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The Economic Analysis of Local Brewing and Its Contribution towards Asset Ownership in Rural Tanzania: A Case of Ulanda Ward in Iringa District, Tanzania

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ABSTRACT

Local brewing is a common household-based rural enterprise in Tanzania, but its contribution to asset ownership has received insufficient examination. This study examined the economic contribution of local brewing to asset ownership among brewer households in Ulanda Ward, Iringa District, Tanzania. Guided by the Sustainable Livelihoods Framework, the study used a cross-sectional mixed-methods design involving 96 brewer households. Data were analyzed using descriptive statistics, gross using descriptive statistics, gross profit analysis, and ordinary least squares multiple linear regression. Three principal local brews were identified: Komoni, Uhambule, and Kangara. The findings show that the brews differed in production processes, input requirements, and economic returns, confirming that local brewing is not a homogeneous rural livelihood activity. Komoni generated the highest mean monthly profit, while Uhambule recorded the highest profit margin. Regression results showed that asset ownership was positively and statistically associated with monthly net profit ($p < .001$), access to credit ($p < .001$), scale of operation ($p < .001$), years of brewing experience ($p = .001$), education level ($p = .004$), and secondary occupation ($p = .016$). Gender ($p < .001$) and household size ($p = .007$) were negatively associated with asset ownership, suggesting that gendered enterprise constraints and household consumption pressure may limit the conversion of brewing income into durable assets. The study indicates that local brewing contributes to rural livelihoods by strengthening financial capital, supporting business reinvestment, and facilitating asset accumulation. However, its contribution depends on profitability, access to credit, enterprise capability, and supportive institutional conditions.

1. Introduction

Rural livelihoods in sub-Saharan Africa are rarely sustained through farming alone (Ellis, 2000). Instead, households combine crop production, non-farm self-employment, casual labour, petty trade, migration, and socially embedded microenterprises to stabilise consumption and manage livelihood shocks (Alobo Loison, 2015; Barasa et al., 2023). This diversification is not merely a survival response. It is also a pathway through which households gradually accumulate livestock, land, housing improvements, business assets, and consumer durables. In Tanzania, asset accumulation is especially important because income measured at one point in time often fails to capture longer-term changes in welfare, resilience, and prosperity (Brockington et al., 2018; Östberg et al., 2018; Howland et al., 2021).

Within this broader livelihood landscape, household-based brewing of traditional alcoholic beverages occupies an analytically important position. Indigenous beers are not only cultural products; they are also locally traded commodities that mobilize household labour, agricultural raw materials, small-scale capital, and community-based marketing networks (Tusekwa et al., 2000; Kubo, 2014; Johansen et al., 2019). Across Africa, traditional cereal-based and mixed-ingredient beers remain economically relevant because they create demand for local grains, support women's enterprise activity, and circulate value within rural economies where formal employment and formal value chains remain limited (Konfo et al., 2015; Rogerson, 2019; Sawadogo-Lingani et al., 2021).

The gendered nature of informal enterprise strengthens the empirical importance of local brewing. Women are heavily represented in informal production and petty trade across East Africa. Still, their enterprises frequently operate under tighter capital constraints, weaker bargaining power, insecure market spaces, and heavier unpaid care responsibilities than those of men (ILO, 2018; Mori, 2015; Isaga, 2019; Pallangyo, 2021; Mpambije & Samiji, 2023). This context matters because local brewing in many Tanzanian rural settings is organized within the household economy: the same enterprise is expected to generate cash, finance food purchases, support school and health expenses, meet social obligations, and contribute to asset acquisition. Thus, profitability alone cannot explain welfare outcomes. What matters is whether brewing earnings are retained and converted into durable assets.

Ulanda Ward in Iringa District provides a relevant case for this analysis because local brewing is visibly embedded in household livelihood portfolios and linked to locally available grains, women's labour, informal capital, and local markets. The field survey revealed that brewing households depend on local raw-material systems, small monthly capital investments, and recurring market sales. These conditions make Ulanda Ward an appropriate site for examining the conversion problem at the centre of rural livelihood analysis: how a small household enterprise moves from cash turnover to asset accumulation.

The research problem is therefore not whether local brewing exists or generates income. The sharper issue is whether, under rural Tanzanian conditions, local brewing functions as a livelihood strategy capable of supporting asset ownership. Existing studies on indigenous beverages have concentrated mainly on production processes, fermentation quality, and microbial characteristics (Kubo, 2014; Kubo & Kilasara, 2016; Johansen et al., 2019). Livelihood studies, by contrast, often treat non-farm enterprises broadly, without isolating the asset effects of particular rural microenterprises (Fox & Sohnesen, 2016; Barasa et al., 2023). This leaves an empirical gap on how brewing profits, production scale, credit access, and household characteristics relate to household asset ownership.

