational workflows and trust signals must work as one experience. Service-design research shows that accuracy and completeness of the core service need to be complemented by accessibility, privacy, security, support, personalisation and transparency [10]. Mobile-government evidence also links online service quality and perceived value to satisfaction and success [11], while Gulf-region studies show that ease of use, usefulness, information quality and trust shape adoption of smart government applications [12,13]. The implication is that compliance cannot be improved by adding more instructions to a difficult interface. The service must make the correct action easier to understand, easier to complete and easier to verify.

The paper therefore connects human-computer interaction with digital-government and regulatory-technology scholarship. Its contribution is not to propose a new regulation or to assess one existing Saudi application. Rather, it develops a review-based design logic for mobile services that mediate standards and compliance obligations. The central argument is that user-centred design supports public value when it reduces unnecessary cognitive and administrative burden without weakening legal precision, auditability or institutional control. This balance is central to citizen-centric digital government, where the user can be understood simultaneously as an end user, a participant in design, a stakeholder in governance and a recipient of public outcomes [14].

II. AIM, OBJECTIVES AND REVIEW QUESTION

The aim of this review is to determine how user-centred mobile design can improve the delivery of standards, compliance and regulatory services in Saudi Arabia while remaining consistent with the efficiency, inclusion and digital-transformation ambitions associated with Vision 2030. Four objectives guide the synthesis: to identify recurring user-experience barriers in mobile public services; to examine how regulatory requirements can be translated into understandable, auditable user journeys; to integrate accessibility, localisation, trust and service-quality evidence into a coherent design framework; and to propose evaluation criteria that public entities can apply before and after deployment. The review question is: which design conditions allow a mobile regulatory service to make compliance easier for legitimate users without reducing the accuracy, transparency or enforceability of the underlying requirements?

III. METHODOLOGY

A structured integrative review was selected because the research problem spans several literatures that use different methods and units of analysis. Relevant evidence appears in mobile-government usability studies, digital-service adoption research, accessibility and inclusive-design research, citizen-centric public administration, regulatory engagement and technology-enabled compliance. A narrowly defined intervention review would exclude useful design evidence, whereas an unrestricted narrative review

would make the basis of synthesis difficult to reproduce. The integrative approach therefore used explicit temporal, topical and quality boundaries while permitting empirical studies, systematic reviews and theoretically grounded design papers to contribute to the same analytical framework.

The evidence window was limited to 1 January 2020 through 31 December 2025 so that the synthesis reflects current mobile design practice and post-pandemic digital-government conditions. Searches were organised around combinations of mobile government, digital government, e-government, user-centred design, citizen-centricity, usability, accessibility, Arabic interface, trust, service quality, regulation, compliance, standards and regulatory technology. Saudi Arabia was the priority context, but evidence from the Gulf and other digital-government environments was retained when it addressed a transferable interaction or governance problem. Candidate records were traced through scholarly publisher indexes, citation metadata and DOI-level records, with emphasis on peer-reviewed sources represented in major academic indexing ecosystems.

A source was eligible when it was published between 2020 and 2025, supplied a resolvable DOI, and contributed direct evidence or a defensible conceptual mechanism relevant to mobile public-service design. Studies were excluded when they were published outside the period, lacked DOI-identifiable scholarly metadata, focused only on backend technology without user or service implications, or duplicated the same contribution. Regulatory-technology studies from financial settings were retained selectively because they explain how digital systems change the cost, traceability and operational effects of compliance [17,18]; they were not treated as direct evidence about Saudi users. Similarly, mobile-app standards research from another regulated domain was included for its treatment of quality criteria and standardisation rather than for domain-specific outcomes [19]. The final synthesis corpus contains 30 sources, all listed in the reference section.

