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LANGAR CREDIT PROTOCOL: AN ISO-ALIGNED VERIFICATION FRAMEWORK FOR COMMUNITY-BASED FOOD SECURITY CONTRIBUTIONS TO SDG 2 AND SDG 12 IN LOW-DATA CONTEXTS

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Abstract
Community kitchens throughout India, such as gurdwara langars, temple annadanam, sufi langars, and surplus food redistribution networks, collectively serve an estimated crores of meals annually to vulnerable populations. Although community kitchens make significant contributions to food security and sustainable consumption, they remain institutionally invisible within national and global Sustainable Development Goal monitoring frameworks.
The Langar Credit Protocol was developed, analytically validated, and empirically tested using design science research principles. This framework, intended for third-party verification, aligns with ISO standards and is designed for pilot implementation in low-data, community-based environments. The research methodology integrates requirements engineering through systematic extraction and adaptation of 105 clauses from ISO 20121, ISO 14064-3, and ISO/IEC 17029, precedent analysis through synthesis of 19 validated techniques from eight established MRV frameworks, and iterative design cycles. The resulting protocol defines six verifiable sustainability indicators mapped to specific SDG 2 and SDG 12 targets, with a three-tier assurance structure differentiating performance using unweighted scoring. Empirical validation via a survey of 422 educated professionals demonstrated strong stakeholder perception of feasibility with 87 percent agreement on indicator feasibility, 89 percent on tier clarity, and 92 percent on training adequacy.

Keywords: SDG 2, SDG 12, verification framework, community-based food security, low-data context, ISO standard, community café, community kitchen

Plain Language Summary
Thousands of community kitchens in gurdwara langar, temple annadanam, sufi langar, and community centers across India serve free meals to millions annually. These community kitchens help reduce hunger and food waste. However, their contributions remain undetected in official government data. When India reports progress on SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption), these community-based efforts are not counted, making it difficult for them to attract funding and gain recognition in the reports.
The Langar Credit Protocol was developed as a step-by-step verification system that allows community kitchens and community cafés (CKCC) to demonstrate their contributions in a credible and standardized manner. The protocol is based on three international quality standards (ISO 14064-3, ISO/IEC 17029, and ISO 20121) but is specifically adapted for volunteer-run operations with limited digital systems for recording data
Six sustainability indicators were created against which community kitchens can be verified: the type of cooking fuel they use (clean energy like LPG or traditional wood), whether they use reusable plates or disposable ones, the nutritional quality of meals, where they source their ingredients, whether they cook fresh food or redistribute surplus, and how many meals they serve annually. Based on their performance, kitchens receive Silver, Gold or Platinum certification levels. To make the verification process practical and affordable, a community-based verifier model called the Langar Seva Verifiers was designed. These are trained local volunteers who complete a six-hour training program and conduct on-site verification of the CKCC.
The Langar Credit Protocol provides community kitchens with a tool to demonstrate their impact using the same quality standards that international organizations trust. NITI Aayog can include community kitchen data in India's SDG progress reports. Corporate donors can identify reliable community kitchens for partnerships and report their contributions in their annual sustainability reports.

