

Support to Project for the sustainable use of Non-Timber Forest Products in and around Gilé National Park, Mozambique

Final report

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Resumo executivo

Desde 2007, a Fondation François Sommer/*International Foundation for Wildlife Management* (FFS-IGF) está a gerir o Parque Nacional do Gilé em parceria com a Administração Nacional das Áreas de Conservação (ANAC), com o objetivo de conservar a biodiversidade faunística e florística, assim como acompanhar as comunidades circunvizinhas para prosperar dentro da nova conjuntura de conservação da zona. Neste contexto, o Departamento de Desenvolvimento Comunitário (CDD) da Reserva está a liderar um projeto ambicioso para o desenvolvimento da cadeia de valor de diversos produtos florestais não madeireiros (PFNMs seja *Non-Timber Forestry Products*, NTFPs) com potencial para promover atividades de geração de renda para as comunidades da zona tampão.

Um desses produtos é o cogumelo selvagem, além de ser apreciado nas comunidades que vivem ao redor da Reserva, apresenta um valor comercial tanto nos mercados locais quanto provinciais. A segunda causa deste interesse sob o cogumelo é que a colheita e o processamento são atividades tradicionalmente reservadas para as mulheres, o que constitui uma oportunidade para promover o empoderamento econômico feminino e o desenvolvimento social equilibrado.

No início do projeto PFMNs, o CDD concebeu a estratégia de desenvolvimento para a cadeia de valor do cogumelo na Reserva e na sua zona tampão. Vários grupos de mulheres estão a ser estruturados e acompanhados na aplicação de técnicas apropriadas de colheita e processamento, de maneira que a qualidade e a quantidade de produto processado sejam melhoradas, e assim garantir uma fonte de rendimento adicional para as comunidades.

Através desta consultoria, a Nitidæ ambiciona apoiar o projeto PFMNs com a melhoria dos conhecimentos e a transferência de capacidades a longo prazo para a equipe do PNAG, no âmbito dos esforços de monitoria e de desenvolvimento das técnicas de produção e transformação sustentáveis.

Como primeiros passos, uma missão de terreno foi realizada por duas especialistas nas matérias de produtividade biológica e de processamento, respectivamente. Durante 10 dias, a Nitidæ trabalhou na zona tampão do PNAG com os membros do CDD e conjuntamente com vários grupos de coletadoras de cogumelos, para observar as etapas de colheita e realizar teste piloto de processamento (secagem).

Para avaliar o potencial de comercialização, um estudo de mercado dos cogumelos foi realizado em algumas cidades da província da Zambézia, dentre as quais: Gilé, Mocuba, Alto Molócue e Quelimane e na capital da província de Nampula. Apesar de não fazer parte dos termos de referência iniciais foi também realizado inquéritos de mercado em Maputo considerando a importância do potencial mercado.

Como recomendação geral para um trabalho de medio a longo prazo, indica-se a oportunidade de ligar a sustentabilidade da cadeia de valor do cogumelo à sustentabilidade socioambiental, através da pesquisa aplicada ao cultivo do cogumelo, e a promoção da preservação de zonas arborizadas na zona tampão para promover a produtividade dessas parcelas.



Por isso, no âmbito da consultoria foram, entre outros, elaborados materiais pedagógicos para promover as boas praticas de colheita e processamento dos cogumelos para a sensibilização das comunidades locais, bem como proposta de implementação de protocolo de monitoria da produtividade biológica dos cogumelos para estabelecer padrões de colheita sustentável.

O relatório final sobre as estratégias de modelo de negócio para a comercialização dos cogumelos secos das mulheres das comunidades da zona tampão do Parque Nacional do Gilé é apresentando neste documento assim como as recomendações estratégicas e os resultados que surgiram durante o presente estudo, nomeadamente os progressos na identificação científicas de algumas espécies de cogumelos bem como as conclusões da análise economica sobre a viabilidade do desenvolvimento de uma cadeia de valor de cogumelos secos na zona tampão do Parque.