Analysis proceeded in two stages. First, each source was coded against six design domains: journey and information architecture; regulatory clarity and decision support; trust, privacy and security; accessibility and localisation; interoperability and proactive service delivery; and measurement and continuous improvement. Second, findings were compared across domains to identify convergent design requirements and important tensions. Particular attention was given to tensions between simplification and legal precision, automation and explainability, security and interaction friction, personalisation and privacy, and digital convenience and inclusive access. No statistical pooling was attempted because the included studies use heterogeneous outcomes and contexts. The result is a qualitative design synthesis intended to support requirements definition, prototyping and service evaluation rather than to estimate a single pooled effect size.

Methodological quality was judged through relevance, transparency of method, clarity of constructs and the extent to which reported findings could be translated into a mobile-service design decision. No paper was excluded solely because it used a qualitative, quantitative or review design; instead, claims were weighted according to what the original method could reasonably support. Saudi and Gulf evidence received greater contextual weight for cultural, adoption and public-service issues, whereas international evidence was used mainly for mechanisms such as accessibility, co-design, service recovery and regulatory engagement. DOI metadata were checked against publisher or scholarly index records before the reference list was finalised. This approach reduces citation uncertainty while avoiding a false impression that every included study is equally applicable to every Saudi regulatory context.

IV. THEMATIC SYNTHESIS

4.1 Journey Design, Cognitive Load and Error Recovery

The first synthesis theme is that regulatory applications should be organised around user journeys rather than agency structures. Users normally approach a service with an outcome in mind: obtain a licence, verify conformity, renew a certificate, respond to an inspection finding or understand an obligation. They do not naturally think in the same categories used by a regulator's internal departments. User-centred

evaluation has shown that redesigning around observed pain points can improve performance and perceived quality [7], while government-app evaluation research emphasises the combined importance of interface, information and experiential quality [8]. A practical implication is to structure navigation around recognisable tasks, expose prerequisite information before form entry, and show the user's current position in the process. Long forms should be decomposed into meaningful stages with visible progress, saved state and a clear statement of what will happen next.

This task orientation is especially important where errors have consequences. Mobile-government usability research treats efficiency, effectiveness, learnability and error handling as mutually reinforcing attributes [9]. A regulatory service should therefore prevent predictable errors before submission rather than merely reject them afterwards. Field-level validation, examples of acceptable evidence, date and format constraints, and contextual definitions can reduce avoidable failure. When a rejection remains necessary, the message should identify the failed rule, explain what can be corrected, distinguish a correctable deficiency from an ineligibility decision, and provide the next procedural option. Such recovery design is not customer-service decoration; it is part of procedural fairness because the user needs enough information to act on the state's decision.

Service quality also depends on reducing duplicated effort. Evidence on mobile-government success indicates that citizens evaluate the digital channel through both service quality and the value it creates relative to alternatives [11]. Re-entering identity data already held by government, repeatedly uploading unchanged documents or being asked to navigate separate applications for adjacent steps reduces that value. Where lawful and technically feasible, data should be reused through consented integration, pre-filled fields and verified digital credentials. The design principle is not maximum automation but minimum unnecessary burden: users should still be able to inspect critical information, correct inaccurate data and understand the source of pre-populated content.

4.2 Regulatory Clarity, Decision Support and Traceability

The second theme concerns translation of regulation into actionable language. Standards and compliance services contain terms that are precise for specialists but ambiguous for occasional users. The interface must preserve the legal meaning while separating the rule itself from the explanation required to complete a task. One useful pattern is layered disclosure: a concise instruction appears first, followed by the applicable criterion, examples, documentary evidence and a link to the authoritative rule when more detail is needed. This avoids the false choice between an oversimplified interface and a screen filled with formal text. Citizen-centricity research supports this distinction by showing that design must connect user needs with governance and end-result perspectives rather than treating ease of use as the only objective [14].

Regulatory clarity should also be temporal. Users need to know which obligations apply now, which are pending, and which become active after a decision, inspection, expiry date or status change. The application should therefore represent compliance as a stateful lifecycle rather than a collection of disconnected forms. Dashboards can display active authorisations, open actions, upcoming deadlines, unresolved findings and evidence history. Proactive digital-service research suggests that appropriately designed services can reduce administrative burden when government anticipates predictable needs rather than waiting for a user to rediscover them [15]. In a standards context, this can mean renewal reminders, pre-expiry checks, notifications that a referenced standard has changed, or an early warning that submitted evidence will expire before review is completed.