The study addressed three research questions: (i) what are the major production systems used in local brewing in Ulanda Ward? (ii) How profitable are the main local brews? and (iii) Which enterprise and household characteristics are associated with higher asset ownership among brewer households? Its contribution lies in linking rural micro-enterprise analysis, traditional beverage production, and asset-based livelihood analysis in a single empirical study focused on rural Tanzania.

2. Literature Review

2. Literature Review

2.1. Empirical Review

Empirical research in rural Tanzania increasingly shows that assets and local conceptions of prosperity better capture welfare change than by expenditure snapshots alone. Comparative work in central Tanzania shows substantial changes in livestock, housing materials, consumer durables, and productive assets over time (Östberg et al., 2018; Brockington et al., 2018). At the same time, those studies highlight the uneven distribution of gains across households and locations (Howland et al., 2021; Brockington, 2021). This matters here because the central policy issue is not merely whether brewers earn cash in a given month, but whether that cash enters a cumulative process of household asset formation.

A second empirical strand concerns rural non-farm enterprise and livelihood diversification. Recent Tanzanian evidence suggests that non-farm entrepreneurship can raise household welfare directly through enterprise income and indirectly through production linkages and expenditure smoothing (Fox & Sohnesen, 2016; Kinyondo, 2017). More recent econometric evidence also links non-farm entrepreneurship to household welfare through multiple channels of transmission (Barasa et al., 2023). Reviews of diversification in sub-Saharan Africa show that rural households diversify for both opportunity and distress reasons (Alobo Loison, 2015).

A third body of work highlights that enterprise performance is strongly gendered. Studies on Tanzanian women entrepreneurs report recurrent constraints in finance (Naegels et al., 2019), market access and business capabilities (Isaga, 2019), and the broader business environment (Mori, 2015; Tundui, 2021). These constraints influence whether enterprise income can be protected and reinvested.

A fourth empirical strand comes from food science, brewing studies, and value-chain research on traditional beverages. Research from Tanzania documents diverse beverages, including maize- and banana-based products, with distinct fermentation schedules, ingredient combinations, and microbial characteristics (Tusekwa et al., 2000; Kubo, 2014; Kubo & Kilasara, 2016). African review studies further show that traditional beers differ in shelf life, safety, consistency, process control and dependence on locally available cereals (Lyumugabe et al., 2012; Konfo et al., 2015). Those differences directly

affect cost, risk and marketability (Johansen et al., 2019; Sawadogo-Lingani et al., 2021; Bejiga & Dasa, 2024).

2.2. Theoretical Review

Three theoretical perspectives inform this study: livelihood diversification theory, asset-based welfare analysis and the Sustainable Livelihoods Framework (SLF). Livelihood diversification theory explains why rural households combine farming and non-farm activities to reduce risk, smooth consumption and respond to market and climatic uncertainty (Ellis, 2000; Reardon et al., 2007). It is relevant because local brewing is one component of a wider household livelihood portfolio. Its limitation is that it does not sufficiently explain how income from a specific activity is converted into durable assets. Asset-based welfare analysis focuses on the ownership of productive and consumer assets as indicators of accumulated welfare. It is directly relevant because this paper uses asset ownership as the dependent variable. Asset-based approaches argue that ownership of livestock, land, productive equipment, housing improvements, and consumer durables can capture longer-term welfare more reliably than current income alone (Filmer & Pritchett, 2001; Rakodi, 1999). However, asset-based analysis alone pays less attention to institutions, gender relations, and conditions of vulnerability that affect accumulation.

This study is ultimately guided by the Sustainable Livelihoods Framework (SLF). The framework was originally articulated by Chambers and Conway (1992), refined analytically by Scoones (1998), and translated into applied development guidance by DFID (1999). It explains how households mobilise human, social, natural, physical, and financial capital under conditions of vulnerability to pursue livelihood strategies and achieve livelihood outcomes. Human capital includes education, skills, and experience; social capital includes networks and trust; natural capital includes access to raw materials and water; physical capital includes equipment and assets; and financial capital includes savings, credit, and enterprise earnings (Serrat, 2017). SLF is preferred because it combines the strengths of livelihood diversification theory and asset-based analysis. It allows local brewing to be viewed as a livelihood strategy that draws on household labour, brewing knowledge, raw materials, social networks, and working capital. It also helps explain why profit alone may not automatically produce better livelihoods unless income is converted into physical and productive assets. In this study, asset ownership is therefore treated as an intermediate livelihood outcome shaped by profitability, credit, scale of operation, education, experience, gender, household size and secondary occupation.

