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Participatory Quality Improvement and Work Ergonomics for a Micro Coffee Shop: The Warkop SYIR Community Engagement Case in Indonesia

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Abstract
Objective: To document a participatory industrial-engineering intervention that addresses inconsistent coffee preparation, raw-material control, operator discomfort, and weak customer-feedback routines at Warkop SYIR, a micro coffee shop in Watampone, Indonesia.
Methods: The 2026 community-engagement program was organized around a process diagnosis, jointly specified brewing and hygiene procedures, a low-cost ergonomic workstation redesign, operator coaching, and a Plan–Do–Check–Act review mechanism. Methods for assessing service time, first-pass product conformity, SOP adherence, stock traceability, and customer perception were formulated.
Results: The documented diagnostic basis identified four interconnected operational deficiencies and produced a structured intervention package comprising recipe cards, checklists, zoning rules, and monitoring instruments. To illustrate evaluation, an explicitly synthetic 40-order-per-phase scenario yields a modeled service-time change from 6.31 to 4.70 min per order; it is not an observed outcome.
Conclusion: Integrating quality standardization, task-level ergonomics, and feedback offers a feasible low-investment improvement framework. Verified field measurements remain necessary before claiming quantitative effectiveness.

Keywords: community engagement, continuous improvement, ergonomics, microenterprise, process standardization, quality control

1. Introduction

Micro coffee shops (locally called warung kopi or warkop) support urban livelihoods and social interaction, yet frequently depend on tacit operator knowledge rather than reproducible production and service routines. As consumer expectations grow, inconsistent brewing, poorly controlled ingredients, and variable queue times can erode perceived quality. From an industrial engineering standpoint, these problems arise from process variability as much as from individual skills; therefore, they should be addressed through a coherent work system rather than isolated staff reminders [1, 2].

The 2026 Universitas Muslim Indonesia community-engagement proposal identified Warkop SYIR in Watampone, Bone Regency, South Sulawesi, as a microenterprise with limited written standard operating procedures (SOPs). Its initial diagnosis reported variable coffee doses, water temperatures and extraction methods, non-systematic raw-material inspection and storage, suboptimal hygiene and workstation organization, and the absence of a formal customer-complaint review. These descriptions provide the documentary baseline of the present case; they are not numerical baseline measurements.

Standardization is especially relevant when taste depends on interacting variables such as beverage ratio, grinding, water characteristics, extraction time and serving conditions. The Specialty Coffee Association offers a brewing control framework to describe the relationship among beverage strength, extraction, and coffee-to-water ratio [3]. A small business need not invest in advanced laboratory instruments to benefit from this logic: a stable recipe card and a repeatable visual or sensory checkpoint already reduce preventable sources of variability. At the same time, ergonomics treats worker capability, work organization, equipment, and spatial arrangement as an integrated system [4].

The practical challenge lies in combining these perspectives at a scale affordable to a microenterprise. A recipe may be technically sound yet difficult to follow if supplies are dispersed, movements are excessive, hot water crosses the customer handover route, or staff lack time to record nonconformities. Equally, reorganizing a counter without defining ingredient and hygiene standards may accelerate the production of inconsistent beverages. Continuous improvement therefore requires simultaneous attention to technical quality, operator conditions and customer feedback [5].

This article presents a practice-based reconstruction of the Warkop SYIR intervention, using the approved proposal and the extended institutional report as its documentary basis. Its aims are to (i) explain the engineering rationale for a participatory quality-and-ergonomics package, (ii) specify operational tools and measurable indicators that can be replicated in comparable coffee shops, and (iii) separate program-design outputs from illustrative numerical estimates. The intervention is treated as completed in 2026 according to the project team's status information, while implementation quantities that cannot be independently established from the submitted records are not claimed as measured field outcomes.

2. Community Engagement and Engineering Method

2.1. Partner, Participants, and Intervention Logic

The partner was Warkop SYIR, located in Watampone, Bone Regency, Indonesia. The engagement involved a faculty team from the Industrial Engineering Department of Universitas Muslim Indonesia, with student assistance, and was directed toward the owner and personnel responsible for beverage preparation, supply handling and customer service. The institutional proposal set an internal-funding plan of IDR 10 million; this represents a proposal budget rather than an independently audited expenditure figure.

The work combined participatory problem identification with applied work-system engineering. The implementation logic comprised seven linked phases: coordination and direct process diagnosis; analysis of improvement priorities; preparation of written SOPs and simple visual aids; demonstration and operator coaching; on-site implementation support; monitoring and review; and handover of responsibility for continued corrective action. The approach avoided assuming that industrial-scale quality systems could be transferred unchanged to a very small enterprise.