However, proactivity must not become opaque automation. A notification should state why it was generated, what information triggered it, the consequence of ignoring it, and whether the user can contest or correct the underlying data. Regulatory engagement research shows that digital tools improve reach only when information is accessible and users receive adequate support to contribute or respond [16]. The same principle applies to compliance interaction.

A user who is told that an obligation applies without seeing the relevant basis may perceive the system as arbitrary. Traceable rule-to-action mapping therefore becomes a design requirement: each consequential prompt, warning or decision should be capable of being linked to a policy rule, service condition or verified data point.

Evidence handling deserves separate attention because documents are often the bridge between a regulatory rule and a digital decision. Users should be told the purpose, acceptable format, validity period and minimum content of each requested item before capture or upload. The interface should distinguish evidence that is missing from evidence that is present but inadequate, and it should retain previous accepted documents when the rule permits reuse. Where automated extraction is used, extracted values should be shown for confirmation when they affect eligibility or a decision. This design makes the evidential chain visible to the user and reduces the risk that a technically successful upload is mistaken for regulatory acceptance. It also supports staff by improving submission quality before cases enter back-office review.

4.3 Trust, Privacy, Security and Auditability

The third theme is trust. In public regulatory services, trust is not produced by visual polish alone. It emerges from accurate information, predictable behaviour, visible authority, privacy protection, security and the ability to understand what the system has done. Saudi evidence links system quality, information quality, usefulness and trust to satisfaction with mandatory e-government services [4,5], while regional adoption studies identify security, risk and trust as antecedents of mobile-government use [12,13]. Consequently, trust cues should appear at moments of uncertainty: before identity verification, before sensitive data are shared, before payment, when evidence is transmitted, and when a decision is issued.

A high-trust interface should explain data use in context rather than relying exclusively on a distant privacy policy. If a permission or document is required, the application should say what is needed, why it is needed, how it affects the decision and whether it will be reused. Security controls should be proportional to risk and integrated into the journey so that strong authentication does not produce unnecessary repetition. Where sessions expire or verification fails, recovery should protect the account without destroying completed work. Trust research in digital public environments shows that information quality, structural assurances, privacy, security and ease of use can reinforce one another [30]. This means that a secure service that repeatedly surprises or confuses users may still be experienced as untrustworthy.

Regulatory technology adds an institutional dimension to trust. Technology-driven compliance can increase traceability and standardise control activities, but it can also introduce fixed costs, dependence on data quality and new operational consequences [17]. Reviews of regulatory technology likewise emphasise governance, fraud prevention, analytics and the interaction between innovation and regulation [18]. For mobile public services, the lesson is to maintain an auditable event trail without exposing users to unnecessary system complexity. Submission receipts, versioned documents, timestamped status histories and clear ownership of outstanding actions allow both the user and the authority to reconstruct what occurred. Auditability should therefore be designed as a shared assurance mechanism, not merely an internal compliance log.

4.4 Accessibility, Arabic Localisation and Inclusive Participation

The fourth theme is inclusive interaction. Accessibility is particularly important in regulatory services because exclusion can prevent a person from exercising a right, meeting an obligation or continuing a business activity. Studies across e-government contexts show that usability and accessibility materially affect end-user satisfaction [20]. Mobile accessibility research identifies recurring difficulties for users with visual impairments and highlights the need for screen-reader compatibility, meaningful labels, logical focus order, adaptable text, non-visual feedback and interaction patterns that do not depend on colour or gesture alone [21]. Evidence from government mobile applications also demonstrates that formal accessibility requirements do not guarantee conformance unless

they are embedded in procurement, development, testing and complaint-response processes [26].

