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Mobile Application Design for Hospitality Management in Puerto Galera Integrating Destination Food Security and Sustainable Practices

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ABSTRACT

This paper presents a software design specification for a mobile application supporting hospitality management in Puerto Galera, with particular attention to destination food security and sustainable operations. A conceptual design approach translated the supplied research framework and selected literature into candidate requirements, user responsibilities, application modules, data relationships, and evaluation criteria. The design connected food sourcing, procurement, inventory, food handling documentation, waste recording, and sustainability reporting within a common management workflow. Proposed users included establishment managers, purchasing personnel, inventory custodians, kitchen personnel, and system administrators. The resulting specification defined a mobile interface, application services, and persistent data storage, supported by access controls, transaction validation, and activity records. An iterative development process connected requirements validation, prototyping, implementation, testing, and pilot feedback. The principal output was a software design artifact and an evaluation plan rather than a tested operational application. The paper contributes a traceable basis for developing hospitality management software in which operational concerns inform features and acceptance criteria. Subsequent implementation and field evaluation are necessary to establish technical performance, user acceptance, and improvements in hospitality operations.

Keywords: hospitality management software, mobile application design, destination food security, sustainable hospitality, Puerto Galera

Introduction

Hospitality management involves decisions about purchasing, stock availability, food preparation, service delivery, and resource use. Information generated by these activities must be sufficiently organized to support timely action. This paper examines the design of a mobile application for the food and sustainability functions of hospitality establishments in Puerto Galera. Its scope covers operational coordination and documentation; accommodation reservations, payroll, and comprehensive financial accounting are outside the proposed initial release.

Destination food security provides a foundation for identifying relevant management concerns. The High Level Panel of Experts on Food Security and Nutrition (HLPE, 2022) discussed availability, access, utilization, and stability together with agency and sustainability. These dimensions broaden food security beyond the presence of supplies to include continuity, participation, and long-term conditions. In hospitality software design, they can inform questions about sourcing, procurement, storage, handling, and the involvement of suppliers. An establishment-level application can support selected activities associated with these dimensions, although its records do not constitute a complete assessment of destination food security.

Sustainable hospitality practices provide a complementary foundation. The United Nations Environment Programme (UNEP, 2024) addressed food waste measurement in food service, retail, and household settings and connected measurement with reduction efforts. For hospitality management, the implication is that records should help users identify the causes of waste and consider changes to purchasing, storage, and preparation. Responsible sourcing, resource conservation, and local participation are additional design concerns requiring confirmation with intended users.

Software development connects these concerns with usable tools. Washizaki (2024) described requirements, design, construction, testing, and maintenance as areas of software engineering knowledge. Applying this guidance requires a clear relationship between an operational need and the function intended to address it. A stock reminder, for example, needs an identified recipient, an agreed threshold, accurate underlying records, and an action that the recipient can take.

The design problem addressed by this paper is how food security and sustainability concerns can be translated into a coherent hospitality management application. The paper aims to establish candidate functional and quality requirements, define user roles and an application architecture, explain integrated operational workflows, and specify an implementation and evaluation process. Its contribution is a software design artifact that can guide development and subsequent validation with hospitality users in Puerto Galera.

Methods

Research Design

The paper used a conceptual software design approach. The supplied research-to-software paradigm and selected literature were analyzed to produce a requirements and architecture specification. The completed activity was the formulation of the design artifact. User consultation, executable application construction, and pilot evaluation are subsequent activities within the proposed development process.

The analysis examined the purpose of each framework component, its relationship to management tasks, the information required to perform those tasks, and the software behavior needed to support them. Candidate requirements were organized according to user responsibility and operational relevance. This approach allowed design decisions to be explained without attributing unreported experiences or preferences to local establishments.

Conceptual Framework and Scholarly Foundations

Destination Food Security served as a domain input. Drawing on HLPE (2022), availability informed supplier and stock information; access informed procurement coordination; utilization informed handling and storage documentation; and stability informed monitoring and alternative sourcing considerations. Agency informed stakeholder participation in requirements validation. Sustainability connected food management with longer-term resource considerations. These mappings are the paper's design interpretation of the cited framework.

Sustainable Hospitality Practices served as a second domain input. UNEP (2024) supported the inclusion of food waste documentation. The design additionally considered responsible procurement, water and energy records, and local supplier participation. The relevance and recording burden of these additional functions must be established during user consultation.

Research Analysis and Requirements Translation connected the domain inputs with software specifications. Guided by the software engineering activities described by Washizaki (2024), each operational concern was translated into a candidate task, required input, system response, and acceptance criterion. This component establishes traceability between the research rationale and application behavior.

