

Integrating Recipe-Based Inventory and Payroll into a Mobile Point-of-Sale System Using Design Science Evaluation

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Abstract—Food and beverage micro, small, and medium-sized enterprises (MSMEs) often keep sales data separate from the information required to manage ingredients, suppliers, employees, payroll, and reports. This study aimed to design and evaluate TRANSARA. This mobile point-of-sale artifact links sales transactions to recipe-based ingredient inventory and selected back-office records in the operational setting at Teras Senja. A case study based on design science methodology integrated the development of an artifact, technical and black-box functional validation, task-based mentoring, operational observation, user feedback, and documentation review. The user evaluation included three participants: one business owner and two staff members. 48 pre-defined black-box indicators were used for additional validation, covering installation, authentication, business access, master data, transactions, stock and recipe functions, workforce and payroll, reporting, synchronization, role controls, external devices, and device compatibility. All 48 indicators met their expected results, achieving 100 percent (48 out of 48). All 10 operational aspects were completed at the recorded mentoring checkpoint: six independently and four with assistance; none were marked as incomplete. After a sale, the central mechanism deducts specified quantities of ingredients from the product recipe or bill of materials and retains the resulting information for stock monitoring and managerial review. The study contributes a design pattern within this single-business case, in which a POS transaction serves as a cross-functional operational trigger, and broader usability, scalability, inventory accuracy, and long-term business effects necessitate multi-site and longitudinal validation.

Index Terms—Food and beverage MSMEs, integrated point-of-sale system, managerial reporting, mobile information system, payroll management, recipe-based inventory.

I. INTRODUCTION

Digital transformation has become a strategic foundation for strengthening the operational capabilities, information management, and competitiveness of micro, small, and medium-sized enterprises in increasingly data-driven business environments. Digital capability has been shown to improve the financial, flexibility, and quality performance of small businesses through the mediating role of digital business transformation [1]. Digital literacy also significantly supports the success of digital business transformation by enabling small enterprises to acquire, interpret, and apply technological knowledge within their organizational activities [2]. These findings indicate that digitalization generates greater organizational value when technological capabilities are translated into coordinated business processes rather than implemented through isolated applications. Accordingly, food and beverage MSMEs require integrated information systems that connect sales transactions with recipe-based ingredient inventory, supplier management, workforce administration, payroll, and managerial reporting.

Operational integration is urgent for food and beverage MSMEs because daily activities involve rapid transactions, ingredient consumption, supplier coordination, workforce management, and reporting, all of which must remain consistent despite limited resources. Evidence from Indonesian culinary MSMEs links digital transformation with financial performance, suggesting that digital tools are more relevant when they support core business activities rather than peripheral administration [3]. Cloud computing adoption among MSMEs has also been associated with business performance, particularly when technological, organizational, and environmental conditions align with enterprise needs [4]. This evidence suggests that fragmented digital tools may reduce the operational value of digitalization when transaction

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and back-office data remain separated across different workflows. TRANSARA addresses this problem through an integrated POS architecture that converts product-level sales into ingredient-level inventory movements while consolidating the application workflow and related operational records.

This study designs, implements, and evaluates TRANSARA as an integrated mobile point-of-sale system that supports sales transactions, recipe-based ingredient inventory, and related back-office functions for food and beverage MSMEs. Point-of-sale and order data can support forecasting and inventory-related decisions when reused beyond the original transaction [5]. At the same time, inventory coordination also depends on information sharing, replenishment visibility, and trust between business actors [6]. Previous work therefore establishes the value of transaction and inventory information. However, it does not resolve the cross-functional design problem examined here: how a product-level sale can trigger ingredient-level stock movement while remaining connected with supplier, workforce, payroll, receipt, outlet, and reporting records in a lightweight mobile environment. TRANSARA addresses this gap through an architecture in which a completed sale invokes the product recipe/BOM, deducts the specified ingredient quantities, updates stock, and retains the resulting records for subsequent operational review.

This study applies a design science-oriented evaluative case study to develop TRANSARA as an information-system artifact and assess its functional and operational relevance in the Teras Senja MSME context. Design science research is appropriate for mobile application development because it connects stakeholder requirements, artifact construction, iterative refinement, and evaluation within a problem-solving research process [7]. Usability evaluation is also relevant because interface quality influences task performance, reveals interaction problems, and provides evidence for software refinement [8]. In this study, those concerns were examined through system development, functional verification, guided task-based assessment, operational observation, user feedback, and documentation review throughout the application workflow, rather than using a standardized usability scale. TRANSARA was therefore evaluated both as an integrated information-system artifact and as a practical design whose contribution could be examined through system integration and operational use.