Saudi context adds two further design requirements: age inclusivity and Arabic-first interaction. Research with older Saudi users shows that culture, cognitive demands and context can require locally adapted usability guidance rather than simple reuse of generic mobile conventions [6]. Arabic interface research similarly shows the value of language-specific guidance and expert validation [22]. For regulatory services, Arabic and English should be treated as coordinated service languages rather than one interface being a partial translation of the other. Terminology needs controlled equivalents, numbers and dates must be displayed consistently, bidirectional layouts should preserve reading order, and document instructions should use examples that make sense in the local administrative context.

Inclusive design also requires participation. Co-design is frequently invoked as a solution to accessibility problems, yet research with people with disability shows that participation can fail when users are consulted without meaningful influence over decisions [23]. Studies of digitally vulnerable populations likewise show that awareness, access and inclusion vary across user groups [24], and organisational research identifies stakeholder structures and institutional capability as important conditions for accessible e-government [25]. A Saudi regulatory app should therefore test critical journeys with users who vary in age, digital confidence, language preference, disability, professional expertise and familiarity with the relevant regulation. Testing should include completion under realistic constraints, not only preference ratings on static prototypes.

4.5 Interoperability, Proactive Delivery and Human Support

The fifth theme is service integration. Standards and compliance journeys often cross organisational boundaries: identity may be verified by one service, a licence held by another, payment processed elsewhere, and inspection evidence generated by a separate authority or accredited body. Users experience these dependencies as one task even when government systems do not. Mobile public-service research demonstrates that applications can improve access to information and procedural interactions when they are designed as coherent digital channels [27,28]. The design priority should therefore be orchestration: the mobile service should disclose dependencies, transfer the user with context when another channel is unavoidable, and return status information to a single understandable view.

Integration must be paired with human escalation. Evidence on standardised public services indicates that digital interfaces do not automatically reduce satisfaction, but service failure and psychological cost still matter, and explanation can support recovery [29]. Regulatory applications should provide assisted routes for exceptional cases, contested data, accessibility barriers and ambiguous obligations. The aim is not to recreate office queues inside a chat channel; it is to ensure that automation has a defined boundary. A well-designed service makes routine compliance self-service while making non-routine problems easy to identify, route and resolve. This combination protects efficiency without forcing users to guess how the institution handles exceptions.

V. PROPOSED USER-CENTRED FRAMEWORK FOR SAUDI REGULATORY MOBILE SERVICES

The synthesis supports a six-layer framework for user-centred regulatory mobile services. The first layer is user intent: the application begins from the task the user needs to complete and the consequences attached to that task. The second is interaction clarity: navigation, content hierarchy, forms and feedback minimise unnecessary cognitive effort. The third is regulatory translation: rules are represented as criteria, evidence requirements, deadlines, decisions and correction paths without changing their legal meaning. The fourth is trust and assurance: identity, privacy, security, payment, evidence transfer and decision history are explained and recorded. The fifth is inclusion and localisation: Arabic and English content, accessibility, age-related needs and assisted alternatives are treated as core requirements. The sixth is service orchestration: authoritative data, notifications, related services and human case

handling are connected around the user's end-to-end journey.

Figure 1 visualises these layers as an architecture in which the user is not merely placed at the centre of the screen but linked to institutional controls around the service. This is important because user-centred design can be misunderstood as reducing friction at any cost. In regulatory work, some friction is legitimate: identity must be proven, evidence may require validation and consequential actions may warrant confirmation. The design problem is to distinguish necessary friction from accidental friction. Necessary friction protects rights, safety or integrity and should be clearly explained. Accidental friction arises from duplicated data, unclear wording, fragmented channels, preventable errors or invisible status changes and should be removed.

Figure 2 converts the framework into an evidence-to-outcome pathway. User research and regulatory requirements provide the inputs; clarity, accessibility, trust and traceability act as design mediators; and task success, reduced errors, confidence and adoption form the immediate outcomes. At an institutional level, these outcomes can support more consistent compliance, fewer avoidable contacts, better-quality submissions and a clearer evidence trail. The model also creates a feedback loop: analytics should reveal where users abandon tasks, trigger validation errors, request support or resubmit documents, while qualitative research explains why those events occur. Continuous improvement should then modify content, workflow or policy implementation while preserving version control so that changes remain auditable.