Figure 1 presents the analytical logic of the SLF adapted for the study. Local brewing is treated as a livelihood strategy that depends on different forms of capital and is mediated by local institutions, market conditions, and household characteristics before it contributes to asset ownership.

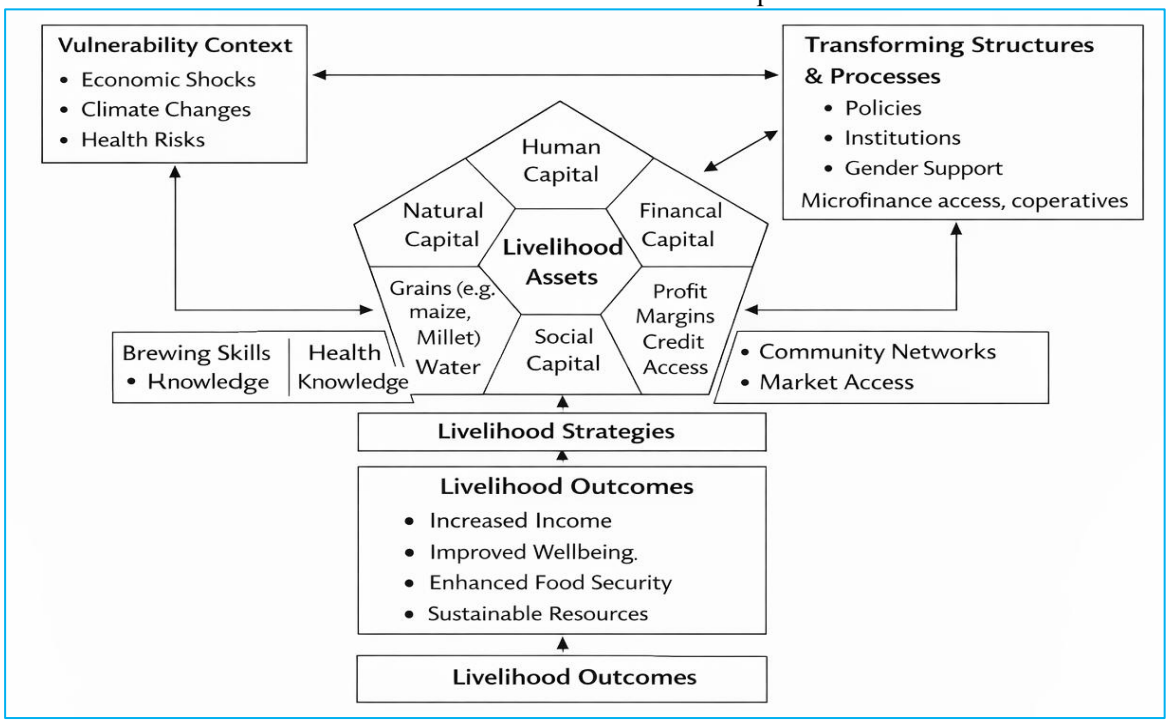

Figure 1: Sustainable Livelihoods Framework adapted to analyse local brewing, livelihood capitals and asset accumulation in Ulanda Ward, in Iringa District

3. Materials and Methods

3.1. Research Design

The study adopted an analytical cross-sectional design embedded within a mixed-methods framework. The quantitative component estimated production patterns, profitability, and statistical associations with asset ownership, while the qualitative component helped interpret production practices, local regulation, and the social organization of brewing. A cross-sectional design was appropriate because the study compared brewer households at one point in time (Wooldridge, 2019).

3.2. Study Area

The study was conducted in Ulanda Ward, Iringa District, Tanzania. The ward was selected purposively because local brewing is widely practiced as a household-based income-generating activity and because the enterprise is socially embedded within the local livelihood system. Ulanda provides a useful rural case for analyzing how households mobilize natural capital, financial capital, labor, and social networks to generate income and acquire assets. This place-based approach aligns with livelihood analysis, which emphasises that enterprise outcomes are shaped by local resource endowments, institutions, and markets (Scoones, 1998; Ulukan et al., 2022).

3.3. Target Population, Sample Size, and Sampling Procedures

The target population comprised brewer households operating within Ulanda Ward. The household was used as the unit of analysis because both brewing income and asset acquisition are organized at the household level. The sample size was determined using Cochran's formula (equation 1) for proportions where the population is large or unknown (Cochran, 1977):

$$n = \frac{Z^2 p(1-p)}{e^2} \quad \text{.....(1)}$$

$$= \frac{(1.96)^2(0.5)(0.5)}{(0.10)^2} = 96.04$$

$$\approx 96 \; households$$

where n denotes the minimum required sample size, Z is the standard normal value for the selected confidence level (1.96 at 95%), p is the assumed proportion of brewer households in the population where the true proportion is unknown, and e is the tolerated margin of sampling error. This procedure follows Cochran (1977) and is appropriate where the population proportion is not known with certainty.