2.2. Quality and Hygiene Controls

The first output was a menu-specific brew sheet defining product name, coffee quantity, water amount or beverage yield, equipment, target sequence, and service presentation. Values must be agreed with the partner and checked for each brewing method rather than copied from a universal recipe. A short first-pass inspection then records whether the order meets the agreed recipe, presentation and sensory reference without rework. This distinguishes product conformance from customer satisfaction, which is assessed separately.

A complementary receiving-and-storage checklist records supplier, lot or receipt date, package condition, product identification, storage location, first-in–first-out or first-expired–first-out rotation as applicable, and corrective disposition. Hygiene checkpoints cover clean contact surfaces, separation of clean and dirty utensils, covered storage, operator hand hygiene, and safe management of waste and hot water. The Codex General Principles of Food Hygiene establish a broader food-safety context for these elementary controls [6]. The proposed checklist is a locally adaptable tool, not a claim of formal food-safety certification.

2.3. Ergonomic Work-System Redesign

The second technical component addressed the relationship between reaching, turning, waiting, handling hot liquids and carrying completed orders. A before–after route map was specified for the sequence: customer order, ingredient retrieval, grinding or dosing, brewing, final check, and handover. High-frequency materials should be positioned within comfortable reach; low-use supplies can be stored farther away. Cleaning implements, waste containers and temporary storage are placed so they do not obstruct the serving route. The International Labour Organization recommends practical, low-cost ergonomic checkpoints that can be adapted to small enterprises [7].

Rather than issuing an unverified optimal dimension, the redesign protocol requires local measurements of available counter height, reach distances, operator stature, walkway clearance and burn exposure. Each proposed rearrangement is accepted by the operator and owner after a short trial. The preferred design is the arrangement that reduces unnecessary movement and handling risk without causing congestion, compromised hygiene or excessive retrofit expense.

2.4. Participatory Monitoring, Measures, and Evidence Boundary

Evaluation was defined at three distinct levels: (a) outputs, such as completed SOPs, recipe cards and coaching instruments; (b) adoption, such as the proportion of checked steps followed and the completeness of stock records; and (c) operational effects, such as service time, first-pass conformity, worker discomfort and customer experience. This distinction prevents a prepared SOP from being mistaken for proven quality improvement. Service time is defined from a clear start event (order acceptance) to a clear end event (beverage handover); sampling must stratify by menu and peak/nonpeak period.

First-pass yield equals conforming drinks at first inspection divided by inspected drinks. SOP adherence equals correctly performed applicable steps divided by all observed applicable steps. Stock traceability equals accepted lots with a completed identification and receiving record divided by all sampled lots. A brief five-point customer feedback scale is proposed for taste consistency, cleanliness, waiting time and overall service, drawing on the general distinction between service expectations and perceptions [8]. These definitions create an auditable basis for a future field verification study.

The materials supplied for manuscript preparation document the partner diagnosis, intended engineering interventions and later analytical elaboration, but do not include signed activity logs, timestamped transaction datasets, original questionnaire returns, or independent confirmation of final adoption counts. Accordingly, numerical comparisons included below are explicitly identified as synthetic instructional scenarios. No inferential test, p-value, or causal impact claim is attributed to Warkop SYIR.

3. Results and Discussion

3.1. Operational Diagnosis and Response Matrix

The documentary diagnosis shows that quality, ergonomics and feedback problems were mutually reinforcing rather than isolated. Variation in preparation could require repeated handling; extra search and travel movements could increase service time; and inconsistent evaluation practices could hide recurring defects. The recommended intervention therefore uses a short set of operating artifacts instead of a complex computerized quality-management system. Table 1 summarizes the action logic.

Table 1: Diagnosis-to-intervention matrix for the Warkop SYIR case.

Diagnostic issue	Engineering response
Variable coffee taste and presentation	Menu-specific recipe card, process SOP, first-pass check
Uncontrolled ingredient condition or ageing	Receiving checklist, stock label, rotation and lot log
Excessive reach, turning and hot-water exposure	Work zoning, point-of-use placement and 5S rules
Undocumented complaints and corrective actions	Customer feedback form and weekly PDCA log

The matrix offers a readily transferable approach: every observed problem should have an owner, a control document and a verification criterion. For example, a recipe is useful only if two operators can repeat the same acceptable serving within the intended variation tolerance. A storage label is useful only if it changes selection behavior. Likewise, an ergonomic rearrangement should be accepted only if it reduces avoidable motion without introducing a new hot-water or cross-contamination hazard.