Table 1 summarises the evidence-to-design translation, and Table 2 provides an evaluation framework for implementation. Together they encourage teams to test a regulatory app against more than screen-level usability. A service can be easy to navigate but still fail if its regulatory explanation is incomplete; accessible but untrustworthy if data use is unclear; secure but inefficient if authentication is repeated unnecessarily; or technically integrated but procedurally confusing if ownership of the next action is invisible. High-quality design therefore depends on joint review by service owners, regulatory specialists, designers, accessibility experts, security teams and representative users.

Implementation should therefore use staged evaluation rather than a single usability test near launch. Early concept testing can verify whether users understand service categories and regulatory language; prototype testing can measure task completion, error frequency and accessibility; pre-production testing can examine identity, payment, evidence and notification flows across integrated systems; and post-launch monitoring can identify new failure patterns. Each stage should include explicit pass criteria for regulatory correctness as well as interaction quality. For consequential journeys, teams should record which rule version was tested and retain evidence of accessibility and content review. This creates an assurance trail showing that the service was not only technically deployed but deliberately evaluated against the obligations and user needs it mediates.

For evaluation, this means pairing usability indicators with regulatory outcome indicators. Completion rate and time-on-task should be read alongside documentary accuracy, correct interpretation of obligations, successful recovery from deficiencies, accessibility conformance, support escalation and confidence in the decision trail. Measuring both sides prevents teams from optimising speed at the expense of compliance quality, or preserving procedural complexity simply because the underlying rule has historically been difficult to navigate.

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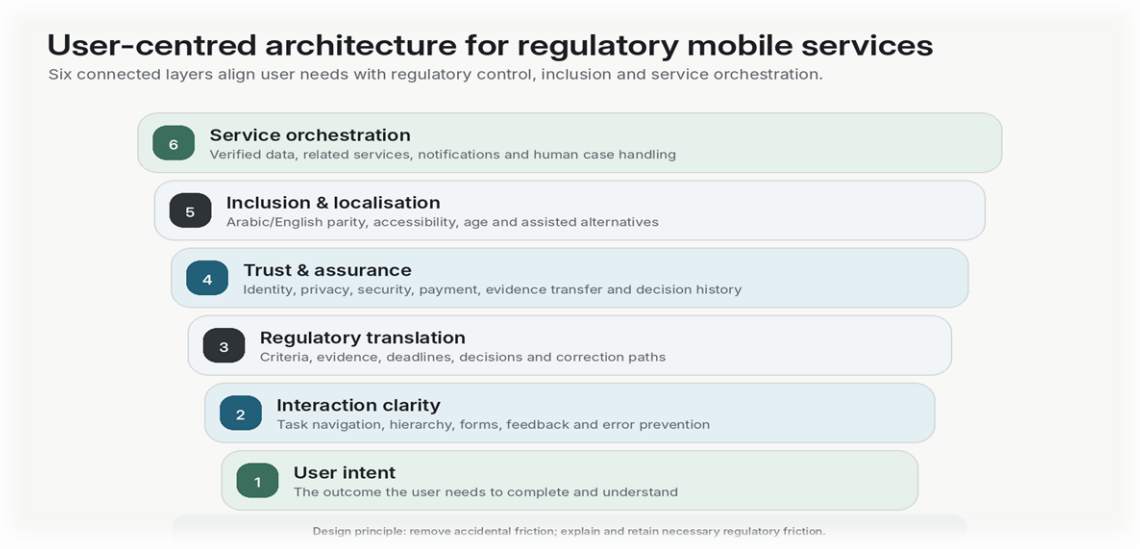

Figure 1. User-centred architecture for regulatory mobile services. Source: review synthesis.