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Glossary of terms

AFD: *Agence Française de Développement* (French Development Agency)

ANAC: *Administração Nacional de Areas de Conservação* (National Administration of Conservation Areas)

BZ: Buffer zones

CDD: Community Development Department

CGRN: *Comité de Gestão de Recursos Naturais* (Natural Resources Management Committee)

FAO: Food and Agriculture Organization

GNAP: Gilé National Park

FFS-IGF : *Fondation François Sommer - Fondation Internationale pour la Gestion de la Faune*

NTFPs: Non-Timber Forestry Products

ODK: Open Data Kit

PNAG: Gilé National Park



1_Introduction

1.1. The NTFPs project

The project for the valorization and marketing of Non-Timber Forestry Products (NTFPs), coordinated by FFS-IGF started in 2017. This project was set up with the financial support of the French Development Agency (AFD) for a period of 30 months. The project aims to i) strengthen the GNAP team capacities to protect natural resources, ii) promote the legalization and organization of the NTFPs sustainable use by local communities living in the Buffer zone, and iii) develop the NTFPs production by identifying and implementing methods, tools and channels of use and valorization.

Nitidæ has been working at the GNAP in partnership with FFS-IGF since 2013, with the implementation of several projects: GNR REDD+ pilot project (2014-2017), MOZBIO project (2016-2019), ACAMAZ project (2018-2021).

Through this consultancy, Nitidæ aims to support the NTFPs project by evaluating the potentiality of commercialization of NTFPs, namely wild mushrooms and honey by local communities living in the Buffer Zone of GNAP and providing basic training to selected communities' members. The consultancy capitalized on the work already done by the Community Development Department (CDD) to ensure that the service provides the needed elements to the GNAP to move forward. The service, on one hand: prioritized support to improve and transfer capacity on long term to the GNAP team on NTFPs monitoring and sustainable production techniques; and on the other hand: realized pilot tests and market studies to help identify suitable technologies and prioritize the best options for NTFPs value chain development.

1.2. Context of the Gilé National Park

The Gilé National Park (GNAP) is located in the Gilé and Pebane districts, in the Zambézia province, in central Mozambique (Figure 1). The park was created in 1932, initially as game reserve and have turned into a conservation area since 2000. The core area covers an area of 283 600 ha and the buffer zone 152 800 ha. Climate is composed of a dry season from May to October and a humid one from November to April with mean annual rainfall between 800 and 1,000 mm. Temperatures vary from 13°C (minimum in June in average) and 37°C (maximum in October in average). Forest of the Reserve and its surroundings is Miombo dry forest, typical of this region, with presence of patches of clearings (called dambo) where hydromorphic soils are present. Miombo is characterised by species from the genus *Brachystegia*, *Julbernardia* and *Isoberlinia* (Campbell 1996).

Since 2009, François Sommer Foundation-International Foundation for Wildlife Management (FFS-IGF) has been co-managing the GNAP with ANAC (*Administração Nacional das Areas de Conservação*) with the aim of conserving plant and animal biodiversity, and is working to rehabilitate the reserve by restoring its infrastructure, combating poaching and reintroducing animals (buffalo, wildebeest, zebra, etc.).

