

Small-Scale Post-Harvest Processing of Underutilized Fruits and Vegetables

A Framework for Assessing Economic Viability

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1. Introduction

- Great potential of underutilized fruits and vegetables (UFV) for producing highly nutritious food products or food supplements [1]
- Prevalence of traditional processing causes high post-harvest losses [2] and deteriorates food quality and safety in UFV value chains [3]
- Yet, modern processing approaches which capitalise on this potential have not been adopted at a significant scale by smallholders and rural entrepreneurs in West Africa (WA) [4]
- Lack of information on market barriers, economically viable and context appropriate business models key limitation for dissemination and uptake of modern processing, such as solar drying [5,6]



2. Methodology

- Based on extensive review of scientific and grey literature, as well as initial stakeholder consultations in Ghana, Nigeria and Sierra Leone
- Development of a framework for the assessment of the (socio-) economic viability of small-scale post-harvest processing of underutilized fruits and vegetables in West Africa
- Initial identification of key market-related barriers faced by small-scale processors
- Value chain perspective adopted to account for up-/downstream factors, actor relationships, marketing channels and related barriers

3. Results

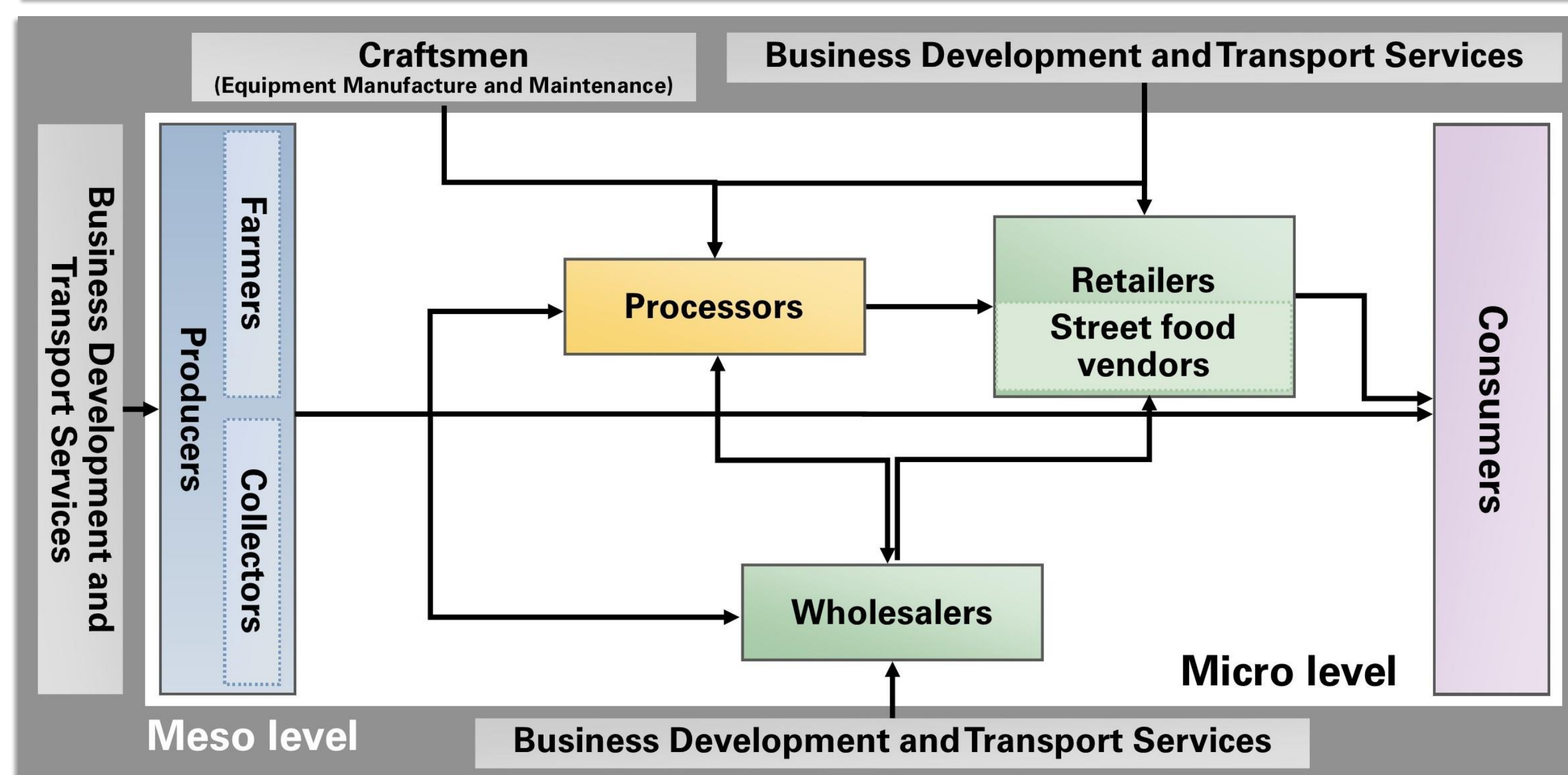


Fig. 1: General UFV value chain schematic, depicting main actors and flows of goods/services

- Demand and usage patterns highly geographically and (ethno-) culturally dependent, together with often weak rural infrastructure leads to fragmented markets [7]
- UFV Value Chains are dynamic and can even change with seasons – e.g. producers selling to consumers on local markets during main season and to wholesalers, who supply further away markets, during lean season [8]
- Due to diversification of livelihoods and agri. production, roles within value chains often overlap for households or individuals (e.g. producer-traders, farmer-craftsmen) and households' cashflow commonly depends on a multitude of seasonally varying, individually weighted on-/off-farm activities [9]



Photo: Lelea



Photo: Akintola



Photo: Lelea



Photo: Lelea



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Production

- Competitive markets: UFV production characterised by low barriers of entry [10], in particular for UFVs primarily gathered in wild
- Production systems' reliance on rainfed agriculture frequently results in distinct patterns of glut and want, and strong price fluctuations for fresh UFVs also within seasons [1,11]

Equipment manufacture

- Local equipment manufacturers play an important role in promoting uptake of modern processing technologies
