

# Value in the eyes of farmers and researchers - a case study on Indigenous fruit fermentation and entrepreneurship

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## ABSTRACT

Since 2018, we have collaborated with Senegalese smallholder women farmers to develop food products with Indigenous ingredients. In 2021 the collaboration received a commitment from the African Development Bank to construct the first food processing plant in the women's village of Ndangane. This study assessed the women farmers' insight into creating a sorghum/fruit yogurt and the values they share with us to continue their entrepreneurship and our partnership. Preliminary surveys revealed the farmers' interest in creating fermented products, and highlighted the market potential of the yogurt being developed in this study. In 2022, yogurt recipe development began utilizing sorghum and baobab fruit. Due to the farmers' concern to uphold Islamic food code we pivoted the grain/fruit fermentation from natural to controlled fermentation with lactic acid bacteria to ensure no alcohol content. January 2023 focus group discussions revealed that partnering communities share the value of supporting women's entrepreneurship with us and they desire to generate a sustainable income stream via value-added processing of local crops. However unpredictable climate, immediate expenses for daily survival, and increasing costs of agricultural inputs are significant barriers that our partnering farmers prioritize to address.



Figure 1: Construction of food processing plant in Ndangane

## BACKGROUND

Over 1/3 of the world's food supply is produced by small family farmers<sup>1</sup>

- Smallholder farmers, like our partners in Ndangane, Senegal contribute significantly to global food security

Indigenous populations live on land with 80% of remaining biodiversity<sup>2</sup>

- Yet many Indigenous crops are underutilized

49% of the Senegalese population is moderately or severely food insecure as of 2020<sup>3</sup>

- Rates of post-harvest loss are as high as 50% for some crops in the country<sup>4</sup>

Participatory Action Research (PAR) can effectively encourage entrepreneurship and development in rural communities<sup>5</sup>

- PAR requires effective communication

## METHODS & RESULTS



Figure 2: Baobab fruit on tree in Senegal



Figure 3: Freeze-dried product



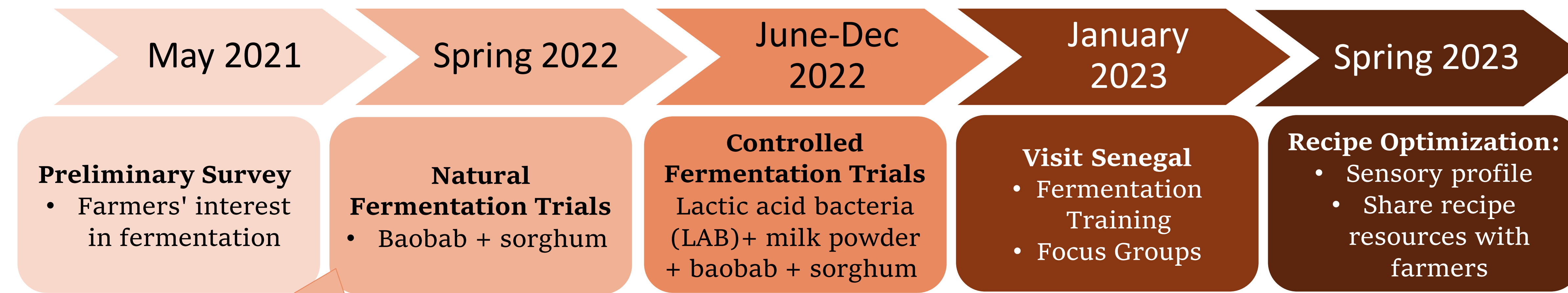
Figure 4: Yogurt fermentation training in Senegal



Figure 5: Focus group discussion in Senegal



Figure 6: LAB fermented product



Farmers' strong concerns for alcoholic fermentation

Farmer: "We have to sell it (yogurt) within the day, 24 hours from milking."  
Researcher: "Have you thought about adding sorghum or millet to make a product from the milk?"  
Farmer: "I have never tried it."

**Focus groups:**

1. How has life and farming been?
2. What are benefits of value-added food processing?
3. Why is our partnership valuable?
4. How can we support you?
5. What does "value-added" mean to you?

"What we are looking for is to be in the village and to work... to have opportunities in the village so we can stay here."