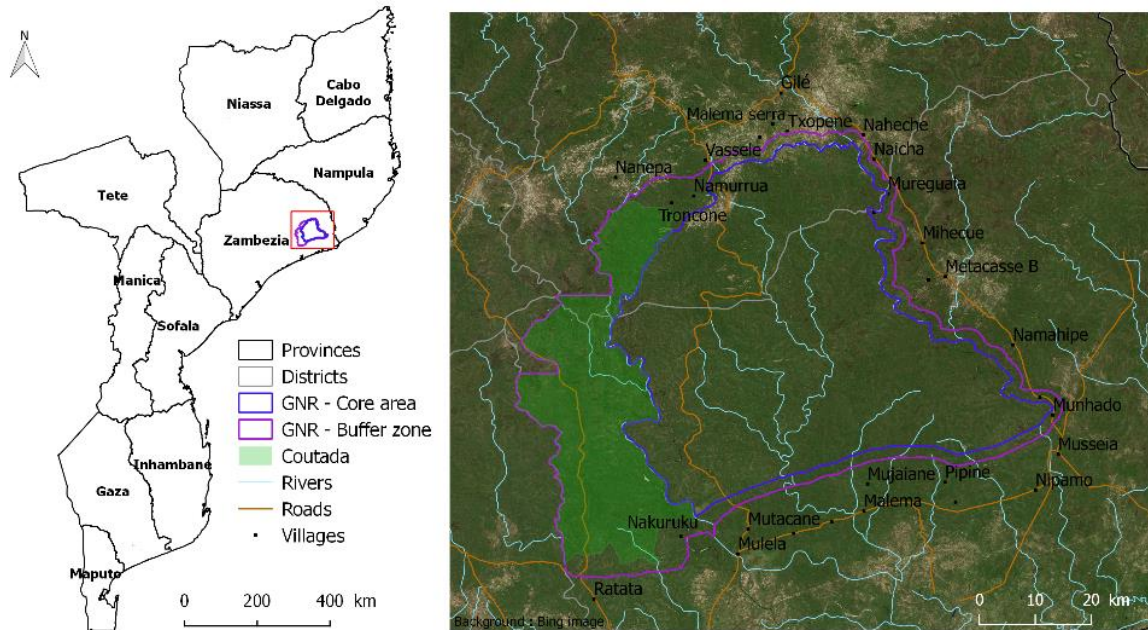


Figure 1 : Gilé National Park location

1.3. Methodology

The research was conducted in different phases to observe the project implementation on the ground and to define relevant aspects for the mushroom value chain development strategy and business model elaboration.

The team was engaged with several activities of fieldwork, trainings, monitoring, remote technical assistance, elaboration of pedagogic materials, bibliography review, meeting with provincial authorities and conduction of a market study private sector to obtain an overview of the value chain and its possibilities.

The meetings with authorities were held in Direção Provincial da Terra, Ambiente e Desenvolvimento Rural da Zambezia and also at Direção Provincial da Industria e Comércio to get a better understanding about the regulations related to NTFPs and associated legal requirements for the commercialization of perishable products.

For the market study, inquiries were conducted in the local markets in Nampula and Zambézia province (Gilé, Alto Molócue, Mocuba and Quelimane), but also in Maputo even though it was not part of the TOR of this study, it did appear along the consultancy the pertinence to assess market potential in the capital.



2_Technical Assistance

2.1. Elaboration of pedagogic materials on Mushroom collection and best practices

Pedagogic materials on mushroom collection and processing best practices has been elaborated jointly by the CDD and Nitidæ team to be used for communities and women groups collector awareness. Pedagogic materials are made of 19 drawings that jointly with a simple “user guide” to help the technicians or community members in charge of doing the awareness meeting to focus the key messages to deliver.

2.2. Progress on Mushroom species' identification

Metadata (collector, date, localization, vegetation type...) and pictures of mushrooms specimens collected during the field mission in February 2020 by the Nitidae and the GNAP team were shared with African mushroom specialists Jérôme Degreef & André De Kesel, researchers at the Meise Botanic Garden, to confirm and complete the species identification.

Pictures will feed the database of edible fungi of tropical Africa (EFTA) of the Meise Botanical Garden¹. The aim of EFTA is to propose an inventory of edible fungi from tropical Africa and to produce distribution maps based exclusively on reference specimens and/or geo-referenced quality photographs. Until today, this database does not contain any data from Mozambique and below species are now being registered in the database. Along the consultancy 7 species have been identified up to gender level and 5 up to the species level, it's therefore a real progress that has been made in terms of mushrooms species knowledge for the Gilé National Park and Mozambique.