Information systems research on MSMEs often focuses on adoption and performance outcomes, whereas the present study examines how operational records remain connected after adoption. Indonesian evidence links digitalization, literacy, and innovation to MSME performance [9], while research on women-led MSMEs identifies innovation and competitive advantage as mechanisms linking digital transformation to performance [10]. These studies highlight the capabilities of digital adoption but do not specify how a transaction event should propagate across material and administrative records. The scientific contribution of the present study is therefore design-oriented rather than theory-building: it conceptualizes the POS transaction as a cross-functional operational trigger

whose effects continue from product-level sales to ingredient use and selected back-office information. This framing shifts evaluation from a feature inventory toward the continuity of information across operational functions.

Evidence from Teras Senja must be read within the boundaries of a single food and beverage business. Research on Peruvian SMEs notes that enterprise size changes the financial, human, and technological conditions under which digitization occurs [11]. Indonesian research on MSMEs and startups also reports uneven effects of digital human resource strategies, although data-oriented and innovation-focused practices may strengthen performance [12]. The present evaluation therefore cannot represent businesses with different scales, operating models, product structures, staffing arrangements, or levels of digital readiness. A broader program of multi-site, longitudinal, and cross-sector testing is needed to determine how the recipe-based inventory, payroll, and reporting functions perform outside this case.

II. RELATED WORK

Digital records become useful to an MSME when information created in one activity can be easily tracked into another. Studies of cloud accounting adoption find it influenced by a combination of technological resources, organizational conditions, and external pressures [13]. Demand-forecasting research approaches the issue by using data to demonstrate how current point-of-sale records inform supply-chain decisions [14]. These studies collectively suggest that system adoption is inadequate when the resulting data cannot be reused after the transaction that generated them. TRANSARA manages sales data, recipe-based stock records, and related administrative information within a single mobile environment.

A food-service POS record need not end with payment; it may also initiate stock control and later reporting. Hourly sales data have been used to estimate food-service demand during periods of geopolitical and economic disruption [15]. Inventory research conducted amid pandemic uncertainty likewise associates operational continuity with greater visibility into available stock [16]. For the present study, the important issue is whether information generated at the cashier carries over into ingredient movement, replenishment, and managerial review. TRANSARA implements this continuity by using the sold product to trigger the ingredient quantities specified in its recipe/BOM.

Supplier coordination and recipe-based inventory logic are important for food and beverage MSMEs because stock control depends on the relationship between purchasing activities, material availability, and product-level sales. Vendor-managed inventory research explains that inventory collaboration gives suppliers a role in maintaining stock within agreed limits, while supplier heterogeneity can affect replenishment consistency and inventory performance [17]. Research on raw material variability in food manufacturing further shows that such variability is a critical factor in designing supply chain and production operations management systems [18]. These studies indicate that ingredient-level control requires more than

recording available stock, as purchasing, supplier reliability, raw material characteristics, and production requirements must be integrated into a single information flow. TRANSARA applies this logic by using recipe-based inventory deduction to connect each product sale with the consumption of specific ingredients and to support supplier-related stock monitoring.

Workforce management, payroll, and managerial reporting should be treated as operational information flows that complement transaction and inventory control in MSME information systems. Enterprise resource planning research in Indonesian organizations shows that information sharing and competent personnel support successful system implementation, indicating that workforce-related data and user capability are critical for integrated business systems [19]. Human factor management research further demonstrates that digitalization can strengthen the relationship between human resource management practices and company productivity [20]. These findings suggest that POS development for food and beverage MSMEs should not separate sales data from staff administration, payroll records, and managerial reports because operational performance depends on both material and human resources. TRANSARA therefore integrates workforce administration, payroll, access control, and reporting with transaction and inventory modules to support more consistent operational monitoring.

To prove that an information-system artifact is both technically operational and suitable for use, it must also be contextually relevant and capable of supporting operational workflows. Design science research is beneficial here, as it integrates artifact development with problem identification, architecture formulation, implementation, and evaluation within a systematic research framework [21]. Further research on usability and user experience emphasizes the importance of assessing interaction quality against user-centered criteria when digital systems are integrated into complex technology systems [22]. These perspectives support an evaluation strategy for TRANSARA that separates functional conformance from guided task execution, operational observation, and user feedback. The study therefore combines technical and black-box validation with task-based mentoring evidence and contextual observation, rather than relying solely on feature availability or a single usability score as sufficient evidence.