Mobile Application Development Framework organized requirements validation, prototype design, implementation, testing, and maintenance planning. Washizaki (2024) supplied the general engineering foundation. ISO/IEC (2023) supplied a product quality foundation for specifying and evaluating relevant software characteristics. Neither source establishes the quality of an application that has not undergone assessment.

Pilot Evaluation and Intended Outcomes connected the implemented software with actual work. Evaluation would examine task completion, record integrity, relevance of features, and compatibility with establishment workflows. Feedback would return to requirements translation and design. The framework therefore provides a pathway for developing and testing the application and examining whether it improves hospitality operations.

Requirements Formulation

Candidate requirements were derived from the relationship between the conceptual domains and management tasks. Each requirement was specified through a user, a trigger, required information, expected application behavior, and an acceptance condition. Functional requirements concerned supplier records, purchasing, stock movements, handling checklists, waste entries, resource records, and reports. Quality requirements concerned authorized access, integrity, reliability, understandable interaction, and maintainability.

Requirements gathering during implementation should involve establishment managers and personnel responsible for purchasing, inventory, kitchen operations, and sustainability documentation. Suppliers should participate where proposed functions affect their information or responsibilities. No completed interviews, sample, or user-validation findings are reported in this design paper.

Proposed Development Process

The development process begins with stakeholder validation of the specification. Approved requirements would be prioritized into an initial release. Interface prototypes would then be reviewed through representative tasks before implementation. Construction would proceed in manageable iterations, followed by functional, integration, access-control, and user-acceptance testing. Pilot findings would inform subsequent releases.

The initial release should prioritize supplier records, purchasing, stock transactions, expiration reminders, and waste documentation. Resource monitoring and external supplier access should be introduced when their value and operational feasibility have been confirmed. Technology selection should follow assessment of available devices, connectivity, developer capacity, and maintenance arrangements.

Evaluation Procedure

The evaluation plan separates software verification from operational assessment. Verification would establish whether features satisfy their specifications. Operational assessment would examine whether application use supports the intended management activities. The qualitative component would include task observation, user explanations, incident records, and review of completed workflows.

Claims of improvement would require documented implementation evidence and comparison with relevant prior practices. The evaluation must also consider alternative explanations, including staff training, changes in purchasing policy, or seasonal operating conditions. User approval alone would not establish improved operations.

Results

Software Design Artifact

The analysis produced a proposed mobile hospitality management system integrating food procurement, inventory control, handling documentation, waste records, and sustainability reporting. Its central design principle is that information should move coherently across operational activities. Receiving purchased goods should update stock records, issuing ingredients should reduce available quantities, and recording discarded food should create a traceable waste entry with an associated stock adjustment where appropriate.

The artifact comprises candidate requirements, role definitions, modules, architecture, data relationships, workflows, and testing criteria. These are design outputs; they are not measurements of deployed software performance.

User Roles and Permissions

Establishment managers would review purchasing requests, authorize applicable transactions, inspect operational summaries, and assign responsibilities. Purchasing personnel would maintain approved supplier information and prepare purchasing records. Inventory custodians would record deliveries, stock issues, physical adjustments, and batch details. Kitchen personnel would document ingredient use, handling checks, and food waste according to assigned duties. System administrators would manage accounts, access permissions, configuration, and technical support.

Permissions would be restricted to the functions and establishment records required by each role. Where one employee holds multiple responsibilities, permissions could be combined through an approved assignment. Supplier access would remain optional; a directory does not require suppliers to hold application accounts.

Functional Modules

Supplier and procurement management. The module would maintain supplier contact details, supplied products, locality information where relevant, and record status. Purchasing records would identify requested items, quantities, suppliers, approval status, and receiving references. The specification does not assume online payments or binding marketplace transactions.

Inventory and expiration monitoring. Stock would be recorded by product and, where needed, batch. Transactions would distinguish receipts, issues, waste, and adjustments. Reorder and expiration reminders would be configurable and based on current records. Users would be able to review the transaction history underlying a displayed balance.

Food handling documentation. Configurable checklists would support recording routine storage and handling activities. Entries would identify the responsible user, time, observation, and follow-up action. A completed checklist would document an activity; it would not independently certify compliance or food safety.

Food waste management. Waste entries would identify the product or prepared item, quantity and unit, reason, operational stage, and responsible user. Where a waste entry concern tracked stock, it would be linked to the corresponding stock movement to avoid duplicate deductions. Summaries would help managers review recurring causes.