Introduction
Across India, thousands of community kitchens and community cafés (CKCC) prepare and serve free or low-cost meals every day (Sikh Research Institute, 2023). These operations include well-known langar halls in gurdwaras, temple-based feeding programs, sufi langars, faith-based canteens, NGO-run kitchens, and emerging community cafés that redistribute surplus food from hotels, hostels, and wedding venues (Sikh Research Institute, 2023). Collectively, these initiatives are estimated to provide crores of meals annually, often reaching people who would otherwise struggle to secure hot, nutritious meals regularly (TERI, 2024). Most CKCC are grounded in local values rather than formal policies, where volunteers routinely donate time, food, and money as part of their spiritual or social commitments (Mahato, 2021; Sikh Research Institute, 2023). Meals are typically cooked in large batches using shared kitchens, simple equipment, and volunteer labor, with records maintained in handwritten ledgers or basic spreadsheets instead of sophisticated information systems (Cruzada, 2022). Despite these resource and documentation constraints, CKCC plays several important roles in local food systems by supplementing household food supplies for daily wage earners, migrant workers, students, and residents of urban slums (World Bank, 2023).
However, this community-based food security infrastructure remains largely undetected in formal reporting (Chaudhary & Singh, 2023; FAO, 2025b). National surveys and Sustainable Development Goal indicators primarily track food security at the household level, relying on consumption data collected through large-scale household surveys (Chaudhary & Singh, 2023). Consequently, the true contribution of community-based feeding initiatives to hunger reduction and sustainable consumption is significantly underestimated in both national and global assessments (FAO, 2025b). The combination of high practical relevance and low formal visibility creates a verification credibility gap where CKCC makes measurable contributions to food security and more sustainable consumption patterns; however, they lack standardized methods to demonstrate these contributions in formats recognized by policymakers, CSR decision-makers, and development partners (ICRIER & NABARD, 2022; KPMG, 2025b).
Addressing this verification credibility gap requires a system that is persuasive for donors and CSR heads, yet practical for low-resource, volunteer-managed operations (TERI, 2024). International standards developed by the International Organization for Standardization provide widely accepted principles for verification, validation, and sustainability management (ISO 14064-3, 2019; ISO/IEC 17029, 2019). Although these standards were not written specifically for the CKCC, they contain concepts and procedures that can be adapted to low-data, community-based contexts (ISO 14064-3, 2019; ISO/IEC 17029, 2019). The Langar Credit Protocol is proposed in response to this challenge, aiming to translate ISO principles into a practical, step-by-step verification system that CKCC can understand and apply with the support of trained Langar Seva Verifiers (Hevner et al., 2004; Peffers et al., 2007). By connecting the grassroots realities of CKCC with the formal language of international standards, the protocol seeks to close the verification credibility gap and make community contributions visible within national and global efforts to achieve Sustainable Development Goals 2 and 12.
The literature review employed a purposive four-stream search strategy designed to balance academic rigor, practitioner relevance, normative authority, and operational precedents (Hevner et al., 2004; Peffers et al., 2007; Venable et al., 2017). This architecture responds to Design Science Research requirements for multi-source triangulation spanning theoretical foundations, real-world problem documentation, normative requirements and validated solution techniques (Hevner et al., 2004). The search yielded 101 sources across academic databases, institutional repositories (FAO, World Bank, TERI, Gold Standard, Clean Cooking Alliance), ISO standards catalogues, and MRV framework documentation. Literature currency is critical for protocol design, with 73 percent of sources published in 2020 or later, ensuring

currency while achieving comprehensive coverage across theoretical, normative, and practical knowledge domains (Hevner et al., 2004; Mitchell et al., 1997).

CKCC operational analysis reveals systematic 3-7 percent variance documented through approximately 200 facilities across 15 states, where manual meal counting conducted during cooking breaks utilizes simple notebook logs, fuel purchase receipts are maintained sporadically through cash transactions, and sourcing documentation relies heavily on verbal supplier relationships (APU, 2018; Borsadwala, 2023; TERI, 2024). The absence of a digital monitoring infrastructure reflects resource priorities favoring service delivery over documentation systems (Borsadwala, 2023). SDG 2 measurement gaps demonstrate systematic exclusion, where India tracks progress primarily through FIES and PoU methodologies, both employing household consumption surveys that systematically exclude CKCC meals consumed outside the home (Chaudhary & Singh, 2023; FAO, 2025b; UN DESA, 2024a, 2024b; World Bank, 2023). The MRV framework comparative analysis extracted 19 transferable techniques across eight frameworks, including Gold Standard PGS kappa 0.82-0.88 validation, IFOAM 70 percent majority-practice thresholds across 150,000 producers, Clean Cooking Alliance fuel ladder with 95 percent accuracy, and UNDP 2.1 cumulative reliability weighting for low-data contexts (Clean Cooking Alliance, 2022; Gold Standard Foundation, 2024b; IFOAM & FAO, 2019; UNDP, 2013).

Methods

This study follows Design Science Research guided by Hevner et al. (2004) and Peffers et al. (2007), positioning artifact development as a pragmatic response to identified real-world problems (Hevner et al., 2004; Peffers et al., 2007). The research methodology integrates three development approaches: requirements engineering through systematic extraction and adaptation of 105 clauses from ISO 20121, ISO 14064-3, and ISO/IEC 17029, categorized into 43 mandatory transpositions preserving core normative principles, 47 conditional adaptations accommodating low-data realities through triangulation protocols, and 15 justified exclusions avoiding documentation impositions structurally incompatible with community-based operations (ISO 14064-3, 2019; ISO/IEC 17029, 2019; ISO 20121, 2024). Precedent analysis systematically extracted 19 validated techniques from eight established MRV frameworks (Gold Standard, IFOAM, Clean Cooking Alliance, ProTerra, UNDP, FAO, UNECE, Verra) across 12 analytical dimensions including scope definition, indicator design, evidence protocols, verifier competence, and quality assurance (Gold Standard Foundation, 2024b; IFOAM & FAO, 2019; ProTerra Foundation, 2023; UNDP, 2013).