Existing research explains important components of digital operations in MSMEs and hospitality, but the complete sequence examined here remains fragmented across separate research streams. POS and demand studies use transaction records for forecasting and decision support [5], [14], [15]; inventory research emphasizes visibility, supplier coordination, and raw-material variability [16], [17]; ERP and human-factor studies address information sharing and workforce capability [19], [20]; and hospitality research considers technology-supported food-waste and inventory management [23]. Studies of digital platform capabilities in Indonesian

coffee MSMEs also emphasize organizational agility and supply chain competitiveness [24]. None of these streams, as represented in the reviewed literature, follows a menu sale through recipe/BOM-based ingredient deduction while keeping the resulting information connected with supplier, workforce, payroll, receipt, outlet, and reporting records. Table 1 summarizes this distinction and positions the design problem that TRANSARA addresses.

Table 1.
Comparative Synthesis of Prior Research and TRANSARA

Research stream	Comparison with TRANSARA
POS/demand [5], [14], [15]	Uses POS data for forecasting/decision support; does not trace a sale into recipe-level ingredient deduction and connected back-office records.
Inventory/suppliers [16], [17], [18]	Examines stock visibility, replenishment, and material variability; does not implement a POS-triggered BOM mechanism within a single mobile MSME workflow.
ERP/workforce [19], [20]	Addresses information sharing and workforce capability; does not examine the specific sale-to-ingredient link together with payroll records.
MSME digital platforms [13], [24]	Emphasizes adoption, platform capability, agility, and competitiveness rather than transaction-level propagation across records.
Hospitality inventory technology [23]	Covers food waste and inventory practices; does not connect menu sales, recipe/BOM deductions, payroll, and reporting in a single sequence.
TRANSARA	Links sales with recipe/BOM inventory and selected back-office records; broader multi-site validation remains required.

III. RESEARCH METHODS

A design science-oriented case evaluation was selected because TRANSARA needed to be examined both as a constructed artifact and within the circumstances of an operating business. Design science links problem definition, artifact development, implementation, and evaluation within an organizational context [25], while qualitative platform evaluation emphasizes interaction quality, acceptability, user experience, and feedback arising from use [26]. In this study, these concerns were combined through artifact development, technical verification, black-box functional validation, guided task-based mentoring, operational observation, user feedback, and documentation review. The user evaluation was not designed as a standardized SUS or UEQ survey; instead, it recorded whether operational activities were performed independently, with assistance, or remained incomplete during the mentoring process. This distinction prevents functional correctness, guided task completion, user experience, and researcher interpretation from being treated as equivalent evidence.

The sequential procedure used to design and evaluate TRANSARA at Teras Senja is illustrated in Fig. 1. The process evolved from identifying operational problems and analyzing requirements to designing artifacts, developing modules,

conducting technical and black-box validation, evaluating task-based mentoring, observing operations, collecting user feedback, and analyzing data, in line with the transparency and accountability standards of qualitative research reporting [27]. The process involved identifying the problem through an online interview and in-depth discussion, followed by configuration, demonstration, guided practice, consultation via messages or screenshots, and evaluation of the completed tasks. The mentoring documentation identifies three participants from Teras Senja: one business owner and two staff members. The three participants were chosen purposively because they directly represented the business roles involved in the operational use and review of TRANSARA: one business owner and two staff members [28]. Available records document a final mentoring checkpoint on 22 July 2026 but do not provide session-level timing, so cumulative exposure time cannot be inferred from the recommended duration stated in the mentoring module.

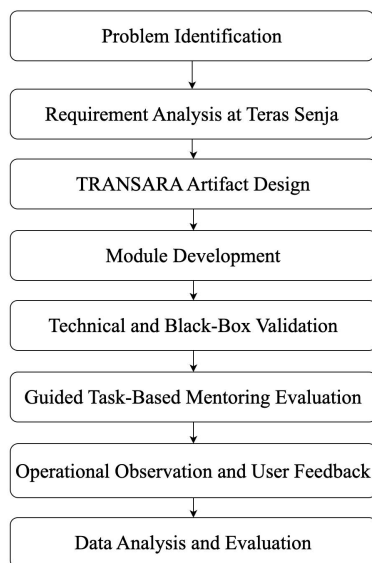


Fig. 1. Research procedure for design science evaluation of TRANSARA.

The development process started with the routine sequence used at Teras Senja rather than a predetermined catalog of screens. Input from end users helped identify practices and expectations that were missing from the initial technical specification [29]. At the same time, a value-oriented service architecture considers user requirements, data flows, service logic, and system structure as interconnected design considerations [30]. The considerations were incorporated into the database structure, navigation sequence, role permissions, and relationships among transaction, inventory, workforce, and reporting functions. Users received demonstrations, practiced assigned tasks on their devices, shared their screens or screenshots when difficulties occurred, and received corrective assistance before proceeding. The task checklist differentiated independent execution from execution requiring assistance and recorded unresolved issues for later review, rather than converting these findings into a standardized usability score.

