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Sketch for a research and training facility, starter culture production, and market research

NWO-WOTRO GCP-1 project *Zambian traditional fermented foods*

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Introduction

In 2015, the University of Zambia, together with five partner organizations, started a project on *Zambian traditional non-alcoholic fermented foods*. *Mabisi* (based on milk) and *Munkoyo* (based on cereal) were chosen for the study. These products are formed through the activity of fermenting microbes that convert raw materials into products with higher value. The aims of the study are to formalise current artisanal processing practice based on a best practice of current local house hold level processing and to design starter cultures of defined mixtures of bacteria to optimize and standardize the fermentation process.

Local farmer cooperatives as focal groups as owners of the tradition. Local farmers and their cooperatives and organisations are involved in our project as key stakeholders. They have been instrumental in designing the research questions and in providing information and samples through our surveys and ongoing consultation. Since ancient times, local people have produced their milk and cereal based traditional foods mainly for self-consumption and for small-scale sales in local communities using part of their primary production, selling most of the raw milk to larger companies. In a recent development, local farmer cooperatives have started to collectively process their primary produce, such as raw milk, into processed products.

Our research on Mabisi and Munkoyo is underway, results thus far point to feasibility for development of local starter culture. Our research so far has revealed that for both Mabisi and Munkoyo variations exist in local processing that give rise to distinct types of Mabisi and of Munkoyo. We are currently formalising the household level processing procedures that yield the best products. The identification of what microbial cultures are essential to include in a starter culture are underway. Results show that, such a starter culture will most likely consist of around six species, in contrast to Western fermented products that commonly consist of one or two species. In addition, we can already conclude that production of traditional fermented products could be performed by local farmer cooperatives.

In order to implement production of traditional fermented products, our research findings need to be translated into (1) marketing plans and (2) concrete protocols for the upscaling of household production to SME level processing aimed at local cooperatives including starter culture production.

1. Assessment of Mabisi and Munkoyo marketing potential

We observed that local farmer cooperatives in Zambia have recently started to process and sell local products to the rural markets and these cooperatives and emerge as a key player in the food value chain of traditional fermented products. Studies have shown that as a low-input and ancient enterprise, fermentation encourages business opportunities related to food security in the context of cultural tradition in many countries [1, 2]. The demand of fermented products commonly is high, not only in traditional rural areas, but also in large urban centres such as Lusaka as a result of traditions and rural to urban migration. However, despite significant technological advances in modern food biotechnology, limitations in infrastructure and existing low technologies in rural areas of most countries pose challenges to counter global developments toward industrialization [1]. The business opportunities of traditional fermented foods are several. A fermentation small-scale enterprise requires little capital to start a business at local level and can provide for numerous financial rewards [1]. Moreover, a fermentation enterprise can operate on a more regular basis than the usual harvest-sales cycles common to farming, which ensures a more regular supply of money to the farmer/producer. If the products are sold directly to consumers, for example at village level, the farmer will have more profit and sell at lower prices than if intermediaries were involved. Moreover, the range of products the fermentation enterprise can offer, enriching the product offering to consumers, also allows more opportunities for a farmer to make more sales and hence potentially generate more income, especially when urban consumers can be reached [1].

For Zambian traditional fermented foods business models, marketing and logistics have not yet been formulated and applied, which at present limits availability of fermented foods to potential consumers, especially in urban areas, resulting in missed opportunities for income generation and in food losses that are preventable [3, 4]. Our current projects have shown that in the past few years, numerous local farmer cooperatives have been established across rural Zambia, some of which have started to process raw materials. Informal discussions with consumer groups and other stakeholders strongly suggest that there is a clear demand for traditional fermented foods in urban areas and clearly opportunities exist for small scale producers to scale up and improve livelihoods through fermentation activities.