3.4. Data Collection Methods and Instruments

Primary data were collected using a structured questionnaire administered face-to-face to sampled brewer households, a semi-structured key-informant interview guide, and direct observation of selected brewing processes. Instruments were aligned with the study objectives and the key constructs of the SLF, especially financial, human, and physical capital. Completed instruments were checked daily for internal consistency before data entry.

3.5. Variable Measurement and Analytical Framework

3.5.1. Analytical Framework

The analytical framework linked each research question to the variables measured, the analytical procedure applied, and the expected output. This was added to illustrate how the methodology supports the study objectives.

Table 1: Link between research questions, variables, and analytical procedures

Research question	Main variables	Analytical procedure	Expected output
Production systems used in local brewing	Brew type, raw materials, stages, duration and volume	Descriptive statistics and process comparison	Typology of *Komoni, Uhambule* and *Kangara*
Profitability of main local brews	Costs, revenue, profit and margin	Gross-profit and margin calculations	Profitability ranking by brew type
Factors associated with asset ownership	Asset score, profit, credit, scale, experience, education, gender, household size and secondary occupation	Multiple linear regression and diagnostics	Factors associated with higher asset ownership

3.6. Measurement of Variables

The main variables were operationalized as shown in Table 2. Education level and secondary occupation were separated because they measure different constructs: education level captures formal schooling attainment. In contrast, secondary occupation indicates whether a household engages in another income-generating activity besides brewing

Table 2: Operational definition and measurement of variables

Variable	Operational measurement	Role in the model
Asset ownership score	Additive score based on asset categories reportedly acquired or improved using brewing income: livestock, land, electronics, business investment and transport assets.	Dependent variable
Monthly net profit	Monthly revenue minus monthly production costs. Revenue equals litres sold multiplied by price per litre; costs include raw materials, processing, transport and permits.	Independent variable
Gender	Dummy variable coded 1 for female brewer and 0 for male brewer.	Control variable
Years of experience	Number of years the respondent household has been engaged in local brewing.	Independent variable
Scale of operation	Average production scale measured through production volume and batches produced per month.	Independent variable
Education level	Ordinal categorical variable: informal/no formal education, primary education, and secondary education or above.	Independent variable
Access to credit	Dummy variable coded 1 if the household accessed formal or informal credit for brewing or enterprise operation, and 0 otherwise.	Independent variable
Household size	Number of persons supported by the household.	Control variable
Secondary occupation	Dummy variable coded 1 if the household had another income-generating activity besides brewing, and 0 otherwise.	Independent variable

3.7. Analytical Model and Data Analysis

Descriptive statistics were first used to summarise the characteristics of respondents, production systems, and profitability patterns across the three brew types. Profitability was measured using revenue per batch, gross profit per batch, monthly revenue, monthly profit, and profit margin. The profitability computations (equations 2 - 6) followed standard enterprise-budgeting logic, in which revenue is computed as output sold at the unit price, and profit is the residual after deducting variable production costs.

$$TR_i = Q_i \times P_i \quad \ldots\ldots(2)$$

$$GP_i = TR_i - TC_i \quad \ldots\ldots(3)$$

$$PM_i = (GP_i / TR_i) \times 100 \quad \ldots\ldots(4)$$

Where TR_i denotes total revenue for brewer household i, Q_i is output sold in liters, P_i is selling price per liter, GP_i is gross profit, TC_i is total production cost, and PM_i is profit margin. This formulation is consistent with enterprise budgeting and farm-management profitability analysis (Gittinger, 1982; Kay et al., 2016).

In the second stage, the study applied the standard multiple linear regression model, which expresses a dependent variable as a linear function of several explanatory variables and a stochastic error term (Wooldridge, 2019). The general model is presented as follows:

$$Y_i = \beta_0 + \beta_1X_{1i} + \beta_2X_{2i} + \ldots + \beta_kX_{ki} + \varepsilon_i \quad \ldots\ldots(5)$$

The model was then adapted to the present study by specifying asset ownership as the dependent variable and enterprise and household characteristics as explanatory variables. The study-specific model is:

$$AO_i = \beta_0 + \beta_1Profit_i + \beta_2Gender_i + \beta_3Experience_i + \beta_4Scale_i + \beta_5Education_i + \beta_6Credit_i + \beta_7HHSize_i + \beta_8SecondOcc_i + \varepsilon_i \quad \ldots\ldots (6)$$

Where AO_i is the asset ownership score for household i; $Profit_i$ is the monthly net profit; $Gender_i$ is the gender of the brewer; $Experience_i$ is years of brewing experience; $Scale_i$ is scale of operation; $Education_i$ is education level; $Credit_i$ is access to credit; $HHSize_i$ is household size; $SecondOcc_i$ is secondary occupation; and ε_i is the stochastic error term.