Protocol development proceeded through three iterative design cycles: the first focused on defining the normative foundation by extracting and interpreting relevant ISO clauses; the second addressed the operational specifications of indicators and tier structures; and the third developed the infrastructure design for verifier training and quality assurance. The validation process followed a sequential mixed-methods approach that comprised three phases. Phase 1 qualitative synthesis integrated literature, standards, and practitioner insights to establish theoretical and normative foundations. Phase 2 analytical validation confirmed internal consistency, standards alignment, and technical robustness across five validity dimensions using ISO compliance matrices, sensitivity analyses, kappa projections, and scenario testing. Phase 3 involved empirical validation through a survey of 422 Indian professionals (58.3 percent with direct CKCC exposure) to measure stakeholder perceptions across five constructs: Training Adequacy, Indicator Feasibility, Tier Clarity, Impartiality, and Protocol Readiness.

Results

Empirical validation involved a quantitative survey of 422 Indian professionals to assess perceived feasibility across five protocol dimensions prior to pilot deployment. The survey design operationalized five constructs through Likert-scale items (1 = strongly disagree to 5 = strongly agree), with Training Adequacy measuring perceptions of the six-hour modular curriculum sufficiency, Indicator Feasibility assessing the practicality of verifying six sustainability indicators in low-data contexts, Tier Clarity evaluating the comprehensibility of Silver-Gold-Platinum classification, Impartiality measuring confidence in registry-based LSV assignment safeguards, and Protocol Readiness capturing overall pilot implementation confidence.

Reliability analysis confirmed internal consistency, with Cronbach's alpha values ranging from 0.72 to 0.84 across all five constructs, surpassing the 0.70 acceptability threshold. Each of the five constructs received positive average scores above the 3.5 feasibility threshold: Training Adequacy ($M=3.58$, $\alpha=0.82$), Indicator Feasibility ($M=3.54$, $\alpha=0.79$), Tier Clarity ($M=3.62$, $\alpha=0.84$), Impartiality ($M=3.59$, $\alpha=0.81$), and Readiness ($M=3.56$, $\alpha=0.83$). Statistical hypothesis testing supported all primary feasibility claims, with respondents familiar with CKCC showing significantly higher perceptions of protocol feasibility ($M=3.75$ compared to $M=3.28$ for those unfamiliar, Cohen's $d=0.58$, $p<0.001$), confirming that contextual legitimacy significantly enhances verification acceptance. Notably, 47.9 percent of participants expressed willingness to become Langar Seva Verifiers, validating the assumption of community-based verifier recruitment. Chi-square tests indicated a medium-strong association between CKCC exposure level and willingness to serve as verifiers ($\chi^2=45.2$, $p<0.001$, Cramér's $V=0.38$). The alignment between the analytical projections and survey findings bolstered confidence in the protocol design, with the survey results supporting analytical decisions regarding the sufficiency of the six-hour training and the achievability of the 70 percent threshold.

Discussion and Conclusion

Discussion

The Langar Credit Protocol successfully bridges the verification credibility gap by translating rigorous ISO principles into a practical system for low-data settings, making community-based food security contributions visible, comparable, and integrable into SDG dashboards and CSR reporting. This protocol provides four distinct contributions to the existing body of knowledge. First, it presents the first ISO-aligned, third-party verification framework explicitly designed for community-based food security systems operating within seva-oriented, low-data contexts, as no existing MRV or certification scheme addresses faith-based and secular CKCC with a standards-based approach tailored to volunteer management and manual record-keeping.

Second, it develops and demonstrates a systematic ISO adaptation methodology, providing a replicable approach for informal sector protocol design through structured clause categorization (43 mandatory, 47 conditional, 15 excluded), precedent integration of 19 techniques from eight MRV frameworks, and cultural sensitivity protocols accommodating the seva ethos and 3-7 percent manual recordkeeping variance.

Third, it frames institutional meal provision as a bridging mechanism between household-centric metrics of SDG 2 and commercial sustainability indicators of SDG 12. This contributes to sustainable food systems theory by mapping CKCC practices across the stages of production, processing, distribution and consumption. Fourth, it produces a pilot-ready artifact presented as an ISO-style practitioner manual, complete with a training curriculum, registry protocols, and quality assurance procedures aimed at achieving inter-rater reliability (kappa $\geq$0.80). For CSR leaders and corporate donors, the protocol addresses practical challenges by offering an independent verification system that facilitates informed decision-making, supports annual sustainability reporting, and demonstrates alignment with SDG 2 and SDG 12 targets. For government agencies, the protocol provides a pathway to incorporate CKCC data into national SDG dashboards, enabling NITI Aayog to use verified CKCC data to complement household survey results and offer a more comprehensive view of hunger reduction efforts.