Resource and sustainability records. The design included optional records for water, energy, procurement locality, and improvement actions. Each record would retain its unit, date range, and source. Comparisons would require consistent reporting boundaries. Local sourcing would be documented as a procurement attribute rather than treated automatically as evidence of sustainability.

Management reporting. Reports would present stock status, pending purchasing activities, approaching expiration dates, recorded waste, and outstanding follow-up actions. Summaries would remain traceable to source transactions. Export permissions would follow user roles and establishment ownership.

Application Architecture

The proposed architecture contains three layers. The presentation layer consists of the mobile interface through which users complete assigned tasks. The application layer validates requests, applies permissions, processes transactions, and produces reminders and reports. The data layer stores establishment, user, product, supplier, procurement, stock, checklist, waste, and resource information.

The application would associate operational records with the appropriate establishment. Server-side authorization would prevent users from retrieving another establishment's records through manipulated requests. Inventory changes would be processed as transactions so that an unsuccessful operation would not leave a partially updated balance.

An offline recording option may be considered if requirements validation establishes a need. It would require locally queued entries, visible synchronization status, unique transaction identifiers, and an explicit conflict-resolution policy. Stock displays would distinguish synchronized information from pending local changes. This is an architectural option rather than an implemented capability.

Data Relationships and Integrity

An establishment would have users and operational records. A supplier could be referenced by multiple procurement records. A procurement record would contain line items referencing products; receiving entries would connect accepted goods with stock batches and transactions. Waste records would reference products or prepared items and, where applicable, related batches and stock movements.

Quantities would retain explicit units, with controlled conversions where required. Records would include creation times and responsible users. Historical transactions would be corrected through authorized reversals or adjustments rather than unrecorded overwriting. Duplicate submissions would be detected using transaction identifiers. These design rules provide a basis for examining integrity during testing.

Integrated Hospitality Workflow

The proposed workflow begins with review of stock and upcoming operational needs. Authorized personnel prepare a purchasing request, record approval where required, and document delivery. Accepted goods are entered into inventory with relevant batch and expiration information. Subsequent issues and waste entries update the stock transaction history. Handling checks and corrective actions are recorded separately but remain accessible to responsible managers.

Management review closes the workflow by examining reminders, waste causes, and unresolved actions. This connects records with decisions about purchasing, preparation, storage, and staff responsibilities. The application supports these decisions while leaving authorization and operational judgment with the establishment.

Testing and Acceptance Criteria

The evaluation specification identified concrete acceptance conditions. Receiving goods should produce one corresponding stock receipt; repeated submission should not create duplicate stock. A waste transaction should create a traceable entry and deduct the relevant stock only once. Users should be unable to access unauthorized functions or another establishment's records. Reports should reconcile with the transactions from which they are generated.

User-acceptance activities would examine whether personnel can complete receiving, stock issue, waste recording, and report review tasks with understandable instructions. Backup and recovery verification would assess restoration of representative records. If offline recording is implemented, synchronization tests would examine duplicate prevention, interrupted connections, and conflicting updates.

Pilot evaluation would then examine the usefulness of these functions in actual work. Required evidence would include the implemented version, test records, observed tasks, user feedback, and documented operational changes. No acceptance results or pilot outcomes are asserted in the present paper.

Discussion

Contribution to Hospitality Management

The design reorganizes the original conceptual framework around a software artifact with identifiable users, tasks, records, and evaluation criteria. It connects food and sustainability concerns with routine management activities rather than leaving them as broad application themes. Procurement, stock, and waste information can be interpreted together because the specification defines their relationships and transaction rules.

The potential contribution is improved visibility of operational information. Whether that visibility produces better decisions depends on record completeness, staff responsibilities, review practices, and actual adoption. The software design therefore incorporates management review and follow-up rather than assuming that reminders or reports lead automatically to action.

Food Security and Sustainability Foundations

HLPE (2022) provides a broad foundation for examining supply, access, utilization, continuity, participation, and sustainability. The specification applies these concerns to establishment workflows. Its contribution remains bounded: the application would support selected management activities and cannot by itself establish destination-wide food security.

UNEP (2024) provides a rationale for food waste documentation. The design extends documentation into an operational workflow by connecting waste entries with stock records and management review. Reduction in waste remains an outcome to be evaluated after implementation. Likewise, local supplier identification and resource records provide information for decisions, but do not establish environmental benefits without appropriate assessment.

Development Traceability and Software Quality

Washizaki (2024) supports organizing development around requirements, design, construction, testing, and maintenance. The paper applies this organization by linking candidate features with operational concerns and acceptance conditions. This traceability enables reviewers to examine whether a feature addresses a defined need and whether the test procedure evaluates its expected behavior.