3.2. Standardized Operating Package

The recommended brewing SOP begins with hand hygiene and equipment inspection, followed by weighing, water preparation, the agreed extraction sequence, beverage checking, safe serving and recording of exceptions. A single-page laminated recipe card enables rapid use at the point of production; a longer SOP defines escalation and cleaning responsibilities. When the beverage does not pass the first check, the operator records whether the reason was ingredient quality, dosing, extraction, presentation, or a customer-specific order. This moves the conversation from blame to controllable process causes.

The raw-material procedure begins before coffee reaches the machine. Packaging integrity, aroma, freshness information and supply identity are documented on receipt. Storage conditions are checked at shift opening and end-of-day cleaning; stock rotation is matched to the product label. Where equipment cannot directly quantify moisture or extractable solids, the system records what is actually observable, avoiding fabricated precision. The benefit of standardization lies in repeatability, traceability and early detection rather than in the mere existence of paperwork.

A concise operating audit was constructed with five domains: recipe completeness, receiving/storage records, hygiene observations, work-zone organization and feedback closure. Each domain is scored using observable criteria (0 = not implemented, 1 = partially implemented, 2 = implemented and evidenced). The score is a management aid, not a validated psychometric measurement. Repeating it monthly can reveal neglected practices and select the next improvement project.

3.3. Ergonomic Flow and Practical Redesign

A coherent counter can be divided into an order point, a clean ingredient-preparation zone, a hot extraction zone, a quality check/handover point, and a cleaning/waste area. Personnel should move through the service sequence without repeatedly crossing the same narrow passage. Frequently used cups, filters and weighing tools belong near their corresponding tasks. Hot surfaces and cables need explicit management so that shorter movement paths do not increase the probability or severity of injury.

The redesign follows 5S logic—sort, set in order, shine, standardize and sustain—but does not assume that a small counter can be redesigned solely by neatness. Working height, grip, reach, duration of standing, visual access to the customer and safe handling of hot liquids must also be reviewed. ISO 6385:2016 emphasizes the combined human, technical and organizational dimensions of work-system design [4]. Where structural alteration is unaffordable, trays, labeled shelves, counter zoning and location marks represent feasible first-line actions.

Figure 1 describes the information and material flow intended by the intervention. It is a conceptual operating model, not a photograph or verified map of the partner's premises.



Fig 1: Proposed service-flow architecture (conceptual design; not documented field measurements).

3.4. Transparent Analytical Illustration

To demonstrate how an evaluator would interpret field records, the institutional report includes a deliberately constructed, non-empirical comparison of 40 hypothetical orders in a baseline phase and 40 in an improved phase. The sample size and all numeric values in this exercise are synthetic, with no claim that the modeled orders were observed in the partner shop. The model is useful for checking formulas, specifying future data collection and discussing practical significance; it cannot establish intervention effectiveness.

Table 2: Synthetic evaluation scenario; all values are illustrative and are not actual Warkop SYIR results.

Indicator	Initial model	Revised model
Service time, min/order (n = 40 per phase)	6.31	4.70
First-pass conformity, % (28/40; 36/40)	70	90
SOP adherence, % (104/200; 182/200)	52	91
Lot acceptance, % (21/25; 24/25)	84	96
Customer rating, 1–5 synthetic mean	3.45	4.20

For the modeled service-time indicator, the relative reduction is (6.31 − 4.70)/6.31 × 100 = 25.5%. If one operator alone performed each order sequentially with no interruptions, the corresponding purely theoretical hourly capacity would change from 60/6.31 = 9.51 to 60/4.70 = 12.77 orders. The latter figures are mathematical consequences of the illustrative means, not shop throughput, sales, or verified staffing productivity. Real systems also contain concurrent preparation, cash transactions, setup, downtime and demand constraints.

The hypothetical conformity increase from 70% to 90% represents eight additional passing drinks among 40 inspected orders; it should not be interpreted as a statistically verified difference. A proper field study would first specify comparable menus, independent inspection rules, observation periods, and the handling of repeat transactions. Likewise, a high SOP score could coexist with poor beverage taste if the recipes themselves were not jointly calibrated. Operational metrics must be interpreted alongside customer experience and process-safety checks.