4. Results and Discussion

4.1 Demographic Characteristics of Respondents

Table 2 shows that local brewing in Ulanda Ward was concentrated among economically active adults and was strongly female-dominated. Females accounted for 77.1% of respondents, while males accounted for 22.9%. The 31-45 age group accounted for 75.0% of respondents, indicating that brewing is not a residual activity for the elderly but a livelihood enterprise undertaken mainly by prime working-age adults. Most respondents had primary education (88.5%), while only 5.2% had secondary education.

Table 2: Demographic characteristics of respondents (n = 96)

Variable	Category	n	%
Age of respondents	18-30 years	6	6.3
	31-45 years	72	75.0
	46-60 years	9	9.4
	60 years and above	9	9.4
Gender	Male	22	22.9
	Female	74	77.1
Marital status	Married	86	89.6
	Widow(er)	8	8.3
	Divorced	1	1.0
	Separated	1	1.0
Education level	Primary education	85	88.5
	Secondary education	5	5.2
	Informal education	6	6.3
Household size	1-3 members	13	13.5
	4-6 members	77	80.2
	7-10 members	6	6.3

These findings concur with ILO (2018), Mori (2015) and Isaga (2019), who observe that women are highly represented in low-capital informal enterprises in East Africa. They also concur with Tanzanian evidence that women's enterprises often remain concentrated in sectors requiring modest start-up capital and household-based labor. However, the findings partly diverge from the assumption that informal rural enterprises are merely survival activities for marginal age groups. The dominance of the 31-45 age group indicates that brewing is embedded in active household economic strategies. The low level of schooling does not necessarily imply a lack of capability; rather, it suggests that brewing knowledge is transmitted through practice and social learning more than through formal certification.

4.2. Production Process and Technical Diversity of Local Brews

Table 3 demonstrates that *Komoni*, *Uhambule* and *Kangara* differ in raw-material intensity and production output. Komoni used substantially more maize, while *Uhambule* used more millet per batch. Kangara relied on maize residue and sugar. Water volume and brew volume also differed significantly across brew types. These differences confirm that local brewing should not be treated as a homogeneous enterprise.

Table 3: Raw material utilization profile in local brewing enterprises

Production characteristic	*Komoni* (n=58)	*Uhambule* (n=27)	*Kangara* (n=11)	Test statistic	p-value
Maize quantity (kg/batch)	45.0 ± 7.2	7.5 ± 1.8	-	184.32	<0.001
Millet quantity (kg/batch)	2.0 ± 0.5	5.0 ± 1.2	-	96.45	<0.001
Maize residue (kg/batch)	-	-	4.5 ± 1.1	-	-
Sugar quantity (kg/batch)	-	-	10.0 ± 2.4	-	-
Water volume (liters/batch)	240 ± 35	10 ± 3	140 ± 25	312.67	<0.001
Brew volume (liters/batch)	263 ± 42	115 ± 28	145 ± 32	89.14	<0.001
Batch frequency (per month)	7.2 ± 1.5	6.8 ± 1.8	8.1 ± 2.1	2.34	0.102

Source: Field survey data, 2024.

The result concurs with Kubo (2014), Kubo and Kilasara (2016), Johansen et al. (2019), and Sawadogo-Lingani et al. (2021), who emphasise that indigenous fermented beverages vary according to raw materials, process control, and local knowledge. It also aligns with Lyumugabe et al. (2012), who argue that African traditional beers should be analysed in terms of their specific cereal base, fermentation processes, and storage characteristics. The implication is important for rural development planning: interventions cannot assume that a single technical package or credit product fits all brew types. *Komoni* appears to be more exposed to maize price shocks, *Uhambule* to cereal quality and process control, and *Kangara* to the cost of purchased sugar. Thus, differences in natural and financial capital shape risk and return.

Table 4 further shows that the three beverages differ in processing stages, duration, and fermentation protocols. *Komoni* involves seven processing stages and dual-stage fermentation; *Uhambule* involves sequential fermentation; and *Kangara* relies on sugar-assisted submerged fermentation. This reinforces the point that production technology is part of enterprise performance rather than a background description.