The Nitidae team is in contact with the mushroom specialists to facilitate the species identification. In order to validate and continue the determination of edible mushroom, samples of each species will still have to be collected, dried and analyzed by the specialists.

Table 1 - Mushroom identification progress.

Local Name	Family	Genus	Species	Status
Ahura	Russulaceae	Lactarius	kabansus	Confirmed
Ehí	Russulaceae	Russula	cellulata	Confirmed
Ekuakua	Amanitaceae	Amanita	sp.	To be confirmed
Exinamuhano	Cantharellaceae	Cantharellus	humidicolus	Confirmed
Eyúkuli	Cantharellaceae	Cantharellus	miomboensis	Confirmed
Khaduve	Russulaceae	Lactifluus	edulis	Confirmed
Muedyomidja	Amanitaceae	Amanita	sp.	To be confirmed
Namahiela	Russulaceae	Lactifluus	sp.	To be confirmed
Namapele	Russulaceae	Lactarius	densifolius	Confirmed

¹ <https://www.efta-online.org/>.



Namperua	Russulaceae	Lactifluus	gymnocarpoides	Confirmed
Niputhuela	Amanitaceae	Amanita	sp.	To be confirmed
Othepo, Namua	Lyophyllaceae	Termitomyces	schimperi	Confirmed
Txaleia, Dxaleia	Russulaceae	Russula	ciliata	Confirmed
Txepuere	Amanitaceae	Amanita	sp.	To be confirmed
?	Cantharellaceae	Cantharellus	platyphyllus	Confirmed
?	Russulaceae	Lactifluus	medusae	Confirmed

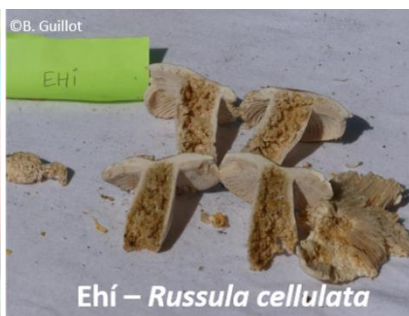




Figure 2 – Gilé National Park Mushrooms species

2.3. Support on choice of materials and improved drying techniques

During the period of technical assistance, the Nitidæ team gave suggestions about the choice of materials for processing and storage of mushrooms using available materials. Namely, in order to prevent the dried mushroom from absorbing back moisture.

Some discussions were also held to give recommendations about how to build a device to dry during the night, which is appropriate to the context of the communities and can complement the solar drying. This device may be tested in the second part of the project.



3_Analysis about the legal framework for Non-Timber Forest Products (NTFP) in Mozambique

3.1. Overview of the NTFPs' legal framework

The main legal structure² related to NTFP is described below:

Table 2 - A brief overview about the legal structure in Mozambique related to NTFPs.

A Brief overview about the legal structure in Mozambique related to NTFP	
Forestry and Wildlife Law	The Land Law (1997)
<p>Mozambique's Land Law and the Forestry and Wildlife Act establish the ways in which community rights are protected. The Forestry and Wildlife Act also sets out how communities can benefit from forest exploitation.</p> <p>Article 9 does include definition of resources included under the law and this extend to NTFP. The same article specifies that exploitation of any forest resource, ie including NTFP, can only be done under a licence.</p> <p>Article 3 of the Forestry and Wildlife Law, the definition of roles and responsibilities of different stakeholders – community, civil society and the private sector – refers to 'exploitation of forest and wildlife resources' only in connection with the private sector.</p> <p>"Under the forestry legislation, communities are entitled to receive 20% of taxes paid to government by private entities exploiting forests for timber. However, the communities need to have in place a formal registered CGRN (which, according to the legislation, should include representatives of local government), a formal registry of the community, and a bank account. There are few examples in Mozambique of communities benefiting from the 20%." (p.10)</p>	<p>Lei de Direito de Uso e Aproveitamento da Terra (DUAT) (Article 12[a] and 9[1] of the Regulations) recognizes traditional land use rights and formalizes these by giving communities co-ownership rights to land that they occupy. Existing users of land have their right to use the land protected under the law on the basis that they can demonstrate 'good faith', ie that they are using the land for their livelihood.</p>
	<p>Nagoya Protocol</p> <p>Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity.</p>
	<p>Community Conservation Areas</p> <p>These are defined as 'area[s] of sustainable conservation, delimited in the community public domain, under the management of one or more local communities, where they have the right to use and enjoyment of land, for the conservation of fauna and flora and the sustainable use of natural resources'. This should be in the form of a partnership agreement between the community and the private operator.</p>
<p>Law for the Conservation of Biodiversity (Law 16/ 2014)</p>	
<p>Establishes the principles and rules for 'protection, conservation, restoration and sustainable use of biological diversity in conservation areas, as well as the framework for an integrated management for sustainable development of the country'. This law includes a range of potentially useful features, from the perspective of community engagement in natural resource management, including community management of conservation areas, sustainable resource use and trade etc (p.11).</p>	