The information in Fig. 2 is generated following the

payment stage of a sale. TRANSARA reads the product recipe/BOM, calculates discrepancies between recorded and required ingredient quantities, updates the stock balance accordingly, and retains the revised information for supplier monitoring and reporting. The evaluation treated this sequence as a single process because examining individual screens would not confirm whether information was transferred consistently across functions. Studies on usability have employed methods such as observation, interviews, and questionnaires to examine how systems operate in real-world environments [31], incorporating formative evaluations that can identify design flaws prior to widespread system adoption [32]. The present study compared technical records with mentoring notes, screenshots, task results, and operational documentation to determine where the transfer was successful and where users required assistance.

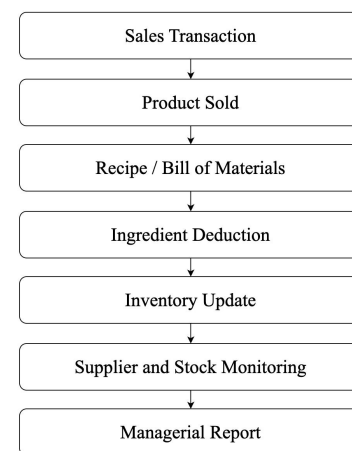


Fig. 2. Transaction-to-Inventory and reporting flow in TRANSARA.

Additional validation was conducted on 20 August 2026 using TRANSARA version 1.19 (version code 20) to strengthen the functional evidence during manuscript revision, which involved a local Android emulator, Firebase CLI, Gradle, and the Firestore Emulator. The black-box matrix comprised 48 predefined user-facing indicators covering installation and launch, authentication and business access, master data, sales and purchases, recipe-based stock, staff and payroll, reporting and export, synchronization and offline operation, role controls, external devices, and device compatibility. Each indicator's expected and actual outputs were compared. The selected core workflows were also documented in 16 traceable execution records, which served as evidence for existing indicators rather than as additional test cases. Technical checks were conducted automatically and reported separately, including completion of debug and release builds, passing Android unit tests, successful validation of 94 Firestore security rule assertions, completion of the production-rules dry run, and a successful launch of the application without a fatal crash during the smoke test.

Table 2 explains the evidentiary function of each source. Technical verification documented the build's unit tests, security rules, and launch behavior, while a black-box matrix compared user-facing scenarios with expected outputs. The mentoring checklist documented whether operational tasks

were performed alone or with support; observation notes and consultation records tracked challenges and suggested modifications; and screenshots, transactions, reports, Play Store records, and device records ensured accountability for implementation. The findings were compared after each source was reviewed in accordance with its evidentiary function, thereby reducing reliance on a solitary type of evidence. Scenario-based inquiry can help assess the adequacy of the information available to users [33], whereas direct observation can reveal existing barriers in concrete interactions [34].

Table 2.

Research Method Components		
Component	Data Source	Output
Technical verification	Build outputs, unit tests, Firestore rules tests, smoke launch	Technical verification evidence
Black-box functional validation	Predefined scenarios, expected/actual results, execution evidence	Functional pass/fail evidence
Task-based mentoring evaluation	Task checklist and user execution records	Independent/assisted/incomplete task evidence
Operational observation	Field notes, screenshots, mentoring interactions	Operational constraints and contextual evidence
User feedback/consultation	Owner and employee responses during guided practice/follow-up	Perceived benefits, difficulties, requested changes
Documentation review	Screenshots, transaction records, reports, Play Store/device evidence	Implementation and traceability evidence

The analysis of the revised evaluation evidence is detailed in Table 3. The technical checks and black-box indicators were summarised by pass/fail status, the sales-to-ingredient mechanism was checked against expected stock movement, and the mentoring checklist was summarized by independent, assisted, and incomplete task categories. Observation and consultation records were grouped by recurring difficulties, operational constraints, and requested changes, rather than treated as standardized usability scores. Clear procedures and contextual reporting support credibility and related quality criteria, as referenced in [35], while multiple analytical viewpoints can enhance interpretation [36]. The resulting audit trail differentiates technical verification, functional behavior, task execution, contextual observation, and user feedback prior to their collective interpretation.

Table 3.