As a first step, we plan to formulate a provisional pilot business model using the Business Model Canvas (BMC) tool (see Figure 1.) [5]. The BMC offers useful signposts towards a better knowledge of the local market conditions. Both the small holders and the actors involved in creating value in the fermented products value chain can benefit from this tool. The BMC represents a strategic management and entrepreneurial tool which allows to describe, design, challenge, invent and pivot a business model in a user-friendly way thanks to its practical applicability, simplicity, and logical cause-and-effect relationships. In doing so, it enables both new and existing businesses to focus on operational as well as strategic management and marketing plans. The BMC shows in a visual way to all the actors involved in the production of traditional fermented products in Zambia both the big picture, their own crucial roles in it, their interdependencies. This tool supports a holistic thinking of the business and the sharing of a simple common language [5]. Through the development of a BMC for the traditional fermented products in Zambia, we aim at describing the value created, mapping the actors involved, depicting the key activities and resources needed, the related costs, designing the possible partnerships. The organization of workshops and field visits is necessary to this process, in order to empower the actors demonstrably, both as individuals and as communities. By raising awareness, providing basic education, by including groups that have been discriminated against and by conferring new hope and pride, this process of developing a pilot business model can give local producers in Zambia the confidence and strength to escape poverty using their own means [1, 2].

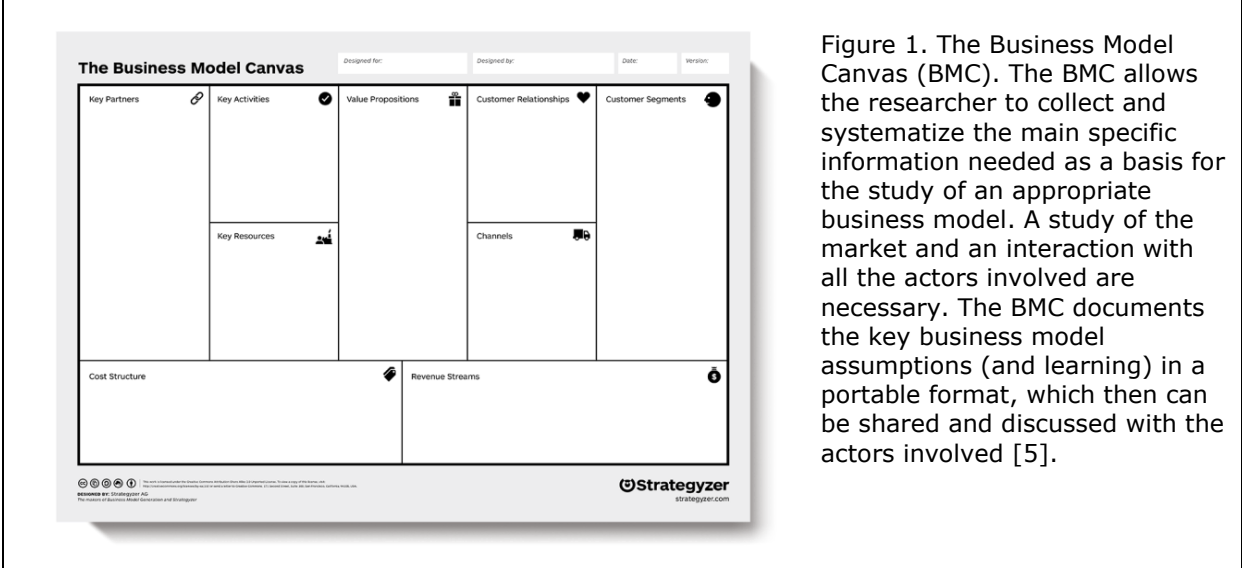


Figure 1. The Business Model Canvas (BMC). The BMC allows the researcher to collect and systematize the main specific information needed as a basis for the study of an appropriate business model. A study of the market and an interaction with all the actors involved are necessary. The BMC documents the key business model assumptions (and learning) in a portable format, which then can be shared and discussed with the actors involved [5].