² Reference: National strategy and action plan of biological diversity of Mozambique. Maputo. MITADER (2015). p.25.



3.2. Regulations related to the Provincial Level

In the scope of the project, meetings were held to collect the main information related to the legislation in the provincial level. The key points of the legal framework for commercialization of perishable products presented at these meetings are described below and the contacts and details of each meeting can be found in Annex 1 – Contact meetings.

In Quelimane, at the Provincial Department of the Industry and Commerce, the main legislation presented was:

- Decree No. 22/2014 of 18 March that regulates the Licensing of Industrial Activities
- Decree No. 39/ 2017 of 28 July (Simplification of the procedure)
- Decree No. 34/2013 of 2 August: which approves the Commercial Activity Licensing Regulation and revokes all previous legislation³, with the exception of the Licensing Regulation Simplified for the Exercise of Economic Activities, approved by Decree No. 5/2012, of 7 march ("Simplified Licensing), which remains in force.

The regulation applies to the licensing of the exercise of economic activity wholesale trade, retail trade and services, under the terms of subclasses of the Classification of Economic Activities (CAE), attached to it.

It's also applicable to economic activities of the CAE that are not covered by special legislation, including commercial activities and agricultural commercialization agent, which until now were covered by the Simplified Licensing.

The process indicated for carrying out the licensing has three stages: first obtain a small industry license for individuals, then a certification and lastly the commercialization:

- 1º Comercial Licence - 2º Certification - 3º Commercialization

The licensing process can be made at the provincial public service counter called "BAU" (Balcão de Atendimento Único), which is a unit that aims to concentrate the provision of public services and to facilitate the legalization of business or, where do they not exist, District Administrator (in case of licensing the exercise of retail trade and service provision by micro and small companies);

The main issues identified are:

- BAU is responsible for processing and issuing simplified licenses and certificates of mere prior communication, as well as suspension and revocation;

▪ ³ Decree No. 49/2004, of 17 November, which predicts provision of licences for commercialization activities under 4 categories, namely class A (rural cantinas), class B (banca fixa), classe C (banca pequena, and class D (rural agrarian commercialization agent).



- Licensing: does not license an association, it must be a legal entity that belongs to the association.
- Licensing of rural commercial activity does not require inspection
- A single processing license for honey and mushroom can be made.

3.3. Requirement for the licenses to the Provincial level

The details of the requirements of the documents necessary to obtain a simplified license (Decree 39/2017) and commercial álvara (Decree 34/2013) are listed in Annex 2 - Requirement for the licenses to the Provincial level. The decrees mentioned above can be found in Annex 3 - Decrees.

The main issues identified:

- Validity of the permit for the exercise of wholesale trade, retail trade and provision of service: indefinite period;
- Fees for the exercise of wholesale, retail and service provision: 1 minimum wage;

License/Authorization to transport Non-Timber Forest Product (NTFP)

The bibliographic review and legislation collected at provincial meetings does not mention mushrooms as a non-timber forest product. In Decree 39/2017, which approves the Simplified Legal Regime for Licensing for the exercise of Economic Activities, there is no mention of regulation for mushrooms at the licensing that considers the productive activity included in the Classification of Economic Activities (CAE).