Table 4: Technical specifications of brewing methodologies in Ulanda Ward

Production parameter	*Komoni*	*Uhambule*	*Kangara*
Processing stages	7	6	5
Total duration (days)	7.2 ± 1.1	8.4 ± 1.3	8.1 ± 1.6
Critical control points	Germination (72h); Komba fermentation (48h); primary fermentation (7h)	Porridge fermentation (168h); mashing (6h); secondary fermentation (24h)	Residue soaking (≥168h); cooking (12h); maturation (24h)
Fermentation characteristics	Dual-stage: solid-state followed by submerged fermentation	Sequential: lactic acid followed by alcoholic fermentation	Single-stage: sugar-assisted submerged fermentation
Key technical operations	Malting, germination, boiling, cooling, mixing, filtration	Soaking, porridge preparation, boiling, mashing, straining	Soaking, boiling, mixing, straining, sugar addition

Source: Field survey data, 2024.

This finding supports the arguments of Konfo et al. (2015) and Johansen et al. (2019) that fermentation control affects safety, product quality, labour demand, and marketability. The study's results therefore strengthen, rather than merely repeat, earlier beverage-science literature by showing that technical differences have economic implications. Longer fermentation and more stages can improve product identity but also increase labor requirements and process risk. This is why technical training should be linked with business training rather than offered as a purely food-processing intervention.

4.3. Income Generation and Profitability Analysis

Table 5 presents the financial analysis of brewing operations. All three beverages generated positive average returns, but their economic profiles differed. *Komoni* recorded the highest monthly profit at TZS 251,100, followed by *Kangara* at TZS 193,400 and *Uhambule* at TZS 124,400. When the same profitability measure is applied consistently, *Komoni* ranks highest in monthly profit, *Kangara* second, and *Uhambule* third. However, *Uhambule* recorded the highest profit margin at 77.3%, indicating stronger cost efficiency despite lower absolute profit.

Table 5: Financial analysis of local brewing operations

Financial metric	*Komoni* (n=58)	*Uhambule* (n=27)	*Kangara* (n=11)	Statistical significance
Total raw materials/batch	49,500 ± 8,200	14,250 ± 3,100	42,000 ± 9,500	$F = 145.67$, $p < 0.001$
Total processing costs/batch	9,050 ± 2,100	4,050 ± 950	6,300 ± 1,800	$F = 32.89$, $p < 0.001$
Total cost/batch	58,550 ± 9,800	18,300 ± 3,900	48,300 ± 10,200	$F = 87.45$, $p < 0.001$
Production volume (litres)	263 ± 42	115 ± 28	145 ± 32	$F = 89.14$, $p < 0.001$
Price per litre	700 ± 0	700 ± 0	1,000 ± 0	$\chi^2 = 89.34$, $p < 0.001$
Revenue/batch	184,100 ± 42,300	80,500 ± 19,600	145,000 ± 32,800	$F = 78.23$, $p < 0.001$
Gross profit/batch	125,550 ± 32,400	62,200 ± 18,700	96,700 ± 28,500	$F = 38.92$, $p < 0.001$
Monthly revenue	368,200 ± 84,600	161,000 ± 39,200	290,000 ± 65,600	$F = 78.23$, $p < 0.001$
Monthly profit	251,100 ± 64,800	124,400 ± 37,400	193,400 ± 57,000	$F = 38.92$, $p < 0.001$
Profit margin (%)	68.2 ± 6.4	77.3 ± 8.2	66.7 ± 7.1	$F = 15.67$, $p < 0.001$
Production efficiency	2.14 ± 0.42	3.40 ± 0.87	2.00 ± 0.51	$F = 42.31$, $p < 0.001$

The profitability findings concur with those of Rogerson (2019) and Sawadogo-Lingani et al. (2021), who show that the interaction among product identity, local demand, ingredient costs, and distribution conditions shapes traditional beer markets. They also concur with Bejiga and Dasa (2024), who note that cereal-based brewing systems can generate value where raw-material conversion is efficient. However, the findings also show an important divergence from a simple price-based interpretation. *Kangara* had the highest selling price, but it did not generate the highest monthly profit or the highest profit margin. This means that price alone is not a sufficient indicator of enterprise performance. Production volume, input cost, and process efficiency matter equally.

In livelihood terms, *Komoni* appears to be a volume-profit product, *Uhambule* a margin-efficient product, and *Kangara* a higher-price niche product. This differentiation is important for policy because brewers do not face the same constraints. *Komoni* producers may benefit most from grain price stabilization and bulk input purchasing arrangements; *Uhambule* producers may benefit from process standardization and market expansion; *Kangara* producers may benefit from sugar cost management and quality upgrading. These findings, therefore, transform a descriptive brewing study into an enterprise analysis relevant to local economic development planning.