The BMC and the planned dissemination activities represent a first step to support the small-scale fermentation enterprises in meeting the challenges that developing a sustainable business faces: lack of knowledge or skills in the managerial and business area, poor market and technical knowledge, an inadequate financial management, lack of confidence and trust in relationships. The BMC will set the stage for larger business development programs as a first step to enhance capacity building of local producers and increased status of local fermented products enhancing women’s socio-economic and cultural empowerment. Small-scale fermentation represents a suitable and empowering income generating option, in particular for the more vulnerable or marginalised members of society, such as women, because it can be combined with traditional domestic duties, can be performed at a small scale, and is not physically demanding [1]. To maximize long-term implementation potential, we will seek active involvement of grass-roots organisations, end-users and private enterprises throughout the project in the development of business models. In this way, we will maximize the contribution to livelihoods of local resource-poor people and contribute to poverty alleviation by supporting women’s access to income-generating activities. Apart from business and marketing plans, a potential long-term outcome is a pilot plant in Zambia for production of starter culture, testing of procedures to upscale production and training of local producers in processing and entrepreneurship.

2. Research/ training facility and starter culture production

To allow members of farmer cooperatives to process Mabisi and Munkoyo, the traditional production needs to be up scaled from the household level to an SME scale that suits local cooperatives. This up scaling needs to be designed and tested in a facility that mimics the facilities of production cooperatives would have at their disposal. Further, members of cooperatives need to be sensitized and need to receive training on how to process and the mixtures of microbes for fermentation (starter cultures) needs to be produced. Starter culture production for traditional products is highly specialized since it involves more complex mixtures than for most mainstream products.

This makes the functionality of the facility three fold:

- a) Research and pilots to optimize Mabisi and Munkoyo production procedures at an SME scale that is compatible with local cooperatives;
- b) Training of members of local cooperatives on how to produce products;
- c) Production of starter cultures.

a) Research and pilots towards SME level Mabisi and Munkoyo production

Research will focus on how to translate our findings on current household level production of Mabisi and Munkoyo to the volumes that would be suitable for local cooperatives. Currently, at household level the batch size is around 5 to 40 litres. We aim to expand this to 200 to 4000 litres using larger fermenters, while maintaining the characteristic product attributes. To achieve this, several steps in the current household processing procedure will need to be modified and tested.

The facility will further engage UNZA staff and students for teaching and research activities. Apart from research on Mabisi and Munkoyo, research on other processing of local products could be performed at a later stage, such as the processing of ground nuts and fruits and vegetables.

b) Training of members of local cooperatives on how to produce products

To ensure that cooperatives and their members will adopt the technology, we will closely work with the Zambia office of our partner Heifer International. Heifer has been highly successful in achieving sustainable development by sensitization of stakeholders before the start of training. We intend to build on this experience by as a first step identifying 4 farmer cooperatives and sensitizing their members. This will be followed by a week-long training at the UNZA facilities. After obtaining necessary equipment, cooperatives will receive an on-site training. In this way, we start our operations with a few front runner cooperatives. Using the experience, we will then expand our training programme. After a few years we aim to run 12 training cycles per year for around 10 to 15 participants each. A training cycle consists of a week-long training at UNZA followed by an on-site training at the local cooperative. In the mid to long term cooperatives are expected to be willing to pay for their training.

c) Production of starter cultures

The production of Mabisi and Munkoyo will require the use of defined mixtures of bacteria (starter culture) to be performed (semi-)controlled fermentations and to achieve minimum product standards. Our current research suggests that around 6 species of lactic acid bacteria are required for the starter culture. Currently, Mabisi and Munkoyo starters are not produced. Together with our partner CSK, who is specialized in starter culture production, we intend to set up the production of starter cultures for traditional fermentation at the facility.

Participating partners

University of Zambia, Department of Food Science and Nutrition
Heifer International, Zambia office
Mondake Dairy Association
CSK Food Enrichment, the Netherlands

Notes

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