As the study by the Ministry of Land, Environment and Rural Development (Mitader) of Mozambique points out: "the existing license regime for forest products, with the exception of bamboo, is mainly directed towards timber products, and is the purview of the provincial services of the National Director of Forestry"⁴.

3.4. Details hygiene standards and legal requirement for commercialization of perishable products

The product certification provides several benefits to consumers, manufacturers, importers and civil society in general, such as the guarantee of complying with the safety standards in force in Mozambique and social responsibility of a product that has been laboratory tested and cannot cause damage to consumers and society.

The National Institute for Standardization and Quality (INNOQ) is a Mozambican institution with responsibilities for the areas of standardization, certification, legal and industrial metrology. Under standardization, it produces Mozambican standards, whose application by economic agents is voluntary.

Main issues found:

- To certify the product you must pay a fee to INNOQ to access the rules:

⁴ Mitader, 2018. Assesment of Non-timber and Non-Wood Forest Products Value Chain in the Nampula, Zambezia and Cabo Delgado Provinces Mitader, 2018, p.131).



- Rule NM 286: 2010 – Recommended international code of hygienic practices for dehydrated fruits and vegetables, including edible mushrooms. (Price: 340,00 MZN)
- It is not an obligation to certify the product just to follow the labeling rules:
 - Rule NM 15:2010 – General requirements for the labeling of prepackaged products and for the sale of goods subject to legal metrology control. (Price: 1270,00 MZN)
 - For labeling aspects of the package that will contain the product, one must follow what is recommended in the Ministerial Diploma No. 141. This Diploma refers to the rule NM 15, which must also be purchased at INNOQ.

Steps for certification of food products according to Mozambican Standards:

1. The company must present the test history laboratories in the last 3 months;
2. The company must present the flowchart containing the main phases of the production process;
3. Submit the label for approval to INNOQ;
4. The company must register the trademark with the Industrial Property Institute;
5. The company must treat the bar code in IPEME (Institute for the Promotion of Small and Medium Enterprises)

After regularizing the points mentioned above, they can ask INNOQ for product certification.

For food product analysis activities, the National Food and Water Hygiene Laboratory (LNHAA) assesses the quality of products.

- The entire formal sector, establishments, such as: grocery stores, supermarkets, restaurants, hotels and others that sell raw or cooked food, must request an analysis to make a periodic control of their products.
- For the health inspection and surveillance sector, it has the National Inspection of Economic Activities (INAE) and the environmental hygiene centers that operate in small establishments.
- During surveillance and inspection, samples of the products in question are taken irregular situation for laboratory analysis. Both the owner of the establishment can go voluntarily to the LNHAA to analyze their products or through inspection.
- It is the responsibility of companies, industries, traders that deal with water and food to submit products for analysis.

The contacts for both INNOQ and LNHAA can be found in Annex 4 – Contacts INNOQ & LNHAA.

3.5. GNAP management

To IGF/FFS and CDD Team: thought more relevant to let you describe the current situation regarding the recent decision from ANAC to not allow mushroom exploration in the core area and how GNAP will take it forward



3.6. Conclusion: The lack of legal structure for NTFP in Mozambique

As pointed in MICAIA report, the 'governance arrangement'⁵ of NTFP and its regulation is composed by several fragments of legislation and practices and is crossed by formalities and informalities. The regulations related to NTFP vary from one country to another and in general expresses inconsistency, as observed in the Mozambican context.

It is important to notice that the Mozambican law recognize the right of communities to benefit from natural resources including harvesting NTFP products by the communities and highlight the relevance of the customary governance based on local community leaders. Although, the Land Law and others regulations provide for community involvement in managing, preserving, conserving and using natural resources on the land they occupy, there is no guidance on how these functions should be performed for the case of NTFP.

