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BUSINESS MINGA: STRATEGIC PRINCIPLE AS SUPPORT OF THE BUSINESS EFFICIENCY THEOREM

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Abstract:
This article aims to demonstrate the validity of the Strategic Business Efficiency Theorem, derived from the Minga Business Model (ME), a phenomenon identified within the COPROBICH company. The study draws on the microeconomic theory of market efficiency as its foundational framework. The Minga, understood as a principle of communal solidarity rooted in South American Andes traditions, underwent analysis within the context of a development research project conducted in the Chimborazo province. Building on this theoretical framework, the research introduces a perspective on business competitiveness aimed at enhancing the assets of micro, small, and medium-sized enterprises (MSMEs) operating in the four most significant sectors of the local economy. The adopted methodology incorporates multivariate analysis based on primary data, supplemented by a mathematical approach focusing on demand elasticity. The main conclusion highlights that the efficiency achieved through the Minga Business Model (ME) surpasses traditional market structures, such as monopolies and corporate cartels. Furthermore, the findings reveal that, within this conceptual framework, the relationship between business size and competitiveness exhibits an inversely proportional dynamic.

Códigos JEL: D24, D40, L1, L6, L7

Palabras Clave: Business Minga; Unit Elasticity; Business Networks; Discriminatory Pricing; Segmented Demand.

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1. Introduction

This study examines a cultural-productive phenomenon observed in the Chimborazo province, as part of a development research project conducted between 2018 and 2020 at the Universidad Católica de Santiago de Guayaquil (Matute & Castillo, 2019). In this context, findings reveal a loss of over 50% in productive value among farmers over the past decade, while businesses report an approximate 30% bankruptcy rate in the last three years. Additionally, informality reaches nearly 75% (INEC, 2020; Matute & Castillo, 2020). Provincial data indicate that 98.6% of the business structure consists of micro, small, and medium-sized enterprises (MSMEs), with microenterprises representing 70% of this total (INEC, 2021). This situation, linked to limited entrepreneurial capacity, may find a structured solution through a collaborative approach.

The present analysis uses the Business Efficiency Model as a foundation, applying it to the case of the Corporation of Producers and Marketers Bio Taita Chimborazo (COPROBICH), which adopts the minga as its guiding principle. The minga, understood as a collective and solidarity-based effort to achieve common goals unattainable individually, emerges as a significant cultural and organizational principle. Supported by an active productive network, this approach facilitates the design of the Business Efficiency Theorem.

The proposed business efficiency model characterizes itself as radically collaborative and rests on two primary components: i) networks of micro and small producers aimed at expanding market reach and balancing production distribution; and ii) popular brands that promote the democratization of branding from the consumer's perspective.

Its theoretical foundation draws on conceptualizations of the minga by Belén and Montoya (2022), Vásquez and Torres (2021), and Flórez et al. (2022). From an efficiency standpoint, the model builds on Tomas Villasante's (2008) theories of territorial networks, supplemented by Rivera's (2021) and Tirole's (2017) collaborative analyses. This theoretical framework posits that market demand elasticity emerges from the networked interaction of micro and small producers.

The business efficiency model, rooted in the cultural principle of the Minga (Atupaña, 2017), integrates individual community efforts and strategically coordinates them to address collective challenges. This phenomenon manifests in the daily practices of farmers and communities in Chimborazo (Informe II, 2020; Informe III, 2021). The Minga aligns with the concept of the "Cooperative Cluster" proposed by Castillo (2015), an organizational structure linking multiple micro and small enterprises through financial flows, supply chains, production, and marketing processes in a strategic network.

Case study: COPROBICH

The Corporation of Producers and Marketers Bio Taita Chimborazo (COPROBICH), established in 2003 in Cajabamba, Chimborazo province, adopts a collaborative business model that extends ownership from producers to final consumers. This model brings together 546 indigenous families from 56 quinoa-producing communities in Riobamba, Colta, and Guamote, achieving an annual processing capacity of 780 tons and an average yield of 1.2 tons per hectare in rural smallholdings. Its products, such as quinoa granolas and flours, reach international markets, including France, Germany, Belgium, Canada, and the Netherlands (COPROBICH, 2020).

Active Productive Network Model

The Active Productive Network Model, rooted in the strategic interaction of entrepreneurs to optimize the value chain, centralizes collaborative processes to reduce risks and costs while enhancing competitiveness (Contreras et al., 2017; Matute-Petroche et al., 2022). This approach enables business networks to negotiate with financial institutions, lower supplier costs, and systematically expand markets. Within this model, the territory, understood as a network of microenterprises, operates as a single economic agent in exchanges (Saiz-Álvarez et al., 2019).

An Active Productive Network thrives on the interaction among entrepreneurs aiming to encompass as many links of the value chain as possible (Contreras et al., 2017). Consequently, this system is referred to as Short Exchanges, highlighting that centralization within strategic collaboration fosters more effective

supply chain interactions and accumulation. Mutual leveraging within this framework distributes risks efficiently (Matute-Petroche et al., 2022). Collaborative entrepreneurial strength supports negotiations with financial institutions, reduces production and supplier costs, and ultimately boosts competitiveness (Matute-Petroche et al., 2022). High productivity at scale gets achieved, and markets expand systematically. New market entry occurs strategically and collaboratively. Here, the economic subject transcends individual actors; instead, the territory—a network of microenterprises—functions as an integrated unit. This network engages in economic exchanges rather than isolated individuals (Saiz-Álvarez et al., 2019).