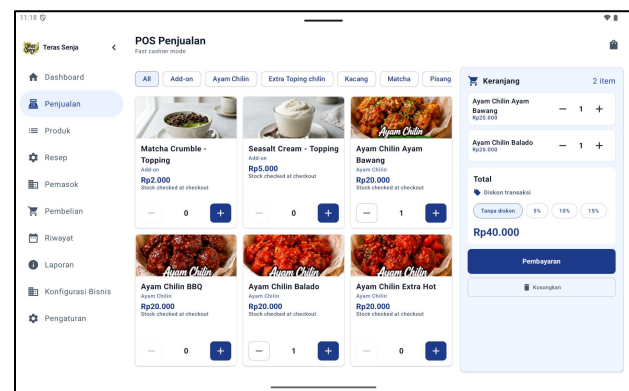
Evaluation Metrics and Analysis		
Dimension	Indicator	Analysis
Technical verification	Build/test/rules/smoke-test status	Descriptive pass/fail summary
Black-box functional validation	Predefined indicators meeting expected results	Pass/fail counts and pass rate
Integration accuracy	Sales-to-ingredient stock consistency	Expected-versus-actual comparison
Task execution	Independent, assisted, or incomplete operational aspects	Descriptive counts and proportions
Operational	Observed difficulties and	Descriptive

observation	workflow constraints	comparison
User feedback	Benefits, constraints, requested changes	Descriptive Categorization

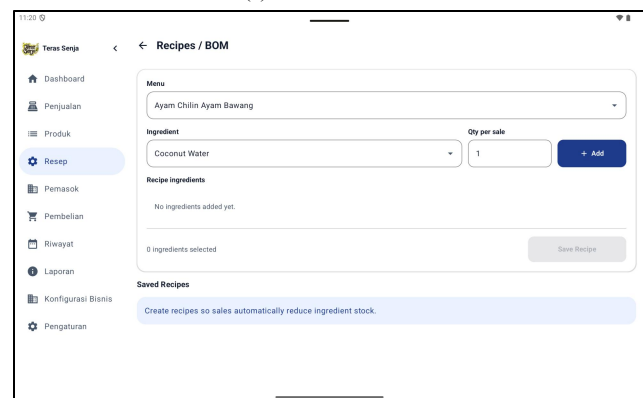
IV. RESULT

Sales and selected administrative records were evaluated in a single mobile application at Teras Senja, with the revision-stage validation incorporating a broader set of predefined functional checks. Transaction data, recipe-based stock records, receipts, history, and reports were linked, while owner and staff accounts followed separate access protocols. The revised results therefore report three distinct forms of evidence: black-box functional validation, the transaction-to-ingredient mechanism, and task execution during mentoring sessions. This separation enables functional pass rates to be interpreted independently of user performance and long-term business impact.

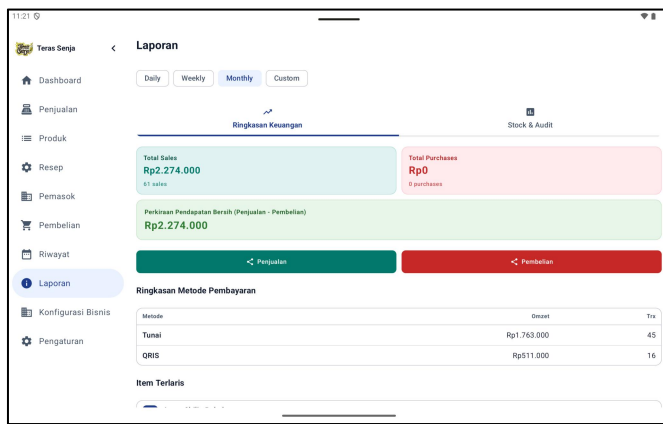
The interfaces depicted in Fig. 3 are used for transaction entry, recipe/BOM configuration, and managerial reporting. Users selected menu items, recorded payments, issued or reprinted receipts, reopened transactions, and managed product, ingredient, recipe, supplier, and inventory details. The screenshots demonstrate that these functions were implemented and accessible within the application. Functional suitability is instead verified through broader black-box validation, as summarised in Table 4.



(a) Sales transaction



(b) Recipe-based inventory



(c) managerial reporting

Fig. 3. Implemented TRANSARA interfaces: (a) sales entry, (b) recipe/BOM configuration, and (c) managerial reporting.