Conclusion

This study successfully developed the Langar Credit Protocol as an ISO-aligned, pilot-ready third-party verification framework addressing CKCC contributions to SDG 2 and SDG 12 within low-data contexts, thereby fulfilling the Primary Research Question and three subsidiary research questions through systematic ISO adaptation, precedent integration, and sequential mixed-methods validation. The Primary Research Question resolution demonstrates how 105 clauses from three ISO standards were categorized into 43 mandatory transpositions, 47 conditional adaptations, and 15 justified exclusions, with precedent analysis extracting 19 validated techniques from eight MRV frameworks to manage 3-7 percent manual recordkeeping variance via 2.1 cumulative reliability triangulation. The resulting protocol defines six verifiable sustainability indicators (Fuel Type, Utensil Type, Meal Type, Sourcing Type, Operation Type, and Verified Meals) mapped to specific SDG 2 and SDG 12 targets, with a three-tier assurance structure (Silver, Gold, Platinum) differentiating performance using unweighted scoring and linking verification intensity to materiality.

The research journey underscored the vital need to balance the normative rigor of ISO standards with sensitivity to the seva ethos, the realities of volunteer recordkeeping, and regional diversity across the CKCC landscape in India. Empirical survey findings highlight the importance of empirical triangulation. These findings offer early assurance that the protocol is not only theoretically robust but also feasible and relevant to potential users, thus establishing its readiness for pilot implementation. The protocol offers CKCC operators, CSR decision-makers, and development partners a structured approach to make CKCC visible within national and global SDG monitoring systems, while also providing transferable insights for adapting standards in informal, community-led sectors characterized by low-data contexts and volunteer management structures.

Data Availability and Ethics

Data Availability

The empirical validation dataset consisted of anonymized survey responses from 422 Indian professionals, 58.3% of whom had direct exposure to CKCC operations. These responses measured stakeholder perceptions across five constructs: Training Adequacy, Indicator Feasibility, Tier Clarity, Impartiality, and Protocol Readiness. To protect participant confidentiality, survey data were de-identified in accordance with institutional data protection policies, with only aggregated demographic categories such as state of residence, professional sector, and CKCC familiarity level retained for the stratified analysis.

Analytical validation materials, including ISO clause extraction matrices (105 clauses from ISO 14064-3:2019, ISO/IEC 17029:2019, and ISO 20121:2024), MRV framework precedent analysis tables (19 techniques from eight frameworks), and protocol development documentation are available as supplementary materials. The pilot-ready Langar Credit Protocol artifact is included in full as Appendix A to this research paper. All normative ISO standards cited are publicly available through the International Organization for Standardization catalogue at https://www.iso.org. MRV framework documentation from the Gold Standard Foundation (2024b), IFOAM & FAO (2019), Verra (2024), ProTerra Foundation (2023), and UNDP (2013) is publicly accessible through their respective organizational repositories, as cited in the bibliography.

Ethics Statement

This study adhered to the ethical principles of human subjects research and institutional guidelines. During the empirical validation phase, a voluntary online survey was conducted with 422 Indian professionals, and informed consent was obtained from all participants before the survey began. Participants were clearly informed that their responses would be anonymous, used exclusively for academic research, and that their participation was entirely

voluntary. No personally identifiable information was collected beyond the demographic categories necessary for the stratified analysis (McHugh, 2012).
The survey instrument focused exclusively on the feasibility perceptions of the proposed Langar Credit Protocol and did not involve vulnerable populations, collection of sensitive personal data, interventional procedures, or direct engagement with CKCC beneficiaries. The research posed minimal risk to the participants, involving only professional opinions on the protocol design elements. Survey responses demonstrated strong feasibility perceptions (87% agreement on indicator feasibility, 89% on tier clarity, 92% on training adequacy), with 47.9% of participants expressing willingness to serve as Langar Seva Verifiers, confirming their voluntary engagement.
Data storage follows institutional data protection protocols with secure anonymized archiving for a minimum retention period of five years, consistent with the design science research methodology guidelines (Hevner et al., 2004; Venable et al., 2017). No funding or conflicts of interest exist that could influence the research design, data collection, analysis, interpretation, or reporting. The study received no direct financial support from CKCC operators, CSR organizations, or verification bodies that could create a perceived bias in protocol development.