To assess the validity of this phenomenon, a two-stage methodology was implemented. The initial phase aims to demonstrate that the relationship between the Minga and the business sector does not represent an isolated aspect within Chimborazo's economy. Two key activities were conducted for this purpose:

Surveys of MSMEs: Results reveal that approximately 80% of the business population supports participatory proposals.

Documentary Review: Previous studies were analyzed, evidencing a high level of organizational participation within the population.

The second phase seeks to demonstrate that this model outperforms classical business approaches prioritizing marginal balance. A mathematical analysis was employed, focusing on the efficiency of demand elasticity.

The primary objective is to validate the Business Efficiency Theorem, which posits that markets operate more efficiently in short segments and that utility increases in proportion to price discrimination within a cooperative unitary demand framework. Confirming this theorem would offer an innovative solution to productive precariousness, serving as a tool to overcome both business and social poverty.

Business Efficiency Model: The Phenomenon and Its Structure

Beyond the COPROBICH experience, theoretical exploration of the Minga from a business perspective has remained limited. Evaluations such as Macías and Polanco (2023) have extensively reflected on the Bucarretes S.A.S. case. Similarly, Parrado (2010) in his article “The Rural Collaborative Enterprise within the Framework of Territorial Development” raises concerns about the efficiency of business design based on the Minga. In alignment with collaborative and relational principles, Vázquez et al. (2018) analyze it in their work “The Minga: Ancestral Participatory Model Applied in Earthen Constructions of Southern Ecuador.” Castillo (2015) further advances the discussion by exploring the organization of business clusters based on collaboration.

A proposal emerges to construct a network combining two business models grounded in the solidarity principles of the indigenous Minga: clustering and productive collaboration (Pineda-Ospina et al., 2020). These models integrate into a Multiple Business System, a mechanism for managed exchanges among microenterprises. A large business structure forms through the strategic collaboration of micro and small enterprises (Álvarez-Herranz et al., 2011), expanding into the competitive brand market while blending the cumulative effectiveness of clusters with the redistributive nature of cooperatives.

Quinoa-producing families collaborate by contributing their harvest to a common silo, integrating it into the product process until it reaches the final consumer. The resulting good arises from the coordination, harmonization, and cooperation throughout the entire supply chain. This practice ensures the lowest possible costs (as each member produces a portion instead of the whole) and more competitive prices, embodying the principle of Minga. An extended quality process approach supports families in improving their assets.

COPROBICH (2024) states on its website:

...it is a legally recognized private producers' corporation, autonomous, non-profit, and dedicated to service and social benefit for its Puruhá indigenous members. Since the 2009 assembly approval, COPROBICH has directly purchased quinoa from its members, applying fair trade principles...

This linkage defines a Cluster where multiple producers and services converge as the product transitions to the final market. However, this Cluster bypasses the classical market, operating instead through

collaboration in the Minga style, thus forming a Cooperative Cluster. This mechanism, composed of community organizations, enables producers to access international markets (SINDE, 2019).

An examination of the model's structure, centered around the Minga concept, reveals two core organizational principles: a) strategic microenterprise collaboration and b) popular brands. Growth stems from new entrepreneurial initiatives that expand the microbusiness network.

Figure 1. Foundation of the ME – CC

Source: Castillo (2015)

An approach to the model's structure, with the Minga as its central axis, reveals two principles. The extended distribution of processes (upper part of the diagram) facilitates system coupling (Paredes, Bejarano, & Dávila, 2023). This principle consolidates three aspects: i) internationalism, ii) reaching the final consumer (Acosta, Mayorga, & García, 2020), and iii) the instrumentalization of capital focusing on new entrepreneurs and the democratic integration into the system. Finally, the market dynamic involves: a) the microenterprise network and b) internationalist growth, emphasizing market acquisition beyond national borders. This structure requires coordinated opinions and consultations for decision-making (a business think tank) (Niquen & Quispe, 2022).

Cumulative efficiency arises from a collaborative utility function proving more effective than monopolies and cartels. The simplified utility function, where xi represents micro-entrepreneur i, N the number of participants, and y the monopolistic product, is given by:

$$u(x1, x2, ..., xN, y)$$

The model's strategy involves managing brands aligned with demand, using prices as the anchoring element (Montalvo-Arroyave et al., 2022). The goal is to direct all production towards middle-lower urban sectors while practicing price discrimination in the higher segments of the demand curve, making it popular (Vásquez-Patiño & Rueda-Barrios, 2019; Andrade & Coronel, 2019). This approach leads to unitary demand elasticity, as indicated by the formula:

$$f(x) = \sum_{n=1}^{N} \left(\frac{\frac{\Delta Q}{\Delta qi}}{\frac{\Delta P}{\Delta pi}} \right) = unitary$$

When demand is segmented, the consumer's arbitration between segments causes this elasticity to approximate unity, given that the number of arbitrations equals the number of segments. The mathematical form of the demand curve elasticity arises from this arbitration, which constructs an indifference curve coinciding with demand. It behaves as a function with a fractional exponent, as illustrated in the following model (Mejía & Arcos, 2020; Valencia et al., 2019).

$$\varepsilon^{1-\left(\frac{1}{\varepsilon-1}\right)} = \varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}$$

The success measured by this model lies in the capacity to generate business microsystems, with accumulation reflected in the creation of new entrepreneurs. The following framework integrates the system's operational levels in alignment with Mechanism Design Theory, ensuring that key and complex variables (income, distribution, costs) remain controlled (Barberá de la Torre, 2008; Becerra, 2021).