Table 4.
Functional Suitability Result

Test Domain	Result
Installation and launch	2/2 passed (100%)
Authentication, business access, dashboard	8/8 passed (100%)
Master data, suppliers, recipe, purchase	7/7 passed (100%)
Sales, payment, history, expense, controls	10/10 passed (100%)
Staff, attendance, payroll	4/4 passed (100%)
Reporting, export, receipt, external devices	6/6 passed (100%)
Sync, security, roles, localization, compatibility	11/11 passed (100%)
Overall	48/48 passed; 0 failed; 0 unexecuted (100%)

The results of black-box validation at the revision stage are presented in Table 4 across 48 pre-defined indicators. All 48 indicators met their expected-result criteria, achieving a documented pass rate of 100% within the defined validation scope, with no indicators failing or left unexecuted. The coverage extended beyond the original module-level checks to include installation, authentication, role restrictions, transaction controls, reporting and export, synchronization and offline behavior, external devices, responsiveness, and production-account access. The technical verification process included successful Firestore security rule assertions (94 passed) and successful build and smoke launch checks. The 100% black-box value applies only to predefined scenarios and does not guarantee error-free operation across all devices, workloads, network conditions, or future releases.

The transaction-to-inventory mechanism was independently verified for the overall pass rate. Upon the sale of an item with an active recipe or bill of materials, TRANSARA identified the associated ingredients, retrieved their allocated quantities, and subtracted them from the corresponding inventory levels once the transaction was finalized. While buying more resulted in the opposite stock movement, insufficient stock was expected to prevent the sale from being completed. Transaction correction scenarios were used to verify that financial totals and stock records were synchronized. These checks provide direct evidence for the operational sequence that distinguishes the artifact from a standard cashier-only POS system.

The mentoring process incorporated user evaluation rather than administering a separate standardized usability survey. Facilitators observed participants working on their own devices, reviewed screenshots or shared screens when difficulties occurred, and provided corrective assistance before moving on to the next activity. The recorded checkpoint covered ten operational areas, including access and outlet selection, business configuration, product management, ingredients/suppliers/purchases, recipe/BOM creation, transactions and payments, history and receipts, staff/payroll, reports, and issue reporting. The data in Table 5 show whether each aspect was completed independently, with assistance, or left incomplete at that stage.

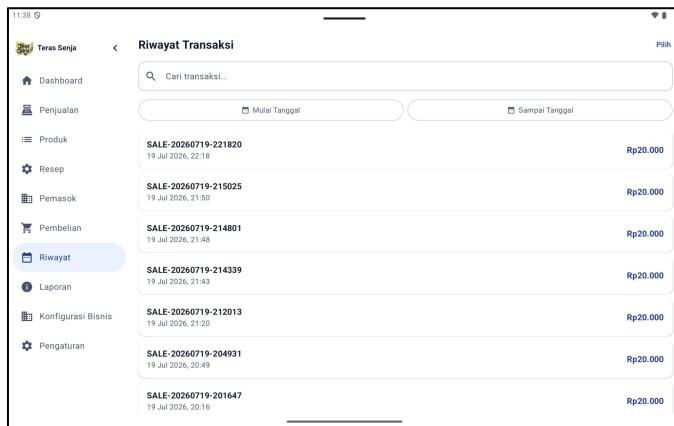
Table 5.
Task-Based Evaluation Result

Operational Aspect	Evaluation Criterion	Recorded Status
Access and business/outlet selection	Enter application and select the correct business/outlet	Independent
Business configuration	Review/change business configuration and payment settings	With assistance
Product catalog	Manage product information	Independent
Ingredients, suppliers, purchases	Manage materials, suppliers, and purchase records	With assistance
Recipe/BOM	Create a recipe/BOM and check units	With assistance
Transaction and payment	Process a transaction and payment	Independent
History and receipt	Open transaction history and receipt output	Independent
Staff/payroll	Manage staff/payroll within authorized role	With assistance
Reports	Open and read operational reports	Independent
Issue reporting	Report a problem with sufficient contextual information	Independent

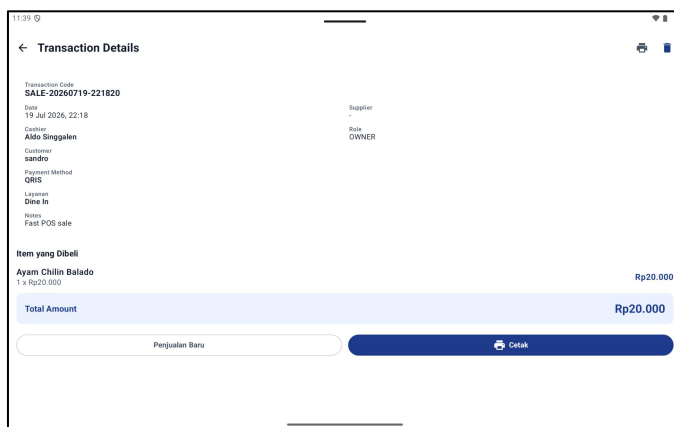
The data in Table 5 indicates that all 10 operational aspects were completed at the recorded checkpoint, representing a 10/10 completion rate within the guided mentoring setting. Six aspects (60%) were completed independently, four (40%) with assistance, and none were left incomplete. Independent activities comprised access/outlet selection, product management, transaction and payment, history and receipt access, report reading, and issue reporting. Configuration-intensive and back-office activities, including business configuration, ingredients/suppliers/purchases, recipe/BOM creation, and staff/payroll, required more guided support than routine front-line tasks. A mentoring record dated 22 July 2026 noted that the session was completed with no issues at the time. However, it is viewed as an outcome rather than a standardized satisfaction or usability score.