- Profitability of processing businesses often falls short to account for ongoing maintenance and repairs, e.g. causing promoted solar dryers to fall into disuse and disrepair [4]

Processing

- Variety of high-nutrient UFV processed foods in literature in stark contrast to very low availability on ground
- Fin. modelling and cash flow analysis frequently rudimentary, lacking real life data [2]
- Renewable energy (RE) driven processing solutions: Critical importance of high capacity utilization due to high capital cost and low running costs

Wholesale/Retail

- Role of wholesalers in particular in UFV value chains remains underexplored
- Shelf life/storage constraints frequently recognized, but willingness to engage with innovative processed products or willingness to pay price premiums for improved shelf life, higher quality and/or higher nutrient products remains unexplored

Consumption

- Isolated, small panel studies tend to over-simplify assumptions on consumers' taste and perception of nutrition and expected buying behaviour and willingness to pay [12,13]
- Context specific fluctuations and price elasticity of demand from substitutability and complements, too, require in-depth understanding of consumer preferences

4. Discussion

- Product differentiation through value added processing can help overcome end product price fluctuations and other challenges of highly competitive market environments, while potentially exacerbating fragmentation of markets
- Reality of diversified livelihoods requires assumptions on resource availability, opportunity costs and cash flows to take into account seasonally varying portfolio of income generating activities
- Constrained supply and price fluctuations of raw materials in conjunction with high required capacity utilization: Business model development should look beyond processing individual UFVs or successions to incorporate cash crops
- Realistic assumptions on demand and market prices for innovative products require (more) detailed understanding of consumer preferences and willingness to pay

5. Conclusions

- Results confirm existence of several critical knowledge and overall weak links between high-nutrient UFV food products described in literature and challenges faced by small-scale UFV processors in WA in developing viable business models
- A more in-depth understanding of market environment, including rural livelihood diversification, repair and maintenance constraints, and especially consumer preferences and willingness to pay is imperative
- Value chain perspective useful to address existing gaps, but hampered by lack of sufficiently data on key parameters such as UFV production, consumption and price development on at least seasonal basis
- As a next step, outcomes will be used to inform data collection and subsequent business model development within the UPGRADE Plus project

6. References

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