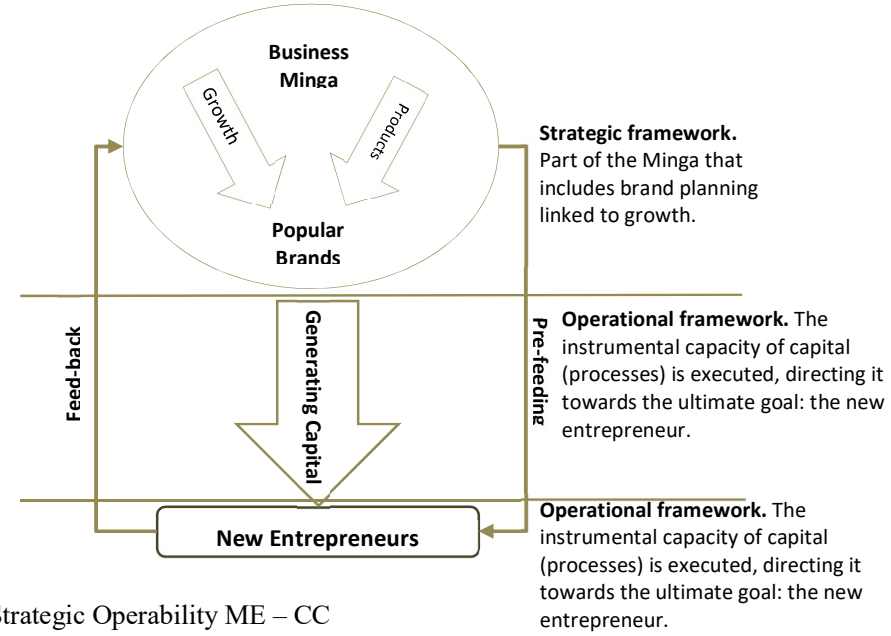


Figure 2. Strategic Operability ME – CC
Source: Castillo (2015)

The dynamics ensuring the success of the Cooperative Cluster include: i) A Strategic Framework that integrates micro-entrepreneurs into an efficient decision-making mechanism (Flores, 2020); ii) An Operational Framework aimed at fostering the emergence of new entrepreneurs; iii) An Organizational Objective, evaluated at the cycle's conclusion based on the number of new entrepreneurs linked to the system. Currency does not represent wealth until it transforms into a new entrepreneur; the monetary set remains instrumental and subordinate to this outcome (Patiño-Vanegas, Benjumea-Arias, Valencia-Arias, & Garcés-Giraldo, 2020).

$$f(x) = \partial CT/\partial N = \text{tends } 0$$

$$f(Q) = \frac{\partial(Q * N)}{\partial N} = is\ maximum$$

While the cost reaches its minimum (CT), the volume produced reaches its maximum (Q). N represents the number of entrepreneurs participating in the Business Minga. As N increases, processes expand, and each participant absorbs a smaller cost, with the derivative tending toward zero.

From the perspective of short exchanges (Contreras et al., 2017) generated within the collaborative cluster and demand segmentation, this model introduces the potential to reorganize business systems in the smallest sectors of the capitalist productive industry. The smaller the sector, the better the performance due to more precise segmentation. The organizational logic behind this business structure enhances both monopoly and perfect competition returns. The conceptual framework presented (popular brands and structural efficiencies) forms the organizational and theoretical foundation of the Business Minga model.

2. Theory of Entrepreneurial Efficiency - TEE

A Minga-style linkage generates a value chain governed from business management to the final market, employing the strategy of extended process collaboration within a Multiple Business System. Its coordination to advance agricultural production through a principle of solidarity enables the structuring of a complex business model in the style of COPROBICH (Solís, 2019; SINDE, 2019). Extended process collaboration materializes when all actors integrate, ensuring performance outcomes distribute equitably (Craviotti & Palacios, 2013; Pomar et al., 2021). This outcome, a consequence of the methodology linking micro and small enterprises, results in a convergence as a Cooperative Cluster capable of segmenting demand and maximizing market profits.

The Cooperative Cluster constitutes a chain structured around a final product within a defined territory. The relational component (extended process collaboration) assists in improving processes affected by pricing disadvantages (Chávez et al., 2017; Gómez, 2020). Meanwhile, the Collaborative Strategy involves connecting entrepreneurs through key processes that facilitate collective management. Peces (2020), in his doctoral thesis The Role of Relational Capital in the Internationalization of Technology-Based Firms, explores this topic, while De la Gala et al. (2021) also address it in their article Relational Capital and Business Growth.

The factor ensuring efficiency within this model is the Minga, acting as a practical adhesive since it minimizes market influence within the cluster. Solidarity functions as a strategic advantage, leading to better and more stable pricing levels, which consequently makes growth planning feasible.

Market Efficiency

Understanding the argument and necessity of the TEE first requires an analysis of what is referred to here as monopoly inefficiency. A capitalist economy aims to maximize utility, leading markets to organize themselves around marginal equilibrium (Marginal Revenue = Marginal Cost) (Florencia-Gabrieli, 2017). However, this structure remains fraught with inefficiencies, as illustrated in the following graph, which defines equilibrium for a monopoly or a cartel (Krugman, Obstfeld & Melitz, 2017).