Records created during use remained available through transaction history, inventory, and reporting functions. Earlier sales could be reopened or used to reproduce receipts, while payment summaries and sales reports reorganized the same records for review. Ingredient balances, payment methods, best-selling items, and operational summaries were accessible through the inventory and reporting screens. During the observed workflow, this reduced the need to consult separate

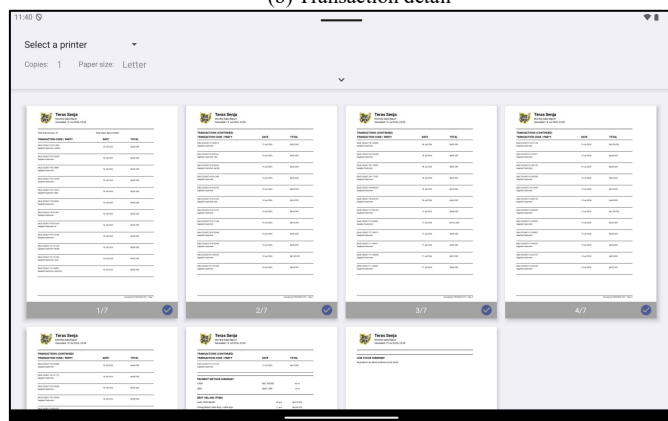
records before reviewing business activity; however, no before-and-after timing study was conducted, so the result is interpreted as improved information continuity within the application rather than a quantified gain in operational efficiency.



(a) Transaction history



(b) Transaction detail



(c) Sales report PDF export

Fig. 4. Managerial reporting output generated by TRANSARA.

The transaction information presented in Fig. 4 is available after a sale has been recorded. Users navigated from transaction history to individual transactions and then to summaries of payments, items, stock, and other operational records, with receipt records remaining accessible for review. The implementation process revealed several practical constraints, including the need for users to adapt and receive guidance for multiple configuration-intensive tasks, inconsistent data-entry practices, occasional image upload failures, and inconsistent layout behavior on phones and tablets during initial use. The observations do not contradict the black-box pass results because they address different aspects of the system: the black-box matrix examines output production, whereas mentoring observations focus on user learning and application of those functions. The practical value thus hinges on consistent data entry, user preparedness, and ongoing refinement of the interface.

V. DISCUSSION

The central finding of the study is that a recorded sale can be propagated to ingredient-level information through the recipe/BOM, and that multiple POS and back-office functions can be integrated into a single application. Previous studies have demonstrated that POS records can support forecasting and supply chain decision-making [5], [14], [15], and have highlighted the importance of stock visibility, replenishment coordination, and material variability in inventory management research [16], [17]. TRANSARA extends these concerns at the artifact level by making the transaction itself the event that triggers the use of recipe-defined ingredients before the updated information is stored for stock and managerial review. This design does not replace more comprehensive ERP or supply-chain systems; rather, it demonstrates a lightweight information-continuity mechanism suited to the operational scale examined in this specific MSME case.

The black-box results provide technical support for this architecture within a predefined validation framework. All 48 indicators successfully produced their expected outputs, encompassing sale and purchase scenarios, insufficient stock controls, role restrictions, reporting, synchronization, and selected external device functions. The result is more robust than the initial "Passed" summary as it explicitly states the test scope and denominator. However, it still signifies a limited conformance result rather than conclusive proof of universal reliability. The distinction in design science is critical, as it enables evaluation of an artifact to determine whether its implemented mechanisms function as intended, without assuming any causal effects on business performance. Firestore security rules, numbering 94, enhance access control verification through assertions, but do not replace independent security audits.

