

REVIEWER'S REPORT

Manuscript No.: IJAR-59184

Title: Human-Centered Mobile Application Design for Saudi Digital Services under Vision 2030: Integrating Accessibility, Responsive Performance, Usability, and Unified Design Systems.

Recommendation:

Accept as it is
Accept after minor revision.....
 Accept after major revision
 Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity		✓		
Significance		✓		

Reviewer Id: JPR-375

Reviewer's Comment for Publication.

The manuscript addresses a relevant and contemporary issue concerning the quality and inclusiveness of mobile digital services in Saudi Arabia under Vision 2030. It proposes an integrated human-centered framework that brings together accessibility, responsive performance, usability, and unified design systems rather than treating these areas as independent quality activities. The topic is particularly relevant to public digital services, where mobile applications must accommodate diverse users, devices, languages, and network conditions.

The manuscript has a clear aim and well-defined objectives. It examines accessibility practices, responsive performance, usability measurement, design-system institutionalization, and a staged implementation model. The three review questions are also appropriately aligned with the stated objectives and focus on how these quality domains can be integrated within Saudi digital-service portfolios.

The review methodology is reasonably structured. The authors explain the use of a structured integrative review, identify the four main concept blocks, define the 2020–2025 evidence window, provide inclusion criteria, describe the appraisal process, and explain deductive and inductive thematic coding. The use of 30 DOI-resolvable references provides a focused evidence base for the conceptual synthesis.

A major strength is the manuscript's treatment of accessibility as a practical service-quality requirement rather than simply a compliance exercise. The discussion appropriately emphasises automated checking, expert review, assistive-technology testing, and representative user testing. The specific attention to Arabic and right-to-left behavior, text scaling, semantic labels, touch targets, and error recovery is particularly relevant to the Saudi context.

The treatment of responsive performance is also valuable. The manuscript recognises that latency, instability, device variation, layout shifts, and constrained networks can affect not only technical

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performance but also users' ability to understand and successfully complete service tasks. The proposed use of performance budgets, device/network testing, telemetry, and resilient interaction states provides useful practical guidance.

The usability section appropriately argues against relying on a single usability score. The combination of task completion, observation, standardized measures, app reviews, support data, and production analytics provides a more comprehensive approach. The manuscript also correctly highlights the importance of subgroup analysis because aggregate satisfaction may conceal difficulties experienced by particular user groups.

The discussion of unified design systems is another important contribution. The manuscript goes beyond describing a design system as a component library and instead presents it as governance infrastructure incorporating accessibility, responsive behavior, content standards, documentation, versioning, ownership, testing, and contribution processes. The proposed federated governance model is logically connected to the need for both institutional consistency and service-specific adaptation.

The proposed five-layer closed-loop framework is coherent. It connects user and service context, accessible interaction, responsive performance, usability evidence, and the unified design system, with production outcomes feeding back into earlier layers. This integration is clearly identified by the authors as the principal contribution of the manuscript.

The Vision 2030 implementation roadmap further strengthens the practical relevance of the paper. The five maturity stages—baseline and inventory, accessible foundations, performance and usability, unified design system, and adaptive governance—are linked to measurable indicators and evidence gates.

The following minor revisions are recommended before publication:

1. **Strengthen the literature-search description.** Although the manuscript identifies concept blocks, the evidence period, eligibility criteria, and appraisal procedure, further details regarding the specific databases/search platforms, search dates, complete search strings, initial number of records, screening stages, and exclusion counts would improve reproducibility.
2. **Clarify the distinction between evidence and the proposed framework.** The manuscript appropriately synthesizes findings into a conceptual framework, but some recommendations appear alongside literature-derived findings. The authors should explicitly distinguish established evidence from their own proposed design principles, governance mechanisms, and implementation recommendations.
3. **Strengthen the Saudi-specific evidence base.** The manuscript uses Saudi studies appropriately for contextual claims, while also incorporating international HCI and software-engineering research. However, the authors should clearly identify where international evidence is being transferred to the Saudi setting and where direct Saudi evidence is available. The manuscript itself acknowledges that international findings may not fully transfer to Saudi administrative, linguistic, or cultural conditions.
4. **Provide additional detail on validation of the framework.** The proposed closed-loop framework and maturity roadmap are conceptual and have not yet been empirically validated across multiple Saudi mobile applications. This should be made explicit wherever the framework's expected benefits are discussed. The proposed future comparative, longitudinal, and controlled studies provide an appropriate direction for subsequent validation.
5. **Improve the explanation of measurement thresholds.** The manuscript lists several useful measures, including accessible completion, task completion, latency, crash-free sessions, usability

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scores, severe errors, component adoption, defect recurrence, support demand, and trust.

However, the paper would be stronger if it briefly explained how institutions could establish baseline values or thresholds for these measures.

6. **Clarify subgroup evaluation and ethical considerations.** The recommendation to segment usability results by age, assistive-technology use, language, digital confidence, device capability, and journey type is valuable. The authors should briefly clarify that such segmentation should be conducted only where ethically and legally appropriate, particularly when dealing with potentially sensitive user characteristics.
7. **Strengthen the discussion of Arabic and right-to-left implementation.** The manuscript identifies important requirements such as mirrored navigation, typography, number/date handling, mixed Arabic-English content, text resizing, and semantic behavior. A concise table or checklist of critical Arabic/RTL design requirements could make this important Saudi-specific contribution more actionable.
8. **Improve the presentation of Figures 1 and 2 and Tables 1 and 2.** These elements are central to the manuscript's conceptual contribution and should be checked carefully for publication-quality formatting, readability, alignment, and consistency with the surrounding discussion. The relationship between the closed-loop framework and the five-stage maturity roadmap should also be visually clear.
9. **Further develop the procurement and assurance implications.** The manuscript makes a useful observation that institutions can specify accessibility, performance, usability, design-system, and telemetry requirements as contractual quality outcomes when commissioning mobile services. This could be expanded slightly to explain how these requirements could be incorporated into vendor acceptance criteria or service-level evaluation.
10. **Check reference and formatting consistency.** The reference list should be carefully checked for consistent journal-title formatting, volume/issue information, page ranges, article numbers, DOI presentation, and punctuation. Minor typographical and line-break issues throughout the manuscript should also be corrected before final publication.

Overall, the manuscript provides a coherent and practically relevant synthesis of accessibility, responsive performance, usability, and unified design systems in Saudi mobile digital services. Its strongest contribution is the integration of these domains into a continuous governance and improvement cycle rather than treating them as isolated quality activities. The proposed framework and Vision 2030 maturity roadmap provide a useful conceptual foundation, while the manuscript appropriately acknowledges the need for empirical validation across Saudi applications.

Recommendation: Accept after minor revision, particularly after improving methodological transparency, clarifying the distinction between evidence and conceptual recommendations, strengthening the validation discussion, and refining the presentation of the framework, tables, figures, and references.