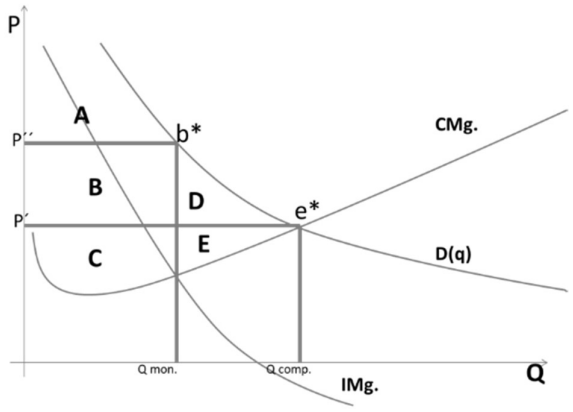


Figure 5. Monopoly Inefficiency
Source: Authors' elaboration

The areas labeled A, B, and C represent revenues exceeding Marginal Cost (MC) and constitute the objective of both monopolies and cartels, as they result from the equality of Marginal Revenue (MR) and Marginal Cost (MC). However, despite their attempts, they cannot overcome the inefficiency illustrated by zones D and E in the graph, since in that segment, MR falls below MC, reaching zero or even negative values, as observed at the intersection e*. For this reason, a monopoly opts to produce at the maximum feasible level b (Qmon), making it prohibitive for these corporations to generate higher output.

On the other hand, perfect competition, driven by market pressure, reaches e*, reducing profits to a near-zero level, as shown in the graph. Along the trajectory from p' to e*, MR = MC = D = P, even though the market could still consume more at better prices for the company. Consequently, the entire area below MC, constrained by demand, becomes lost (Ruiz, 2020).

The core issue for these business structures stems from production costs. This article, through the Minga Business (ME) model, demonstrates the existence of a more efficient market position that benefits businesses and, above all, society. By applying ME-style collaboration among micro-businesses, demand approximates unit elasticity. The model divides demand into smaller segments, engaging in price discrimination and market segmentation, treating them as micro-monopolies. However, when integrated into a single administrative system, they generate a market demand with near-unit elasticity. This demand behavior results from consumer arbitration, where buyers shift between segments seeking the best price. The graph below illustrates this segmentation and price discrimination in the market.

Two central assumptions underlie this theory: popular brands and the entrepreneur as capital itself. Popular brands technically enable market segmentation by appealing to the entire target social base. Additionally, the inclusion of micro-businesses is essential, generating short cash flow cycles adapted to segment-specific demand conditions while contributing to the cluster's overall cash flow. In this model, costs are evaluated individually (not globally), as total cost tends to align with each participant’s variable cost. This structure allows price discrimination and, unlike monopolies and perfect competition, captures demand in its entirety.

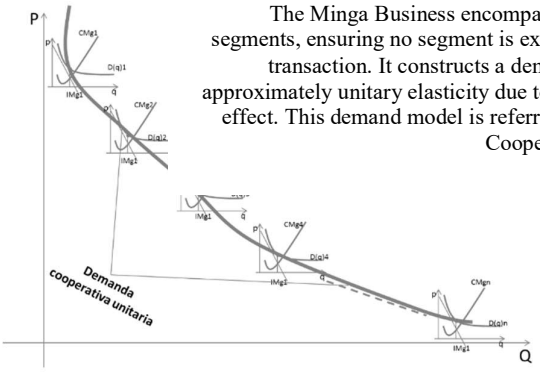


Figure 6. The Unitary Demand of the ME – CC Model
Source: Authors' elaboration

As observed, the bold line intersects the efficiency points of each market segmentation, thereby constructing the demand curve for the ME – CC business system. In other words, as the number of market participants increases, the allocated cost decreases while average prices remain stable—higher than in perfect competition yet lower than in a monopoly. This dynamic renders the consumer utility curve efficient.

Consequently, from the business efficiency model emerges a fundamental theorem referred to as the Theorem of Business Efficiency, which states: The market responds more efficiently within short exchange segments, and utility increases as price discrimination occurs within a framework of unitary cooperative demand.

$$u(x1, x2, \dots, xN) = \alpha ln \left[\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}} \left(x1^{1-\left(\frac{1}{\varepsilon}\right)} + x2^{1-\left(\frac{1}{\varepsilon}\right)} + \cdots + xN^{1-\left(\frac{1}{\varepsilon}\right)} \right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)} \right]$$

This utility curve corresponds to a demand constructed under the logic of the TEE. Its outcome will maximize utility for each x participant within the segmented demand.

3. Methodology for Generalizing the Model and Efficiency Analysis of the TEE

The methodology unfolds in two phases: first, a multivariate analysis consolidates the relationship between the Minga and the cluster; second, a mathematical analysis demonstrates the model's market efficiency. The questionnaire was developed digitally and divided into three sections: the first section inquired whether the company had participated in collaborative actions such as the Minga; the second section analyzed variables such as collaborative processes, frequency, and production criteria, assessing the fairness of collaboration; the third section collected entrepreneurs' perceptions regarding the continued use of collaborative actions during a crisis. The survey consisted of 10 questions, answered by 337 micro-entrepreneurs drawn from a population of 21,753 businesses, with a 95% confidence level and a 5% margin of error. Data was generated using the Google Forms platform and processed in SPSS version 26 to perform a correlational multivariate analysis. The central methodological question explored in this study is: Is it possible to organize complex business models based on the principles of the Minga? To address this inquiry, the following questions were analyzed.