3.5. Customer Feedback and PDCA Sustainability

Sustainable improvement depends on converting front-counter problems into decisions. A one-minute customer card can ask about taste consistency, cleanliness, waiting time, courteous service and overall satisfaction, with an optional open-ended complaint. Managers should examine item distributions as well as averages because a stable mean can conceal recurrent low ratings for a particular menu or shift. Service quality concepts are useful here, but a short operational questionnaire should not be presented as the full SERVQUAL instrument [8].

The weekly improvement log begins with a defined deviation and a simple cause assessment. In Plan, the operator and owner select one manageable issue, the current process condition, and the expected verification sign. In Do, they trial a revised tool location, recipe step or shift-opening checklist. In Check, they examine evidence, including exceptions and operator feedback. In Act, they either standardize the change or revise the intervention. This is aligned with Deming's emphasis on system learning [1] and published comparisons of PDCA with more complex quality methods [5].

A useful monitoring rhythm is a two-minute shift-opening review, a brief end-of-day exception record, a weekly 15-minute problem-solving discussion, and a monthly SOP audit. Assigning responsibility is critical: recipe ownership may sit with the head operator, stock traceability with the purchasing or receiving person, workplace organization with all shift personnel, and final prioritization with the owner. This distribution makes the system more resilient to staff turnover and minimizes paperwork that is not acted upon.

3.6. Practical Contribution and Limitations

The major engineering contribution of this case is its integrated and replicable intervention architecture. Quality controls reduce preventable variation; ergonomic zoning supports stable task execution; hygiene procedures constrain risks; and PDCA turns feedback into structured adjustment. Crucially, the framework is proportionate to a microenterprise: printed cards, labels, a short audit form and basic observations can be introduced without advanced software. In the terms of operations management, small improvements are selected by frequency of use, process risk, feasibility and owner commitment rather than technical sophistication alone [9]. The emphasis on visible standard work and waste elimination is also consistent with lean management principles [10, 11] and service operations design [12].

The article has two important limitations. First, the proposal describes intended activities and expected outcomes; the user confirmed that the engagement was completed, but contemporaneous attendance sheets, dated photographs, signed handover evidence and raw performance datasets were not supplied for independent validation. Second, the example before–after table is an analytical reconstruction. It therefore cannot support a causal or statistical claim about Warkop SYIR, and should be replaced by original source records before submission as an empirical impact evaluation. A future verification exercise should compare matched menu categories and time windows, document observer calibration, disclose missing data and include worker safety and discomfort responses.

3.7. Practical Verification and Replication Protocol

Before the improvement package is adopted as a benchmark for other community partners, each control should be checked in the normal rhythm of operations. A suggested four-week verification cycle begins with one week of baseline observation, followed by operator practice, a second week of observation under the revised procedure, and joint review of deviations. Order-type and staffing differences must be tracked, because a shorter service time in an uncongested period is not necessarily attributable to workstation redesign. The protocol should specify identical start and end events for stopwatch data, randomly selected orders within time bands, and independent rechecking of a subset of the observations.

The verification procedure is designed to be achievable with a notebook or simple spreadsheet. For each order, the operator or trained observer records menu, order time, handover time, rework, adherence exceptions and unusual interruptions. For raw materials, a receiving log records supplier, batch identity, storage location and accepted/rejected status. For the workstation, a walk-through notes unobstructed movement, hot-water hazards, repeated reaching, visual access and signs of operator discomfort. A small, voluntary customer survey complements these operational measures, while avoiding personal identifiers.

Table 3: Minimal evidence package for a replicable improvement audit.

Control domain	Verification record	Owner / review
Brewing SOP	10 observed steps per operator; exception notes	Shift lead / weekly
Ingredient control	Batch log; storage and expiry check	Receiver / each delivery
Ergonomic layout	Route sketch; reach and hot-water audit	Owner and staff / monthly
Customer feedback	Anonymous rating and complaint closure	Owner / weekly
Service performance	Time-stamped comparable orders	Trained observer / baseline and follow-up

Replication should be judged against explicit readiness conditions: written procedures can be followed without a trainer present, operators understand why the steps matter, the equipment arrangement is not creating a new safety problem, and at least one complete improvement cycle has a recorded decision. If those conditions are not met, an attractive diagram or a single training event should not count as sustainable technology adoption.

This evidence plan also improves the interpretability of quantitative results. Descriptive distributions, ranges, and within-menu comparisons should accompany mean service time; any statistical test would require a prespecified sampling design, appropriate independence assumptions, and sufficient observations. Results should be reported alongside unintended effects such as additional administrative work, delays during peak service, or operator discomfort. The next program cycle can then target the largest remaining source of variation instead of treating all variation as operator error.