The mentoring results show that functional conformance

alone is not enough to evaluate an MSME information system. At the recorded checkpoint, six of the ten operational aspects were performed independently, while four required assistance and none were left incomplete. Research underscores the significance of guidance in business configuration, materials and purchases, recipe/BOM creation, and staff/payroll, consistent with research on digital literacy and organizational capabilities related to technology adoption [2], [9], as well as studies linking workforce capability and information sharing to integrated-system implementation [19], [20]. The practical implication for TRANSARA is that deployment should include structured onboarding and corrective support, rather than assuming that functional availability automatically leads to independent use.

Implementation observations to some extent qualify the broader contribution. The artifact's operation within a sociotechnical setting is apparent in uneven data-entry practices, occasional image-upload failures, differences in phone and tablet layout behavior, and the need for assistance with selected tasks. Research into digital-platform capability in MSMEs highlights the significance of organizational agility and supply-chain competitiveness [23], and hospitality studies indicate a requirement for technology alignment with food and inventory practices [24]. The current case involves a design-focused approach: integrated records depend on disciplined configuration, role-specific access, and consistent operational input, as well as on the transaction-to-inventory mechanism itself. Further research should examine whether this design maintains stability across diverse MSMEs, larger and more varied user groups, higher transaction volumes, different device and network environments, standardized usability metrics, repeated evaluations of inventory accuracy, and longitudinal assessments of workflow and business outcomes.

VI. CONCLUSION

TRANSARA implemented an integrated mobile workflow at Teras Senja, which enabled a completed menu sale to automatically invoke the stored recipe/BOM, deduct the specified ingredient quantities, update stock levels, and retain related operational records for future review. The revised evaluation further supports this mechanism: all 48 predefined black-box indicators met their expected outcome criteria, while the mentoring checkpoint documented all 10 evaluated operational aspects as completed, with six carried out independently and four with assistance. The results confirm that treating a POS transaction as a cross-functional operational trigger is a more effective design approach than viewing it solely as a payment endpoint. The application does not, however, establish that it alone improves business performance, produces population-level usability outcomes, or guarantees reliability outside the tested conditions.

The integrated workflow enabled the participating business to manage transaction, stock, receipt, workforce, payroll, and reporting information within a single application environment, with the mentoring process pinpointing areas where users required additional guided support. The evaluation is restricted

to a single food and beverage MSME, three participants consisting of one business owner and two staff members, a specific set of predefined functional scenarios, and descriptive task evidence without the use of a standardised usability tool or longitudinal before-and-after business-performance metrics. Studies involving multiple sites should therefore investigate the architecture using larger user samples, standardized usability metrics, scalability and load testing, diverse device and network environments, repeated inventory-accuracy checks, and longer observation of operational outcomes. This work would determine whether the sales-to-ingredient design remains reliable and practically useful beyond the conditions specified in this case.

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SOFTWARE AVAILABILITY

TRANSARA is a mobile POS application for food and beverage MSMEs that stores sales data with selected operational and administrative records. Its functions include products, recipes, ingredient inventory, suppliers, staff, payroll, outlet information, receipts, and managerial reports. Registered testers can access the application via the Google Play closed testing track under the package name `com.yerik.transara`: <https://play.google.com/store/apps/details?id=com.yerik.transara>. The additional validation reported in this revision used the local configuration version Name 1.19 (version Code 20) on 20 August 2026. Production distribution will be considered after closed-testing requirements and additional validation are completed.

CLARIFICATION AND ATTRIBUTION

This manuscript was prepared under the Rector Decree of Atma Jaya Catholic University of Indonesia Number 4575/II/SK-OT.10.05/10/2025 concerning Academic Integrity in the Production of Scientific Works, and the Rector Decree Number 4576/II/SK-OT.10.05/11/2025 concerning Guidelines for the Use of Artificial Intelligence (AI). The authors conducted the analysis, design, development, implementation, and evaluation of TRANSARA. Artificial intelligence tools were limited to editorial revision, language refinement, structural organization, and consistency checking. At the same time, the authors reviewed and approved all arguments, system descriptions, figures, tables, references, and final content. Artificial intelligence was not credited as an author, and responsibility for the article's accuracy, originality, interpretation, and integrity remains with the authors.

The research procedure diagram in Fig. 1 and the integrated operational architecture diagram in Fig. 2 were prepared by the authors to describe the methodological process and system

architecture applied in the study. Figures 3 and 4 contain screenshots captured directly from the TRANSARA application to document the implemented sales, inventory, supplier, staff, payroll, outlet, transaction history, receipt, and reporting functions. Any identifiable user, staff, transaction, or business-sensitive information visible in the application interface was removed or anonymized to protect privacy and confidentiality. All external concepts, methods, models, evaluation metrics, and comparative studies used in the manuscript are acknowledged through the references section.

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