Survey Question	Variable Represented
Do you know the term *Minga* and have you applied it?	V1
Do you believe profitability has decreased over the past three years?	V2
Are you familiar with collaboration strategies (associations, alliances, networks)?	V3
Are you aware of any collaborative activities currently being carried out?	V4
Have you used any form of collaboration to improve financial results?	V5
Do you think collaboration methods are fair for all parties involved?	V6
Does the implementation of collaboration strategies improve financial results?	V7
Does the benefit of applying collaborative strategies lead to greater business efficiency?	V8
Do you believe collaboration strategies should continue to be used?	V9
Do you think public policies should strengthen business collaboration activities?	V10

Secondly, the analytical and deductive study of the utility-consumption function for an infinite number of participants and the mathematical analysis of demand elasticity are adopted to test the Productive Efficiency Theorem. This approach involves demonstrating, through integrals, how total cost converges toward variable cost (VC) as *n* (the number of micro-entrepreneurs) tends to infinity, while VC itself approaches a minimum.

The concept of demand elasticity is evaluated within the intra-industrial market structure, which consists of various firms producing the same good but with variations in design or service delivery (Hernández & López, 2019). The model's assumptions are as follows:

A. There exist multiple *L* micro-entrepreneurs in the market.

B. The market is segmented in a coordinated manner, preventing perfect competition pricing.

C. Arbitrage *Z* occurs across multiple segments (mini-markets) to capitalize on price discrimination, preventing monopoly or cartel pricing.

D. Smaller collaborating firms achieve higher market efficiency.

Following the intra-industry model inspired by Cobb-Douglas, preferences in this specific market are determined by the following elasticity criteria:

$$\varepsilon^{1-\left(\frac{1}{\varepsilon-1}\right)} = \varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}} \tag{1}$$

The formula adjusts for the elasticity of the entire economy and subsequently refines it within the sector using an exponential criterion, following the definition of a utility curve in microeconomics (Gabrielli, 2016). The utility function is presented below.

$$u(x1, x2, \dots, xN, y) = \alpha ln\left[\left[\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(x1^{1-\left(\frac{1}{\varepsilon}\right)} + x2^{1-\left(\frac{1}{\varepsilon}\right)} + \cdots + xN^{1-\left(\frac{1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)} * \varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}} Z\right]\right] + [\![(1-\alpha)lny * Z]\!] \tag{2}$$

The utility function is composed of the consumption of products x plus the consumption of a product y. The expression ⟦(1-α)lny*Z⟧ represents a market with a single product; therefore, no arbitration occurs, placing it outside the scope of this analysis. In contrast, $\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}} Z$ represents the lag in elasticity derived from the set of arbitrages, which is defined by the following factor:

$$\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(-z1^{1-\left(\frac{1}{\varepsilon}\right)} - z2^{1-\left(\frac{1}{\varepsilon}\right)} - \cdots - zN^{1-\left(\frac{1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)} \tag{3}$$

$Z \in \mathbb{R}$ and takes values between (0, 1), excluding the extremes. As Z approaches 1 (minimal arbitration), demand becomes extremely inelastic, whereas as it nears 0 (numerous arbitrations), demand becomes highly elastic (perfect competition). Arbitration always occurs, yet due to the prohibitive effects of multiple segmentations (the cost of arbitration), it tends toward zero in this cooperative model.

In this equation, ((1-α) lny) represents the elasticity of a monopolistic or cartel market within the same domestic economy of a country, where Z = 1.

$$u(x1, x2, \dots, xN, y) = \alpha ln\left[\left[\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(\sum_{i=1}^{N} xi^{1-\left(\frac{1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)} * \varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(\sum_{i=1}^{N} zi^{1-\left(\frac{1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)}\right]\right] + (1-\alpha)lny$$

x_i = Quantity consumed of variety i of good x.

N = Number of segments in the market or microenterprises offering product variations.

ε = Elasticity. Here, 1/N = ε

α = Portion of income allocated to the consumption of x_i

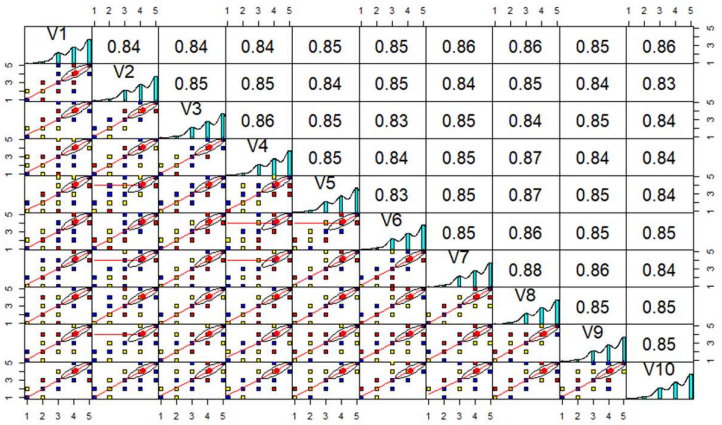
1−α: Portion of income allocated to the consumption of y.

4. Results and Discussion

The demonstration of the TEE requires, therefore, examining the results of the multivariate analysis, verifying cost behavior within this model, and substantiating the consumer's superior well-being.