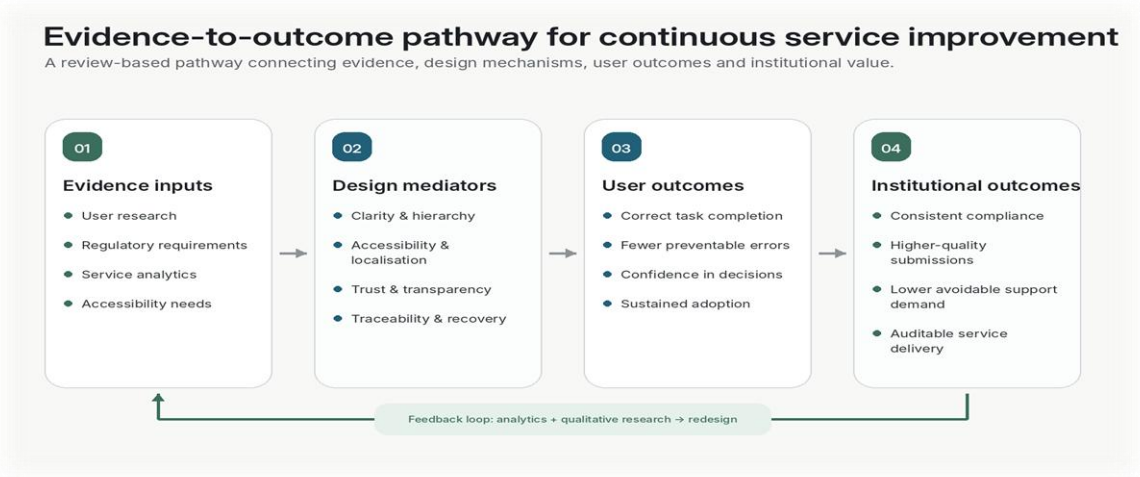

Figure 2. Evidence-to-outcome pathway for continuous service improvement. Source: review synthesis.

Table 1. Evidence-to-design synthesis for mobile standards and compliance services.

Domain	Evidence synthesis	Design response	Indicative measures
Journey & information architecture	Users approach services through intended outcomes, while fragmented agency structures and long forms create cognitive burden [7-11].	Task-based navigation; prerequisites before data entry; staged forms; visible progress; contextual validation and recovery.	Completion rate; time-on-task; validation errors; abandonment; repeat submission.
Regulatory clarity & traceability	Citizen-centric and proactive services require accessible explanation, visible obligations and support for response [14-16].	Layered rule explanations; lifecycle dashboards; deadline logic; reasoned prompts; rule-to-action traceability.	Interpretation accuracy; missed deadlines; correction success; support contacts about meaning.

Domain	Evidence synthesis	Design response	Indicative measures
Trust, privacy & security	System quality, information quality, trust and perceived risk shape satisfaction and adoption [4,5,12,13,30].	Contextual data-use explanations; proportionate authentication; preserved progress; receipts and status history.	Authentication failure; privacy-related abandonment; dispute rate; confidence rating.
Accessibility & localisation	Accessibility failures can exclude users even where digital access exists; Saudi age, culture and Arabic interface needs require local adaptation [6,20-26].	Arabic/English parity; assistive-technology support; adaptable text; logical focus; inclusive research and testing.	Accessibility conformance; assisted-service demand; completion by user segment; complaint resolution.
Integration & human support	Mobile public services create value when channels are coherent, but exceptional cases still require clear recovery and escalation [27-29].	Pre-fill verified data; preserve context across services; expose dependencies; define boundaries for automation and assisted handling.	Duplicate entry; cross-service failure; escalation resolution time; repeated contact.

Table 2. Proposed pre-release and post-launch evaluation framework.