4.4. Contribution of Local Brewing to Asset Ownership

Table 6 shows that brewing income supported several asset categories, with the highest responses recorded for business reinvestment (100.0%), livestock (89.6%), land (67.7%), and electronics (53.1%). Transport assets were reported by only 16.7% of households. This pattern suggests that brewing income is most readily converted into assets that are either productive within rural livelihoods, such as livestock and land, or directly support the enterprise, such as reinvestment in the business

Table 6: Multiple-response analysis of asset types acquired through brewing income

Asset category	Responses	Percent of cases
Livestock	86	89.6
Land	65	67.7
Electronics	51	53.1
Business investments	96	100.0
Transport assets	16	16.7

These results concur with the Tanzanian asset literature. Brockington et al. (2018), Östberg et al. (2018), and Howland et al. (2021) show that livestock and land remain central markers of rural prosperity and social mobility. The high livestock response is therefore consistent with local rural accumulation patterns. Business reinvestment also fits with livelihood theory because households frequently protect or expand the income source that finances current consumption. The lower transport-asset share does not contradict the livelihood contribution of brewing; rather, it indicates that certain asset categories require capital thresholds that most small brewers cannot routinely meet.

The result also extends asset-based welfare analysis. Filmer and Pritchett (2001) demonstrate that assets can proxy welfare, but this study shows one of the micro-enterprise pathways through which such assets are accumulated. The finding also aligns with Rakodi's (1999) capital assets framework: financial capital from brewing is partly converted into physical capital and productive natural capital. However, this conversion is neither automatic nor uniform; it depends on profit level, household claims on income, credit access, and the institutional environment.

4.5. Descriptive Statistics of Variables Used in the Regression

Table 7 presents the mean, minimum, maximum, and standard deviation for the main analytical variables. The descriptive statistics improve transparency by showing the distribution of profit, household characteristics, and asset ownership before the regression model is interpreted

Table 7: Descriptive statistics of selected analytical variables

Variable	n	Mean	Minimum	Maximum	Std. deviation
Monthly net profit (TZS)	96	208,854	124,400	251,100	79,929
Age category midpoint (years)	96	41.06	24	65	12.31
Education score	96	5	0	10	0.34
Household size midpoint	96	4.78	2	9	1.56
Asset ownership score	96	3.27	1	5	1.18

The descriptive statistics show that brewers operated at modest but meaningful profit levels. The mean monthly profit of TZS 208,854 indicates that brewing is not merely occasional

subsistence production; it generates a recurrent surplus. At the same time, the dispersion in monthly profit indicates that the potential for asset accumulation differs across households and brew types. This supports Alobo Loison's (2015) argument that rural diversification can represent both opportunity and coping, depending on returns and household conditions. It also supports Barasa et al. (2023), who found that non-farm enterprise welfare effects in Tanzania operate through differentiated income channels rather than through uniform enterprise participation.

4.6. Regression Results and Econometric Interpretation

Table 8 presents the results of the multiple linear regression. The model summary was strong ($R = .845$; $R^2 = .713$; Adjusted $R^2 = .687$; $F = 27.45$; $p < .001$), indicating that the included predictors jointly explained a substantial share of variation in asset ownership scores within the sample. Monthly net profit had the largest positive coefficient ($B = .524$, $p < .001$), followed by access to credit ($B = .458$, $p < .001$) and scale of operation ($B = .318$, $p < .001$).

Table 8: Multiple linear regression analysis of factors associated with asset ownership

Predictor	β	Std. error	Beta	t	p-value
Constant	.385	.095	-	4.053	.000
Monthly net profit	.524	.064	.412	8.188	<.001
Gender	-.287	.071	-.238	-4.042	<.001
Years of experience	.226	.069	.185	3.275	.001
Scale of operation	.318	.059	.301	5.390	<.001
Education level	.194	.065	.168	2.985	.004
Access to credit	.458	.068	.396	6.735	<.001
Household size	-.168	.061	-.142	-2.754	.007
Secondary occupation	.142	.058	.128	2.448	.016

The positive effect of monthly net profit concurs with asset-based welfare theory and with Brockington et al. (2018), who show that asset growth is tied to cumulative surplus rather than momentary income alone. It also aligns with Barasa et al. (2023), who link non-farm entrepreneurship to welfare through income-transmission channels. In this study, the interpretation is that more profitable brewing enterprises have greater capacity to purchase livestock, acquire land, improve household equipment, and reinvest in the business. However, the result should not be overinterpreted causally, as some assets may have been acquired before current profit levels were observed.

Access to credit was also strongly and positively associated with asset ownership. This concurs with Isaga (2019) and Naegels et al. (2018), who show that finance constraints shape the performance of women-owned enterprises in Tanzania. The finding implies that credit not only expands working capital but may also help brewers stabilise production, purchase inputs on time, and avoid selling output under pressure. In contrast, a lack of credit can force brewers to operate below an efficient scale, reducing the surplus available for asset accumulation.