Multivariate Analysis: Feasibility of Model Application

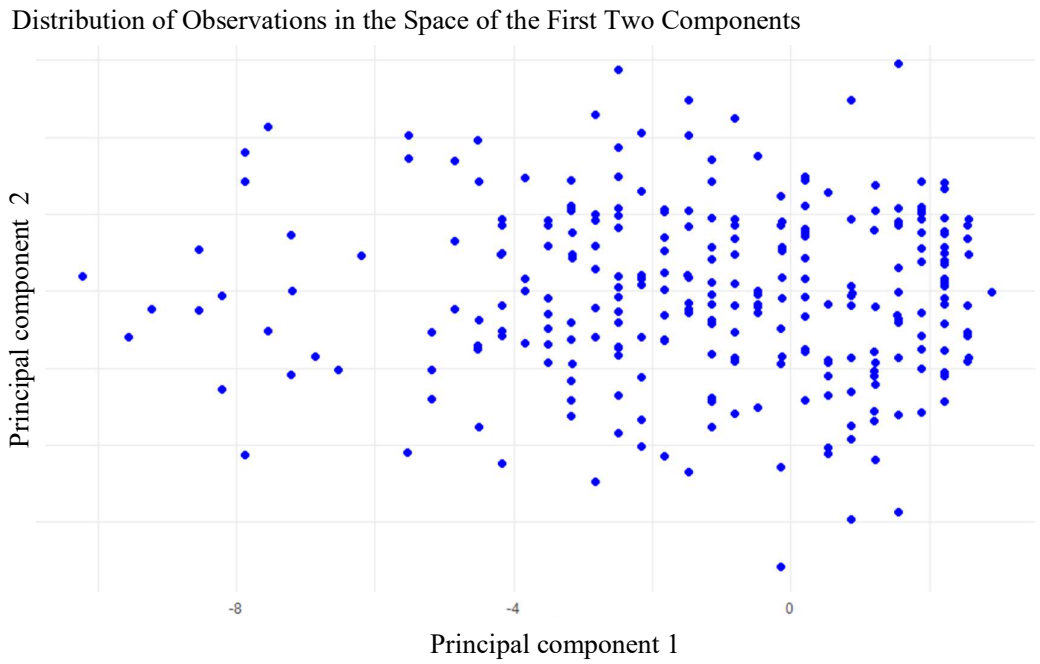
The following multivariate analysis aims to explore the predisposition of micro-producers to participate in an extended process relationship inspired by the Minga system, ultimately evolving into the entrepreneurial form of a cooperative cluster. The subsequent table displays the correlation among the variables presented and their normality distribution.



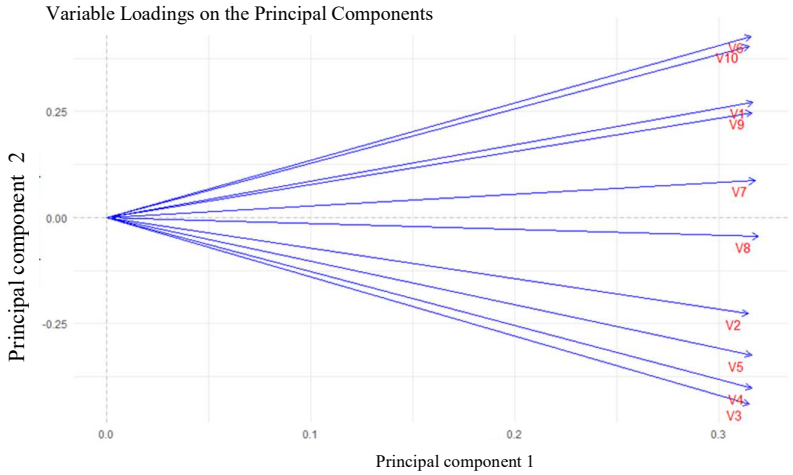
This analysis reveals a strong correlation, exceeding 80%, among the responses provided by micro-entrepreneurs in the province. Such findings indicate the feasibility of micro-entrepreneurs' willingness to engage within the logic of the Minga business model.

Importance of components:	Standard deviation	Proportion of Variance	Cumulative Proportion
PC1	2.938	0.863	0.863
PC2	0.44583	0.01988	0.88291
PC3	0.41516	0.01724	0.90015
PC4	0.41066	0.01686	0.91701
PC5	0.40479	0.01639	0.93339
PC6	0.39096	0.01528	0.94868
PC7	0.3820	0.0146	0.9633
PC8	0.36392	0.01324	0.97652
PC9	0.35904	0.01289	0.98941
PC10	0.32543	0.01059	100.000

In the variable transformation process, using a probability criterion, PC1 (related to knowledge of the Minga) and PC2 (the reduction of returns) account for 88% of the data variance. Including a third variable (knowledge of collaborative strategies) raises this explanation to 90%. Therefore, these components reveal the relationships among the variables presented.



This indicates a strong correlation, suggesting the feasibility of converging toward the proposed efficient business model. Consequently, generalization becomes possible. The following chart illustrates the probabilistic relationship among the variables based on principal components.



The principal component, acting as the central variable of the analysis, displays a well-balanced and proportionally acceptable distribution. This finding not only reinforces the feasibility of constructing the proposed model but also indicates the viability of positive demand segmentation. Entrepreneurs perceive a positive-sum exchange among micro and small producers, generating a dominant market force.

Cost Behavior in the Minga Business Model

By applying integrals, it becomes demonstrable that as the Minga criterion is applied with greater efficiency, segmentation, and collaborative discrimination, the fixed production cost approaches zero for all participants.