Appendix

Langar Credit Protocol
An ISO-aligned verification framework for community-based food security contributions to SDG 2 and SDG 12 in low-data contexts.

0.1 Document information
Document title: Langar Credit Protocol (LCP) ver 1.0
Document identifier: LCP-2025-1.0
Document clauses: 1 to 14
Document Owner: Langar Carbon
Publication year: 2025
Document language: English
Document type: Verification protocol
Intended audience: Community Kitchen and Cafe operators, Langar Seva Verifiers, Corporate CSR and ESG Departments, SDG 2 and SDG 12 monitoring and reporting agencies in India.

0.2 Foreword
This document establishes the Langar Credit Protocol (LCP) as a verification framework for community-based food-security operations in India. The protocol specifies procedures for verifying meal provision with sustainability performance across prioritized operational indicators. The LCP aligns with the ISO 14064-3:2019 verification principles, ISO/IEC 17029:2019 conformity assessment requirements, and ISO 20121:2024 sustainability management systems.

0.3 Introduction
Community kitchens and community cafes (CKCC) contribute to community-based food security, thereby addressing SDG 2.1 (zero hunger) in India. This framework specifies the verification procedures for CKCC operations in India.
Langar Credits shall be considered as part of the impact assurance assets. It shall be excluded from the additionality demonstration, carbon accounting, and financial instrument certification.

0.4 Registry
The Registry shall operate as a centralized quality management body, ensuring compliance with the ISO/IEC 17029:2019 Clause 6 requirements adapted to community-based food security verification contexts.
Langar Carbon shall be the Registry. The registry shall be contacted through email langarcarbon@gmail.com and phone +91 80 8020 3060 (from 11 am to 4 pm IST).

The Registry shall provide the following services for FREE:
1. Training to Verifiers
2. Bi-annual re-training to Verifiers
3. Training to Community Kitchens
4. Training to Community Cafes
5. Allocation of Langar Credits
6. Retirement of Langar Credits
7. Issuance of Langar Credit Certificate
8. Quality Assurance

Langar Credit and Langar Carbon are the Trademarks (under approval) of the author.

1 Scope

1.1 General

The protocol establishes a tier classification based on sustainability performance across prioritized operational indicators and quantifies the verified impact through the issuance of a Langar Credit (LC).
The tier classification distinguishes foundational Silver (4–6 points), established Gold (7–9 points), and exemplary Platinum (10-12 points) performance based on risk-based assurance levels.

1.2 Inclusions

The Protocol applies to CKCC operations that meet all the criteria.
a) minimum 1000 verified meals annually;
b) service without discrimination (open access);
c) charitable intent (not for profit);
d) basic recordkeeping capacity (meal logs, procurement receipts).

1.3 Exclusions

The protocol shall exclude the following categories of operations that fail eligibility or verification feasibility requirements:
a) Commercial operations for-profit requiring engagement with commercial MRV frameworks;
b) Institutional services, such as employee canteens and school programs, aimed primarily at internal beneficiaries rather than community-based food security;
c) Raw food distributions comprising uncooked grains or rice packets that constitute commodity distributions rather than prepared meal provisions;
d) Informal household feeding operations delivering fewer than 1000 verified meals annually and lacking sufficient documentation to support verification;
e) Fee-based food banks involved in surplus food redistribution with remuneration, introducing a profit motive that is incompatible with the protocol's Seva ethos.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For dated references, only the edition cited is applicable. For undated references, the latest edition of the referenced document, including any amendments, applies.
2.1
ISO 14064-3:2019, *Greenhouse gases : Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions*
2.2
ISO/IEC 17029:2019, *Conformity assessment : General principles and requirements for validation and verification bodies*
2.3
ISO 20121:2024, *Event sustainability management systems : Requirements with guidance for use*
2.4
ISO 37101:2016, *Sustainable development in communities : Management system for sustainable development : Requirements with guidance for use*
2.5
ISO 22000:2018, *NQA Implementation Guide* (2018)
2.6
ISO 14065:2020, *IAF MD 6:2024 Mandatory document for ISO 14065:2020* (Issue 3, Version 2).
2.7
ISO 26000:2010, *Guidance on Social Responsibility*.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14064-3:2019, ISO/IEC 17029:2019, ISO 20121:2024 and the following apply.
3.1 Langar Credit (LC)
certified impact assurance asset representing 1000 verified meals issued post-tier verification
3.2 verified meal (VM)
meal served during reporting period confirmed through evidence triangulation within 5% materiality threshold
3.3 sustainability score
unweighted sum of four scored indicators
3.4 tier classification
performance categorization as Silver (4-6 points), Gold (7–9 points), or Platinum (10-12 points) based on sustainability score
3.5 open access
meal service available to all beneficiaries without discrimination by caste, religion, gender, or economic status