Scale of operation, experience, and education were all positive. These findings align with livelihood theory, as human capital and enterprise capability influence the conversion of resources into livelihood outcomes (Scoones, 1998; DFID, 1999). Education should not be read narrowly as formal certification; rather, it may encompass numeracy, record-keeping, bargaining, and the ability to navigate credit or regulation. Experience similarly represents tacit knowledge about fermentation timing, customer demand, input sourcing, and loss reduction. The positive coefficient for secondary occupation also supports diversification theory: households with more than one income source are better positioned to

reinvest brewing income rather than using it all for immediate consumption.

The negative household-size coefficient contradicts the assumption that larger households always provide more labour for enterprise expansion. In this case, larger household size appears to increase consumption pressure and reduce the share of brewing income available for asset accumulation. The negative gender coefficient should also be interpreted cautiously. It does not mean that women are less capable brewers. Rather, in a context where brewing is highly gendered, it may reflect structural constraints, such as limited control over income, greater care burdens, reduced access to collateral, and weaker market power. This interpretation is consistent with Mori (2015), Pallangyo (2021), Tundui (2021), and Mpambije and Samiji (2023).

4.7. Diagnostic and Robustness Considerations

Given the cross-sectional design, the model was treated as an associational ordinary least squares model and interpreted within its appropriate inferential limits. Multicollinearity was assessed using variance inflation factors and pairwise correlation inspection; linearity and outlier influence were examined using residual plots and Cook's distance; and homoscedasticity was assessed through residual diagnostics. These procedures were used to improve the credibility of the estimates without overstating causal inference.

Table 9: Econometric diagnostic and robustness considerations

Diagnostic issue	How it was addressed	Implication
Linearity	Scatter and residual logic used to assess whether the asset score could be modelled as a linear function of predictors	OLS retained as an associational model
Multicollinearity	Variance inflation factors considered for explanatory variables	Model interpretation focused on conditional associations
Heteroscedasticity	Residual variability assessed; robust interpretation recommended where non-constant variance is suspected	Significance interpreted cautiously
Cross-sectional limitation	No claim of strict causality made	Findings framed as associations, not causal effects

The diagnostic assessment strengthens the econometric interpretation by clarifying the conditions under which the multiple linear regression estimates should be read. More advanced approaches such as instrumental variables, Bayesian regression or panel models may be appropriate in future studies if longitudinal data, larger samples and valid instruments become available. In the present study, ordinary least squares remain defensible because the objective is to estimate conditional associations between asset ownership and observed household and enterprise characteristics, not to claim strict causal effects.

4.8. Emerging Policy Implications

The findings have four policy implications. First, local brewing should be recognized as part of rural local economic development, not merely as a cultural or informal residual activity. It creates markets for local raw materials, generates household income, and supports asset acquisition. Second, access to working capital is central. Since credit had a strong positive association with asset ownership, microfinance institutions, community savings groups, and local development programs should design small, flexible, and gender-responsive credit products for brewer households. Third, technical and business training should be combined. Improving hygiene, fermentation control, and input efficiency will have only a limited developmental effect if brewers do not also strengthen pricing, record-keeping, reinvestment, and market access. Fourth, regulation should be predictable and enabling. A punitive regulatory environment could suppress livelihood activities that support women's enterprises and rural asset formation, while clear licensing, safety guidance, and local market organisation could improve both public health and economic outcomes.

5. Conclusion

This study set out to analyze local brewing in Ulanda Ward as a rural livelihood strategy with measurable economic and asset outcomes. The findings show that local brewing is a differentiated enterprise system composed of distinct products, input structures, process technologies, and return profiles. *Komoni* generated the highest monthly profit, *Uhambule* achieved the highest profit

margin, and *Kangara* occupied a higher-price niche. Brewing income was associated with business reinvestment, livestock, land, electronics, and transport assets, although the strength of asset conversion differed across households.

The regression results indicate that monthly net profit, access to credit, scale of operation, years of experience, education, and secondary occupation were positively associated with asset ownership. In contrast, household size and gender were negatively associated. These results confirm that local brewing contributes to asset accumulation when enterprise surplus, credit access, human capital and livelihood diversification are present. The study therefore supports a more serious scholarly and policy treatment of local brewing as part of rural livelihood diversification and local economic development in Tanzania.

5.1. Study Limitations and Areas for Further Research

The study has four main limitations. First, the cross-sectional design limits causal inference and cannot establish whether current profit preceded asset acquisition. Second, some data were self-reported and may contain recall errors. Third, the asset ownership score captures the presence of assets but not their value, quality, or acquisition timing. Fourth, the study is limited to one ward, so caution is warranted for broader generalisation. Future research should use panel data, detailed enterprise accounts, asset valuation and comparative ward-level designs to test causal pathways from local brewing to livelihood resilience and asset accumulation.

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