ISO/IEC (2023) supplies a product quality foundation for assessment. The specification translates quality concerns into concrete checks involving permissions, transaction integrity, understandable task completion, and reliable record restoration. Formal claims of conformity would require a documented assessment beyond the design specification.

Implementation and Maintenance

Implementation should clarify responsibility for account administration, supplier updates, stock reconciliation, user training, backup management, and technical support. Configuration changes should be recorded and assessed before deployment. Personnel should understand how to correct errors and report incidents. The continuing usefulness of the application depends on these arrangements as well as on its technical construction.

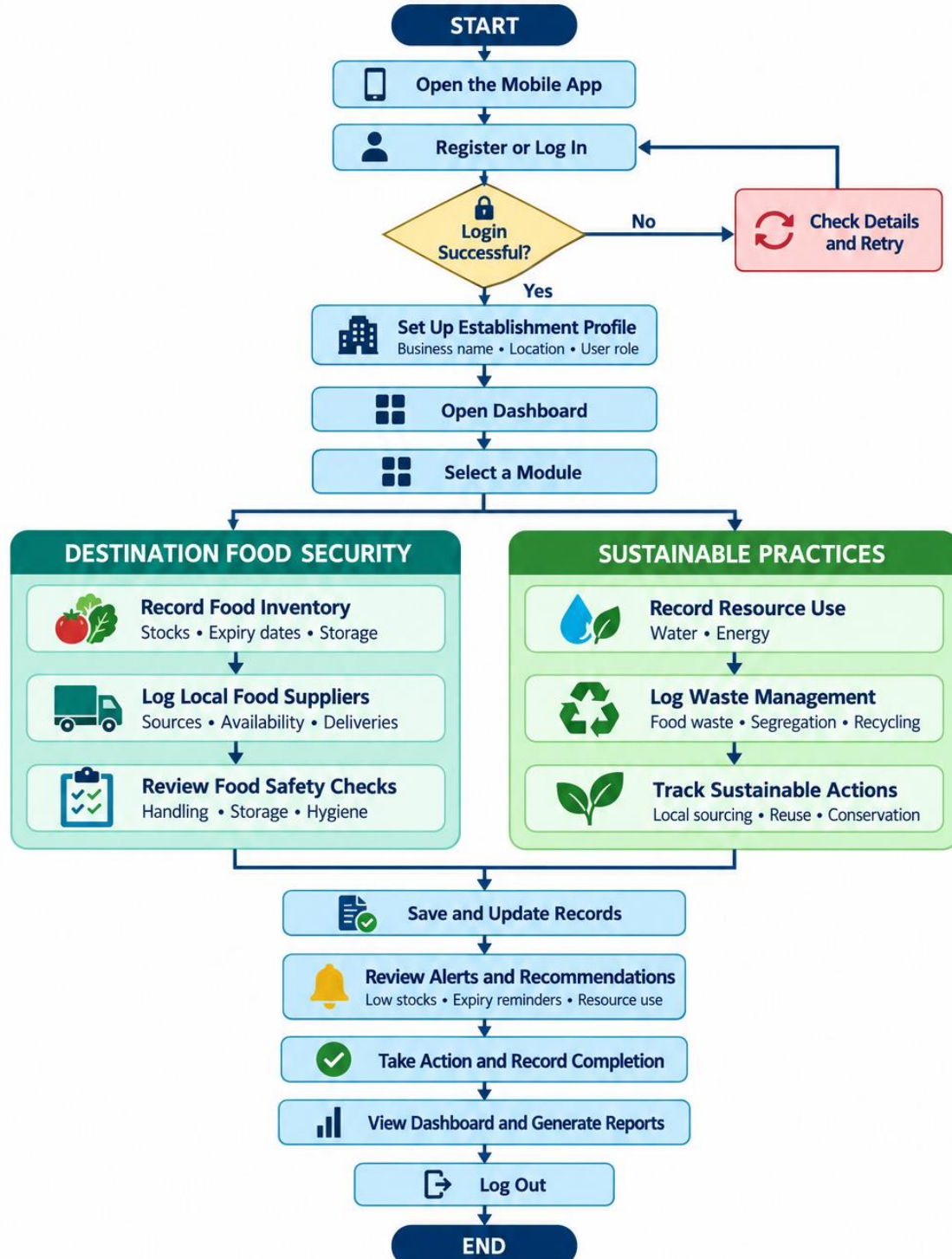
Where establishments have different procedures, configurable thresholds, checklists, and approval responsibilities may be more appropriate than a single fixed workflow. However, configuration should preserve common transaction rules so that flexibility does not undermine record integrity.