$CT = cv + cf$ where $cv = \frac{t}{X}$ and $cf = \frac{E}{X}$ with CT representing total cost, cv variable cost, cf fixed cost, t the time invested by each actor, and E the space occupied (plant and equipment used). To calculate the total cost when an infinite number of participants join:

$\lim_{n\to\infty} \int_1^n CT\, dn = \lim_{n\to\infty} \int_1^n (cv + cf)\, dn = \lim_{n\to\infty} \int_1^n \left(\frac{t}{X} + \frac{e}{X}\right) dn$ where n represents the value of X, the number of segmented participants. The result of this integral equals t log|X| evaluated from 1 to n plus E log|X| evaluated from 1 to n, yielding an infinite variable cost while the fixed cost converges to zero. This outcome indicates the integral lacks convergence, as the area under the curve equals the variable cost assigned to each participant, which absorbs the segmentation. Thus, at any point on the curve, the cost allocation for a participant equals their variable cost.

Behavior of the Market Utility Curve under the ME-CC Model

If X represents the total quantity of good x_i consumed and assuming the consumption of equal quantities across all goods, utility increases with the number of varieties:

$$\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(x1^{1-\left(\frac{1}{\varepsilon}\right)} + x2^{1-\left(\frac{1}{\varepsilon}\right)} + \cdots + xN^{1-\left(\frac{1}{\varepsilon}\right)}\right) = \varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(\left(\frac{X}{N}\right)^{\left(\frac{\varepsilon-1}{\varepsilon}\right)} + \left(\frac{X}{N}\right)^{\left(\frac{\varepsilon-1}{\varepsilon}\right)} + \cdots + \left(\frac{X}{N}\right)^{\left(\frac{\varepsilon-1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)}$$

$$\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(N\left(\frac{X}{N}\right)^{\left(\frac{\varepsilon-1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)} = \varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}}\left(N^{1-\left(\frac{\varepsilon-1}{\varepsilon}\right)}(X)^{\left(\frac{\varepsilon-1}{\varepsilon}\right)}\right)^{\left(\frac{\varepsilon}{\varepsilon-1}\right)}$$

Given that 1/N=ε, the following expression emerges:

$\varepsilon^{\frac{\varepsilon-2}{\varepsilon-1}} N^{\left(\frac{1}{\varepsilon-1}\right)} XZ = (NXZ)$ The resulting elasticity is expressed as: $N_z^x = \frac{XZ}{N}$

This demonstrates that greater price and market discrimination reduces elasticity, though it never reaches zero, as it is adjusted by a factor Z preventing the market demand from reaching extreme values (either highly elastic or inelastic). In this model, elasticity varies directly with the number of product varieties x (micro-enterprises) present in the market.

Additionally, the cost structure of each firm is constrained by the following cost function:

$$CT(x) = \emptyset + \mu x \qquad (5)$$

where ∅ denotes fixed costs and μ represents variable costs, with CT being the total cost. Given increasing returns to scale, the average cost decreases with production levels:

$CM(x) = \frac{CT(x)}{x} = \frac{\emptyset + \mu x}{x} = \frac{\emptyset}{x} + \mu$

The marginal cost is derived as:

$$CMg = \frac{\partial C(x)}{\partial x} = \mu$$

Consequently, in a domestic economy aiming to maximize consumption:

$$\max_{x1,x2,\ldots,xn} x1^{1-\left(\frac{1}{\varepsilon}\right)} + x2^{1-\left(\frac{1}{\varepsilon}\right)} + \cdots + xN^{1-\left(\frac{1}{\varepsilon}\right)}$$

$$p1x1 + p2x2 + \cdots pNxN = E \quad (6)$$

Where E represents the total expenditure allocated to the market (E = budget constraint).

The necessary condition to satisfy the transitivity requirement is expressed through the Marginal Rate of Substitution (MRS) as follows:

$$RMS = x = \left(\frac{pi}{p1}\right)^{\varepsilon} xi$$

In the RMS equation, p_i represents the price of unit i and p_i denotes the price of the first unit. Substituting this expression into the budget constraint yields the following:

$$p1\left(\frac{pi}{p1}\right)^{\varepsilon} xi + p2\left(\frac{pi}{p2}\right)^{\varepsilon} xi + \cdots + pN\left(\frac{pi}{pN}\right)^{\varepsilon} xi = E$$

Rewriting the equation and factoring out common terms $pi^{\varepsilon} xi$

$$(p1^{1-\epsilon} + p2^{1-\varepsilon} + \cdots + pN^{1-\varepsilon})pi^{\varepsilon} xi = E \rightarrow xi = \frac{E}{[\![(p1]\!]^{1-\epsilon} + p2^{1-\varepsilon} + \cdots + pN^{1-\varepsilon})pi^{\varepsilon}}$$

Based on these aspects, the individual demand for consumer h can be determined as:

$$xi^{h}(p1 + p2 + \cdots + pN, E, N) = \frac{E}{[\![(p1]\!]^{1-\epsilon} + p2^{1-\varepsilon} + \cdots + pN^{1-\varepsilon})pi^{\varepsilon}}$$

It is possible to simplify its expression to the following equation:

$$x_i^{h}(pi, P, E, N) = \frac{E}{NP^{1-\varepsilon} pi^{\varepsilon}} \quad (8)$$

Where P represents a price index for the different varieties of x.
The market demand for variety i of good x is expressed as:

$$xi^{h}(pi, P, E, N, L) = x_i^1 + x_i^2 + \cdots + x_i^l = Lx_i^h$$

$$xi^{h}(p_i, P, E, N, L) = \frac{LE}{NP^{1-\varepsilon} pi^{\varepsilon}} \quad (9)$$

In the equation, L represents the number of varieties or micro-enterprises offering the good. From this, it becomes possible to determine the market demand elasticity.

$$\varepsilon_i p^d = \frac{dxi^d}{dpi}\frac{pi}{xi} = -\varepsilon \frac{LE}{NP^{1-\varepsilon} pi^{\varepsilon-1}} \frac{pi}{\frac{LE}{NP^{1-\varepsilon} pi^{\varepsilon}}} = -N \quad (10)$$

Demand elasticity increases with the number of micro-enterprises (or product varieties). In this model, individual elasticity equals NXZ, while market demand elasticity equals −N. Due to individual arbitrages, elasticity approaches unitary levels. Since the various micro-enterprises contribute to the total demand, each represents a fraction of it. It is important to emphasize the presence of micro-strategic collaboration, where participants operate as if they were a single enterprise.