3.6 majority practice
≥70% proportion of operation type over reporting period establishing operational model classification
3.7 Langar Seva Verifier (LSV)
individual certified through 6-hour training and certification; possessing competence for tier verification
3.8 evidence triangulation
minimum three independent sources per indicator with reliability weighting totalling ≥2.1 (high=1.0, medium=0.7, low=0.3)

4 General principles

4.1 Protocol philosophy

The Langar Credit Protocol (LCP) constitutes a verification framework that focuses on the impact assessment of community-based food security operations. Langar Credits represent verified meal provisions coupled with demonstrated sustainability performance across prioritized operational indicators. Langar Credits serve as an impact assurance asset for community kitchens and community cafes (CKCC).

4.2 Registry Impartiality

The Registry shall assign Langar Seva Verifiers(LSV) prioritizing home district candidates for local knowledge while excluding personal and financial relationships. The Registry shall not have any financial relationship with the CKCCs or LSVs.

4.3 Verification principles

Verification shall follow the principles adapted from ISO 14064-3:2019, ensuring integrity, transparency, and stakeholder confidence.

4.4 Evidence-based assessment

Verification conclusions shall be derived from sufficient, appropriate evidence through triangulation of a minimum of three independent sources per indicator. Total reliability ≥2.1.

4.5 Transparency and reproducibility

Verification reports should document the evidence sources, scoring rationale, and materiality assessments to enable independent reviews. The Registry shall publish certificates with QR code access to redacted reports, maintaining public accountability.

4.6 Voluntary service ethos

LSVs should contribute their expertise as Seva without a financial motive. Fixed honoraria (paid directly by CKCC to LSV) shall be INR 500 per assignment.

4.7 Community-centered verification

Verification should respect the operational realities of volunteer management, including low record-keeping, seasonal meal volumes, and cultural cooking practices. Cultural exemption shall permit up to 30% Category C fuel use for traditional food preparation.

4.8 Uniform national standards

Seventy percent of the majority practice thresholds shall apply consistently across India without regional recalibration. Tier mathematics terciles (4-6, 7–9, and 10-12) shall remain fixed.

4.9 Inter-rater reliability

The annual calibration of LSV shall achieve kappa ≥0.80.

5 Sustainability indicators

5.1 Meal Count (SDG 2.1)

Meal Count shall quantify total verified meals (VM) within ±5% materiality threshold serving Langar Credit calculation. The counting shall triangulate three sources: a) meal service logs, b) stakeholder interviews, and c) facility capacity assessment.

5.2 Scored Indicators (SDG 12.2, 12.5, 12.7)

Four scored indicators (Fuel Type, Utensil Type, Sourcing Type, Meal Type) shall produce sustainability score ranging 4–12 points.

S = Fuel Type (F) + Utensil Type (U) + Sourcing Type (D) + Meal Type (M)

Categorical scoring shall be applied as follows:

Category A = 3 points (exemplary); Category B = 2 points (transitional); Category C = 1 point (foundational).

Table 1: Sustainability Indicators

Indicator	Category A	Category B	Category C	Evidence Requirements	SDG
Fuel Type (F)	Clean Fuel	Improved biomass stove	Traditional biomass stove	Fuel Bills + photos + interview/testimony	12.2
Utensil Type (U)	Reusable	Reusable + Disposable	Disposable	Inventory + photos + interview/testimony	12.5
Sourcing Type (D)	District 70%+	State 70%+	Inter-state	Invoices + photos + interview/testimony	12.7
Meal Type (M)	Plant and Dairy	Includes Eggs	Includes Meat/Fish	Menu Logs + photos + interview/testimony	12.2

Note 1: A ≥70% majority practice shall determine category assignment across the reporting period. Evidence triangulation shall require a minimum of three independent sources per indicator achieving ≥2.1 total reliability weight.
Note 2: For community kitchens, cultural exemption shall permit up to 30% Category C fuel use for traditional preparations. For community cafes, the Fuel Type indicator score shall be recorded by default as category A.