Evaluation dimension	What good looks like	Evidence and decision rule
Regulatory correctness	Every consequential instruction, validation, notification and decision is linked to the current rule or service condition.	Rule mapping reviewed by regulatory owner; version recorded; test cases include eligible, ineligible and deficiency scenarios.
Usability	Users can understand where to start, what is required, what happened and what to do next.	Moderated task testing; completion rate; time-on-task; error severity; comprehension questions.
Accessibility & bilingual parity	Core journeys work with assistive technologies and convey equivalent meaning in Arabic and English.	Manual and automated accessibility checks; screen-reader testing; language-content review; representative-user testing.
Trust & assurance	Identity, payment, permissions, evidence transfer and status changes are explained at the point of action.	Security journey review; privacy comprehension; failed-authentication recovery; receipt and audit-trail inspection.
Evidence quality	Users understand acceptable documents and can distinguish upload success from regulatory acceptance.	Document-quality errors; evidence rejection reasons; reuse rate; extraction-confirmation accuracy.

Evaluation dimension	What good looks like	Evidence and decision rule
Service orchestration	Related services and authoritative data are connected without hiding ownership or next actions.	Integration tests; duplicate-entry rate; cross-service completion; hand-off failure; case ownership visibility.
Continuous improvement	Analytics and qualitative research are connected to controlled content and workflow change.	Abandonment/error dashboards; support themes; change log; rule-version traceability; post-release regression testing.

VI. POLICY AND PRACTICE IMPLICATIONS

For Saudi public entities, the framework suggests several implementation priorities. Product teams should define end-to-end regulatory journeys before defining screens, create a controlled plain-language layer linked to authoritative rules, and include accessibility and bilingual content requirements in procurement and acceptance criteria. Service analytics should measure completion, error recovery, support demand and time to verified outcome rather than downloads or log-ins alone. Governance should require documented ownership for rule changes, notification logic and content updates so that the application remains aligned with current obligations. These practices support Vision 2030 not because mobile technology is intrinsically transformative, but because they convert digital capacity into more intelligible, efficient and accountable public service delivery [1].

The framework also has implications for standards bodies and regulators. Regulatory content should be designed for digital execution at the point when rules or procedures are created, not translated into screens only after policy is finalised. Structured eligibility criteria, machine-readable status states, defined evidence types and explicit appeal or correction routes make later mobile implementation more reliable. Technology teams, in turn, should not infer legal meaning from prose without governance. Joint design between policy and product functions can reduce the gap between institutional intent and user experience while maintaining a verifiable chain from rule to interaction.

VII. LIMITATIONS AND FUTURE RESEARCH

This review has limitations. It synthesises heterogeneous studies rather than estimating a pooled effect, and several transferable sources come from jurisdictions or regulated sectors outside Saudi Arabia. The evidence base also changes quickly as government applications, accessibility standards and digital identity infrastructure evolve. The framework should therefore be treated as a design hypothesis to be validated on specific Saudi regulatory services. Future studies should compare task performance before and after redesign, include users with different accessibility and language needs, measure the effect of rule explanations on compliance accuracy, and examine whether proactive notifications reduce missed obligations without creating notification fatigue or privacy concerns.

VIII. CONCLUSION

Mobile standards, compliance and regulatory services are successful when they make authoritative processes understandable without making them less authoritative. The reviewed literature shows that usability, accessibility, trust, information quality and citizen-centric service design are mutually dependent. For Saudi Arabia, a user-centred regulatory application should organise services around user intent, translate rules into traceable actions, support Arabic-first and accessible interaction, explain data and security decisions, integrate related government capabilities, and preserve routes for correction and human support. This approach reframes interface quality as part of regulatory quality. By removing accidental burden while retaining necessary controls, public entities can create digital services that are easier

to use, easier to audit and more consistent with the service-transformation objectives of Vision 2030.

The principal design test is therefore whether a legitimate user can move from uncertainty to a correct, evidenced and traceable action with proportionate effort. That test keeps user experience connected to regulatory purpose. It also gives agencies a practical basis for prioritising investment: redesign should focus first on points where misunderstanding, exclusion, repeated data entry or opaque decisions are most likely to produce non-compliance or unnecessary administrative work. A mature mobile service can then become a reliable front door to regulation rather than an additional digital layer that users must decipher.

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