3.8. Standardized Measurement and Data Integrity

The proposed measurement system distinguishes a process-control measure from an outcome measure. Recipe completion, batch labeling and point-of-use cleanliness are leading indicators of implementation. Service time, accepted-drink proportion, perceived consistency and worker discomfort are downstream outcomes influenced by customer mix, equipment reliability, staff proficiency and demand intensity. A balanced dashboard should therefore avoid declaring success from checklist compliance alone. When evaluating a beverage, the observer should use a recipe-specific specification accepted by the owner and operator, rather than applying a universal sensory threshold to different beverages. Deviations ought to be recorded as actionable categories, such as incorrect dose, brew-time variance, inadequate mixing, temperature nonconformity, unnecessary waiting or remaking.

Service-time observations require an unambiguous start event (customer order confirmed) and completion event (beverage handed to the customer). Samples should be distributed across morning, afternoon and peak demand periods, including repeated menu types where feasible. Observers should record interruptions without silently deleting them, because the interruptions may reveal genuine workflow constraints. For process-adherence auditing, each SOP item should use an explicit pass criterion and the same denominator for the baseline and follow-up periods. A binary checklist may be suitable for hygiene and storage, whereas a scale with documented anchors is more appropriate for operator posture or self-reported discomfort. These safeguards reduce observer discretion and improve reproducibility.

An auditable report should link each percentage to dated source forms, a numerator, a denominator, and an identified recorder. SOP compliance equals the number of passing applicable steps divided by the number observed, multiplied by 100. Missing observations must not be counted as passes. Photographs can corroborate tool placement and posted SOPs but cannot replace transaction records; customer identities are unnecessary for this assessment.

3.9. Ergonomic Safeguards and Implementation Priorities

Ergonomic improvement must not be reduced to visual tidiness. A counter may appear organized yet still require frequent twisting, prolonged reaching across hot liquids or awkward wrist positions during tamping and serving. Accordingly, the proposed inspection emphasizes the most frequent tasks and the most severe credible hazards: handling of kettles, lifting of water containers, repeated transfer between grinding and extraction points, walking around other operators and retrieval of stock from low or high shelves. Interventions should first remove obstacles and minimize unsafe reach, then group frequently paired items within comfortable access. Height adjustments, mats or tool holders should be considered only after the task sequence has been understood and with worker feedback.

The recommended sequence is to diagnose major deviations and hazards, agree on a workable standard recipe, zone the work area, train operators with return demonstrations, implement simple checklists, and review deviations every week. This sequence reduces paperwork and prevents changes that merely relocate congestion. The owner should approve who maintains each procedure and when it must be revised after changes in equipment, staffing, supplier or menu.

Table 4: Suggested evaluation questions and minimum verifiable evidence for a subsequent field audit.

Evaluation question	Evidence required
Are recipes consistently followed?	Dated observation records; per-item SOP criteria; deviations by beverage.
Are materials controlled?	Accepted/rejected batch logs, dates, handling and storage checklist.
Has the service flow improved?	Matched order-time records by menu and shift, with interruptions.
Is work physically safer?	Before–after task photographs or sketches with operator feedback.
Can improvement continue without trainers?	Owner-approved SOP, assigned duties and a completed PDCA record.

These checks distinguish a completed training engagement from measured operating improvements. Until source records are reviewed, the article reports the design and evaluation approach without attributing unverified quantitative changes to the partner.

4. Conclusions

The Warkop SYIR case illustrates how a university–microenterprise partnership can translate industrial-engineering knowledge into a practical, low-investment operating system integrating recipe standardization, raw-material checks, food hygiene, ergonomic work zoning, customer feedback and PDCA. The proposal establishes a credible set of initial operational challenges, and the completed-case reconstruction specifies actionable artifacts and assessment criteria that comparable coffee shops can adapt. The synthetic scenario demonstrates possible evaluation calculations, but does not constitute observed productivity or quality improvement. Subsequent institutional verification should prioritize implementation evidence, real transaction logs and repeated audits before quantitative achievement is reported.

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6. Evidence and Data Availability

The source material comprises the 2026 Warkop SYIR engagement proposal and the extended report prepared from that proposal. No independently verifiable transaction dataset was included in the material supplied for this manuscript. Illustrative figures and indicator values are explicitly synthetic; the formulae and definitions are available in the accompanying institutional report. Field records, if retained by the implementing team, should be checked and deposited or summarized according to the partner's consent and the target journal's data policy.

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