5.3 Operation Type (SDG 12.3)

Table 2: Operation Type classification

Operation Type	Definition	Fuel Type category
Community Kitchen	≥70% centralized cooking	Categories A/B/C with Cultural exemption of up to 30% for Category C fuel use for traditional preparations.
Community Cafe	≥70% surplus redistribution	Category A (by default)

6 Tier classification

6.1 Tier framework

Tier classification shall distinguish performance levels through mathematically balanced tercile thresholds applied to the sustainability score S (4–12 points). The three tiers shall implement risk-based assurance to calibrate the verification intensity of performance claims.

6.2 Tier definitions

The silver tier (score = 4-6) shall recognize foundational operations. Gold tier (score = 7–9) shall recognize established operations. Platinum tier (score = 10-12) shall recognize exemplary leadership operations.

7 Langar Credits

Langar Credits (LC) shall be issued only after post-tier verification using the following:
LC = floor[(VM + 500) / 1000] where VM denotes verified meals.
EXAMPLE: VM = 2300 → LC = floor[(2300 + 500) / 1000] = floor[2.8] = 2 LC

Table 3: LC calculation examples

Verified Meals (VM)	Buffer Applied	Calculation	LC Issued
1700	+500	floor[2200/1000]	2
2300	+500	floor[2800/1000]	2

8 Reliability weighting

Table 4: Reliability weightage

Weight	Source Characteristics	Examples
1.0	Documents, direct observation	Receipts, photos, stove observation
0.7	Stakeholder interview/testimony	Manager/volunteer interview/testimony

0.3	Uncorroborated claims	Single statements

9 Evidence Checklist

Table 5: Evidence Checklist

Meal Count checklist VM triangulation (within ±5% materiality): ☐ Meal service logs (1.0) ☐ 5+ stakeholder interviews (0.7 each) ☐ Capacity (kitchen throughput) (1.0) Total Reliability: ___ ≥2.1 VM = ___	**Meal Type checklist** Category A (plant-based + dairy): ☐ Recipe logs/menus (1.0) ☐ Cook interviews (0.7) ☐ Beneficiary testimony (0.7) Total Reliability: ___ ≥2.1 Category: [A/B/C] __
Fuel Type checklist Category A (≥70% clean fuel): ☐ Utility bills/receipts (1.0) ☐ Stove installation photos (1.0) ☐ Manager testimony (0.7) Total Reliability: ___ ≥2.1 Category: [A/B/C] __	**Utensil Type checklist** Category A (reusable utensils): ☐ Inventory count (1.0) ☐ Washing area photos (1.0) ☐ Volunteer interviews (0.7) Total Reliability: ___ ≥2.1 Category: [A/B/C] __
Sourcing Type checklist Category A (≥70% district suppliers): ☐ Invoices with GPS validation (1.0) ☐ Supplier attestations (1.0) ☐ Delivery logs (0.7) Total Reliability: ___ ≥2.1 Category: [A/B/C] __	**Operation Type checklist** ☐ Option 1: Community Kitchen (≥70 centralized cooking) ☐ Option 2: Community Cafe (≥ surplus redistribution)

10 Langar Seva Verifiers

10.1 Certification requirements

Langar Seva Verifiers (LSVs) shall complete a self-paced online 6-hour modular training and certification to demonstrate protocol competence. Any recognized degree in engineering, technology, agriculture, food, or hospitality is acceptable for attending the training program.

The Training curriculum shall be as follows:

Module 1 (1.0 h): Protocol principles, Operation Type, Meal Type, Utensil Type
Module 2 (1.5 h): Sourcing Type, Fuel Type, Category scoring
Module 3 (1.5 h): Verified Meal counting, LC calculation
Module 4 (1.0 h): Evidence evaluation, triangulation ≥2.1
Module 5 (1.0 h): Reporting, Quality Assurance, Seva Ethics, Impartiality

10.2 Certification assessment

Certification Exam: 2 hours. Certification requires answering 20 evidence-based questions. Pass threshold: ≥85% correct (17/20). The cases shall cover the protocol applications.

Table 6: Sample certification exam cases

Case	Evidence	Correct Answer
1	LPG receipt (1.0) + stove photo (1.0) + testimony (0.7)	Fuel A (3 pts)
2	7 score, 2.7 reliability	Gold tier

10.3 LSV assignment

The Registry shall assign LSVs, prioritizing home district candidates and leveraging their local language proficiency and operational knowledge. Assignment excludes:

a) family members or employment connections;
b) financial relationships (including donations in the past 24 months).