Figure 7: Focus group discussion with women farmers in Ndangane village

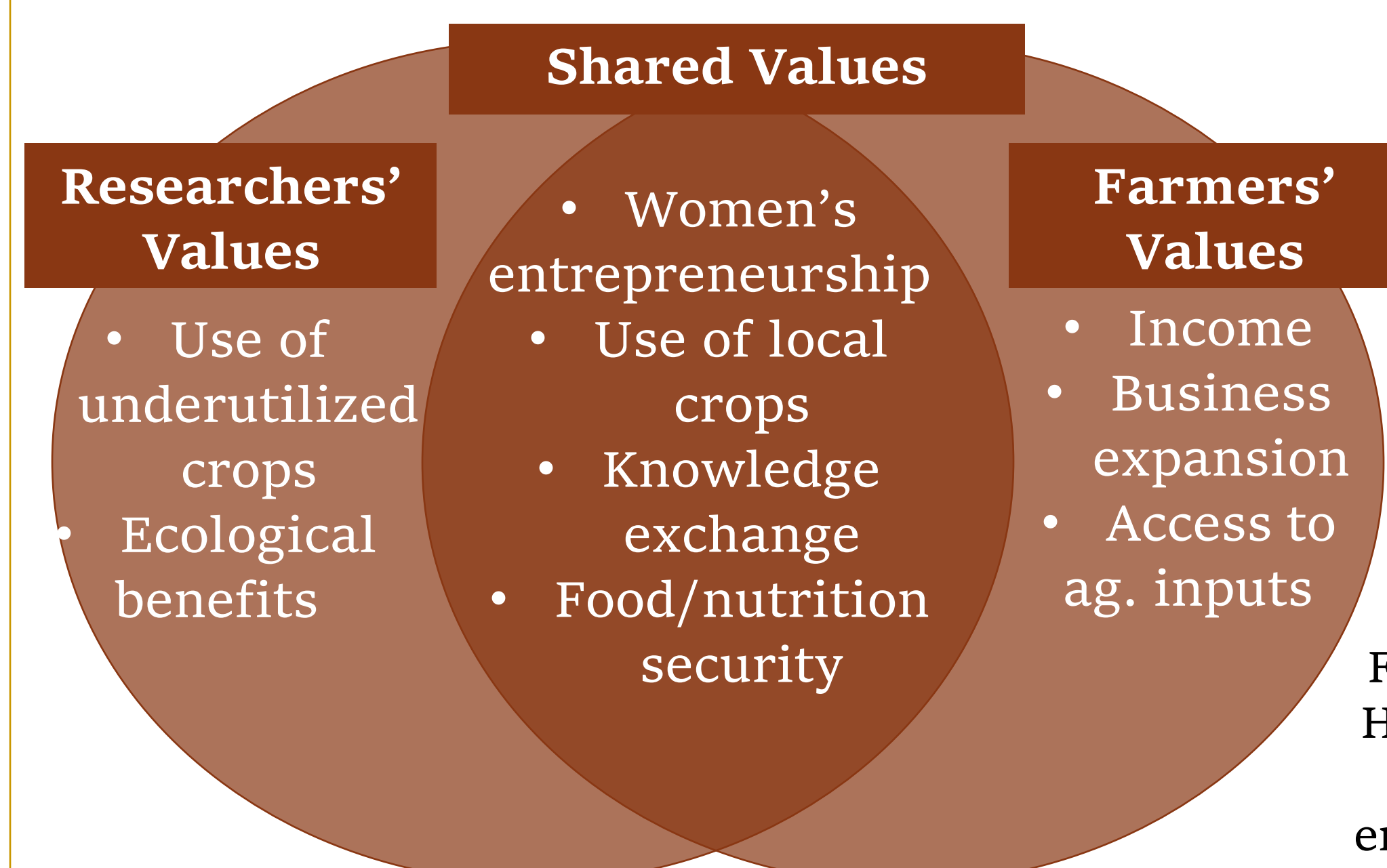


Figure 8: Venn diagram of shared and distinct values

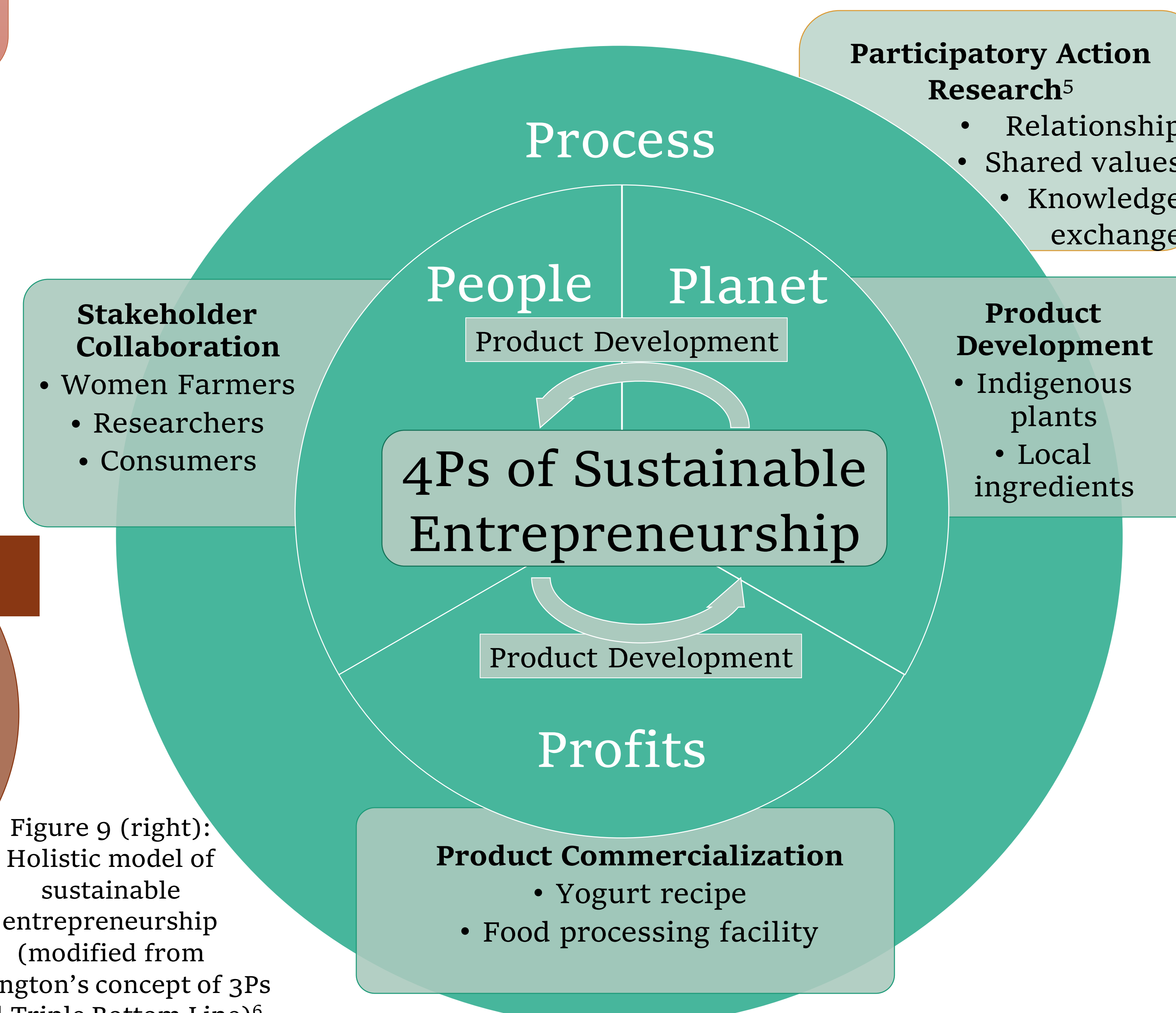


Figure 9 (right): Holistic model of sustainable entrepreneurship (modified from Elkington's concept of 3Ps and Triple Bottom Line)<sup>6</sup>

## CONCLUSIONS

A LAB-inoculated fruit/grain yogurt is a viable product for manufacturing by our partnering women farmers based on their insight.

- Farmer interest in fermentation
- Availability and sensory potential of local ingredients
- Construction of the processing plant with potential cold-storage and drying capacity
- No ethanol after fermentation

Shared values between MSU and the farmers exist (see Figure 9).

- Disparity exists in researchers' stronger focus on planet & people whereas farmers' stronger focus is on the profit & people components of 4P model (Figure 9)

Future direction should consider educational and language barriers to facilitate cross-cultural exchange.



Figure 10: Male farmer milking cow in Ndangane village

## ACKNOWLEDGMENTS

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