A micro-enterprise producing variety i seeks to maximize profit:

$$\pi = pixi - \emptyset - \mu xi = (pi - \mu)xi - \emptyset = \frac{(pi - \mu)LE}{NP^{1-\varepsilon}pi^{\varepsilon}} - \emptyset$$

The firm selects the price that maximizes its profit:

$$\frac{\delta\pi}{\delta p} = \frac{LE}{NP^{1-\varepsilon}}\left[\left[\frac{1}{pi^{\varepsilon}} - (pi - \mu)\varepsilon\frac{1}{pi^{\varepsilon+1}}\right]\right] = 0 \rightarrow$$

$$\frac{LE}{NP^{1-\varepsilon}pi^{\varepsilon}}\left[\left[1 - \frac{\varepsilon(pi - \mu)}{pi}\right]\right] = 0 \rightarrow pi\left[\left[1 + \frac{1}{-\varepsilon}\right]\right] = \mu$$

Where the first term represents marginal revenue and the second term corresponds to marginal cost.

$$p - CMg = \frac{\mu}{1+\frac{1}{-\varepsilon}} - \mu = \frac{1}{\varepsilon-1}\mu \quad (11)$$

This demonstrates that the firm applies a fixed percentage markup over the marginal cost $\frac{1}{\varepsilon-1}$

This percentage decreases as demand elasticity increases. Since a higher number of micro-enterprises raises demand elasticity (making it more elastic), the price becomes a decreasing function of the number of varieties.

Entry Freedom: If positive profits exist, new firms will enter the industry until profits adjust to unitary elasticity. Given the symmetry among micro-enterprises, the following condition holds:

$$xi = \frac{LE}{NP^{1-\varepsilon}pi^{\varepsilon}} = \frac{LE}{Np^{1-\varepsilon}p^{\varepsilon}} = \frac{LE}{N}\frac{1}{P} \quad (12)$$

By substituting the expressions, the following result is obtained:

$$p = \mu + \frac{\emptyset}{xi} = \mu + \frac{\emptyset}{\frac{LE1}{N\,p}} = \frac{\emptyset Np}{LN} \rightarrow p = \frac{\mu LE}{LE - \emptyset N}; x = \frac{1}{\mu}\frac{LE}{N}\frac{\emptyset N}{} \quad (13)$$

Given that $\emptyset = 0$ $We\ simplify\frac{\mu LE}{LE}$ $p = \mu$ and $x = \frac{LE}{\mu N}$ $but\ N = \epsilon$ Therefore $x = \frac{LE}{\mu}$ Ultimately, the price converges toward the variable cost, and the quantity consumed equals the total expenditure divided by the variable cost. This outcome is evidently more efficient than both monopoly and perfect competition.

These results confirm that market behavior under the *Minga Empresarial* model tends to align with the TEE framework. In the traditional model, an increase in the number of firms reduces individual production and raises average costs. However, under the strategic collaboration model (*ME-CC*), this phenomenon disappears due to two key effects:**Price Discrimination,** Minimizes consumer surplus; **Demand Discrimination (Segmentation),** Market segmentation by zones prevents the free-rider problem.

These mechanisms drive a **Cooperative Unitary Demand**, balancing the market while keeping average costs below demand levels. Consequently, the typical inefficiencies of monopolies and cartels are minimized. Sustaining competitiveness, therefore, relies on maintaining low average costs, achievable through *Minga Business* collaboration.

5. Conclusions

The *ME-CC* model fosters a positive-sum exchange among micro and small producers, creating a dominant and stable market force within a capitalist framework marked by centralized accumulation in large monopolies and corporate cartels. This approach directly addresses the issue of capital decumulation, particularly evident in the early links of the production chain, where the producers of the Chimborazo province operate.

The analysis of the TEE's validity reveals the potential for a business alliance strategy capable of overcoming conditions of productive precariousness and capitalist accumulation. Implementing this model clearly demands commitment, discipline, both practical and theoretical knowledge, as well as a degree of trial and error to achieve the optimal design. These principles are culturally inherent in the *Minga*, explaining its viability in Chimborazo. Though the model could be applied in other societies, it would first require developing collective awareness in these areas.

The conceptual and mathematical elements developed here demonstrate this model's efficiency surpasses both monopolies and corporate cartels. Thus, the hypothesis can be positively verified, emphasizing the importance of achieving a **Cooperative Unitary Demand**. However, it is essential to recognize that this business system inherently accumulates and centralizes wealth and power. For this reason, it becomes crucial to clarify both who controls the wealth and how wealth is defined within the model. Entrepreneurs must fully understand that wealth does not entirely belong to them, as individual success is unattainable without collective collaboration. This ethical principle ensures the continuous integration of new entrepreneurs, preventing the system from becoming corrupt or socially compromised.

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