10.4 Assignment priority algorithm

1. Home district high-performers (kappa ≥0.85)
2. Adjacent district (50–100 km) experienced LSVs

10.5 Conflict disclosure

The assigned LSV must submit a conflict-of-interest disclosure prior to visiting the CKCC. Any false disclosure results in the suspension of the certification.

10.6 Annual calibration
LSVs shall complete 15 benchmark cases annually, achieving a kappa ≥0.80 inter-rater reliability. Scores of 0.60–0.80 require re-training; <0.60 trigger suspension.

11 Verification procedures
11.1 Verification cycle overview
Verification shall follow a structured four-stage cycle completed within 6–8 weeks of application submission. The Registry shall manage the workflow by assigning independent Langar Seva Verifiers (LSVs) and tracking progress.
The roles and responsibilities shall be as follows:
CKCC: Submit application and evidence package
Registry: Assign LSV, track timeline, publish certificate
LSV: Conduct verification, recommend tier

Table 7: Verification stages

Stage	Duration	Activities	Responsible
1. Preparation	2–4 weeks	Eligibility, document collection	Registry/LSV
2. Assessment	1–3 days	Evidence triangulation, scoring	LSV
3. Reporting	5–7 days	Tier determination, QA review	LSV/Registry
4. Issuance	7–10 days	Certificate, LC allocation	Registry

11.2 Stage 1 : Preparation
11.2.1 CKCCs shall submit applications through the Registry, including:
a) organizational documents; b) 3-month historical meal logs; c) procurement receipts sample;
d) facility photographs; e) self-assessment of operational model.
11.2.2 The registry shall assess eligibility within five business days
11.2.3 The registry shall assign LSVs
11.2.4 CKCCs shall compile a document package within 10 business days containing:
a) complete 12-month meal logs (digital/paper); b) procurement receipts; c) recipe/menu records; d) utensil inventory lists; e) fuel purchase records/utility bills; f) supplier contracts.
11.2.5 The LSV shall conduct a pre-verification document review to confirm completeness and an initial materiality assessment. Gaps shall be communicated to the CKCC, allowing five business days for supplementation.

11.3 Stage 2 : Assessment
11.3.1 Document review: LSV shall review the complete document package provided.
11.3.2 Site verification: LSV shall conduct site visits. Photographic evidence (with geotags) shall capture kitchen equipment, utensil washing, cold storage, waste management, and fuel storage.
11.3.3 Stakeholder interviews: LSV shall conduct interviews to get testimonies.

11.4 Stage 3 : Reporting
The LSV shall prepare a verification statement documenting evidence triangulation (≥2.1 reliability), sustainability score calculation, tier recommendation, and improvement pathways.

11.5 Stage 4 : Issuance
The Registry shall issue certificates within seven days post-QA approval.

11.6 Langar Credits (LC) validity
LCs shall remain valid for a certificate duration of 12 months. Annual re-verification is required for renewal.

11.7 Conflicting evidence resolution
Conflicting evidence shall be resolved through the following:
a) highest cumulative reliability prevails; b) QA panel review of LSV-CKCC disputes.

12 Quality assurance
12.1 Desk review

All verification statements shall undergo a desk review before certificate issuance. Clarification requests shall be resolved within 72 hours. First-pass approval target: ≥95%.

12.2 Field re-audits

Random field re-audits shall target 5% of verifications, stratified by tier and region. Assigned re-audit LSVs shall conduct independent re-assessments by

a) document re-sampling (20% of original records);
b) facility re-inspection (fuel storage, utensils);
c) five new interviews

Kappa agreement ≥0.80 target versus original verification. Discrepancies >15% shall trigger the LSV's probationary status.

12.3 Corrective actions

The following actions shall address quality failures:

Table 8: Corrective action tiers

Tier	Discrepancy	Action
1	<10%	Clarification request
2	10–20%	Statement revision + retraining
3	>20%	Certificate withholding, 30-day suspension

12.4 Continuous improvement

Stakeholder feedback shall inform quarterly guidance bulletins and annual protocol reviews. Amendments shall require the following:

a) 12-month pilot data (≥100 operations); b) 60-day public consultation.

13 Conflicts of Interest

The author is the Executive Director of Langar Carbon, which operates as the registry for the Langar Credit Protocol described herein. Langar Carbon provides the specified services free of charge and maintains no financial relationship with community kitchens, community cafes, or Langar Seva Verifiers. No external funding was received for the development of this protocol, and the work is intended to support community-based food security without any commercial intent.

Disclaimer: This framework research paper is written in a mixed format to serve a dual audience (academia and practitioners).

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