The flowchart illustrates how hospitality personnel in Puerto Galera would use the proposed mobile application to manage destination food security and sustainable practices. Users begin by opening the app, registering or logging in, setting up their establishment profile, and accessing the dashboard. The Destination Food Security module allows users to record food inventory, log local suppliers, and review food safety checks. The Sustainable Practices module enables users to monitor water and energy consumption, document waste management, and track sustainable actions. After saving their records, users review alerts and recommendations, record completed actions, and generate reports to support informed hospitality management decisions.

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How to Use the Mobile App

Proposed User Workflow



Daily records support informed hospitality management decisions.

Limitations and Further Development

The paper reports a software design specification derived from a supplied conceptual framework and selected sources. It contains no locally validated requirements, executable prototype, technical test results, or completed pilot findings. Its initial scope concerns food and sustainability operations within hospitality management, and it does not cover all functions of a hotel or resort management system.

Further development should validate the requirements with intended users, implement a prioritized prototype, document testing, and examine use in participating establishments. Any subsequent publication claiming operational improvement should identify the evaluated software version, establishment context, evaluation procedures, supporting records, and limitations of attribution.

Conclusions

The paper produced a software design specification for mobile hospitality management in Puerto Galera integrating destination food security and sustainable practices. The specification defined user responsibilities, application modules, architecture, data relationships, workflows, and acceptance criteria. Requirements translation connected the research domains with functions that can be implemented and evaluated.

The framework establishes a structured basis for software development, testing, and pilot assessment. Implementation should prioritize reliable procurement, inventory, and waste records, followed by user-validated extensions. Demonstrated improvements in hospitality operations remain dependent on documented development and field evaluation.

Recommendations

Based on the software design specification, the following recommendations are proposed:

1. **Validate requirements with intended users.** The researchers should consult hospitality managers, purchasing personnel, inventory custodians, kitchen staff, and local suppliers in Puerto Galera to confirm whether the proposed features address their operational needs.
2. **Develop a functional prototype.** Software developers should prioritize supplier records, procurement, inventory transactions, expiration alerts, and food waste documentation. Additional sustainability features should be introduced according to user needs and available resources.
3. **Conduct software testing before deployment.** The development team should verify transaction accuracy, duplicate prevention, access restrictions, report consistency, and backup restoration. User testing should determine whether personnel can complete routine tasks accurately and independently.
4. **Undertake pilot implementation.** Selected hospitality establishments should use the prototype under actual operating conditions. The researchers should document user feedback, technical difficulties, task completion, and compatibility with existing procedures to guide revisions.
5. **Provide user training and operational guidance.** Participating establishments should train personnel in recording deliveries, updating inventory, documenting waste, reviewing alerts, and correcting errors. Clear responsibilities should support consistent application use.
6. **Establish data protection and maintenance arrangements.** The application should provide role-based access, establishment-specific records, activity logs, and regular backups. Responsibility for account administration, technical support, and software updates should be assigned before deployment.
7. **Evaluate operational outcomes using documented evidence.** Future evaluation should compare relevant baseline and pilot records, including inventory discrepancies, expired stock, food waste, and reporting time. Claims of improved hospitality operations should be supported by verified results.
8. **Strengthen institutional collaboration.** Mindoro State University, participating hospitality establishments, local suppliers, and relevant Puerto Galera offices should coordinate requirements validation, pilot participation, and continuing development. Future studies should examine adoption, maintenance costs, and suitability for establishments of different sizes.

References

- High Level Panel of Experts on Food Security and Nutrition. (2022). *Policy responses to the current food crisis must support multiple dimensions of food security*. Food and Agriculture Organization of the United Nations. <https://www.fao.org/cfs/cfs-hlpe/insights/news-insights/news-detail/Policy-responses-to-the-current-food-crisis-must-support-multiple-dimensions-of-food-security/en>
- International Organization for Standardization, & International Electrotechnical Commission. (2023). *Systems and software engineering—Systems and software Quality Requirements and Evaluation (SQuARE)—Product quality model* (ISO/IEC Standard No. 25010:2023). <https://committee.iso.org/standard/78176.html>

United Nations Environment Programme. (2024). *Food waste index report 2024*. <https://www.unep.org/resources/publication/food-waste-index-report-2024>

Washizaki, H. (Ed.). (2024). *Guide to the software engineering body of knowledge (SWEBOK guide)* (Version 4.0). IEEE Computer Society. <https://www.computer.org/education/bodies-of-knowledge/software-engineering>