As pointed by Micaia, the NTFP in Mozambique are not "covered by any formal regulatory governance arrangement [...]" and "the regulatory governance established under the law has had to date little impact on NTFP"⁶.

As described in Micaia's report, the lack of regulations and the void of legal structure in Mozambique open the space for different types of arrangements. As there is no existing formal marketing of local mushroom species we can assume that the GNAP works forward for formalization of dry mushroom commercialization, if market secured, which will require some flexibility, innovation and close dialogue with authorities.

4_ Mushroom market study

4.1. Overview of the market: supply, demand and general organisation

For the market study, inquiries were conducted in the local markets in Nampula and Zambézia province (Gilé, Alto Molócue, Mocuba and Quelimane), but also in Maputo even though it was not part of the TOR of this study, it did appear along the consultancy the pertinence to assess market potential in the capital.

4.1.1. Local and provincial market

Category of products and availability

Inquiries have been conducted in main cities of Zambézia province and in Nampula. We identify 3 kind of product available on the market: fresh, dry and canned mushrooms (table 3). While fresh

⁵ Micaia Reflections 3 Report, 2019. Implications of baobab value chain development for land and natural resource rights and governance. Micaia Foundation.

⁶ Micaia Reflections 3 Report, 2019. Implications of baobab value chain development for land and natural resource rights and governance. Micaia Foundation.



and dry mushroom are available on village and urban markets, canned mushrooms are only available in supermarket in major cities (such as Nampula). There is also a marginal offer of imported fresh mushroom in Nampula's supermarkets.

As indicated in the figure 3, fresh mushrooms are mainly available on local markets from December to March/April but supply highly depends on climatic conditions. Dry mushrooms supply is concentrated between February and March but market supply can also be possible from January if rains have been good in December. Canned mushrooms are available all year along.

Table 3 - Type of mushroom available, main outlets and supply calendar.

Products	Outlets	Calendar
Fresh mushroom	village markets, urban markets and supermarkets (imported)	highest offer usually from December to March/Abril but highly depending on climatic conditions
Dry mushroom	Village markets and urban markets	highest offer between February and March, possibly in January
Canned mushroom (white mushroom)	Supermarkets	available all year long Included in the market study as it is the main product bought by hotels and restaurants.

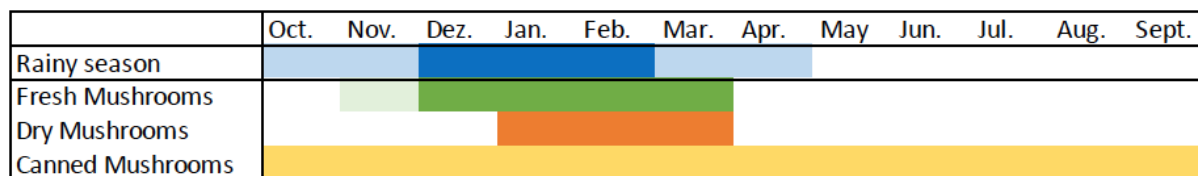


Figure 3 - Mushroom availability at provincial level over a year

Supply organisation

Urban market supply for fresh and dry mushroom is organised around 3 categories of actors: pickers, wholesalers and retailers (figure 4). Wholesalers play a key role, aggregating the fresh mushroom picked in the morning by women and transporting them to larger markets, such as in Nampula. Retailers are responsible for the final offer to consumers, organizing the product by type, size and color. The quality is managed by the retailers, mushrooms are usually sold in small amount (up to 350g), and large mushrooms like Othepo are sold per unit. Alto Molocuè and its surroundings is an important place of mushroom picking and, due to its strategic position (paved road), fresh and dry mushrooms found in Nampula's markets come for a significant part from this area.

A shorter supply chain was observed in places such as Alto Molocuè where many women pickers sell directly their harvest on the local market. This is mostly due to the proximity of forests in comparison to others cities.

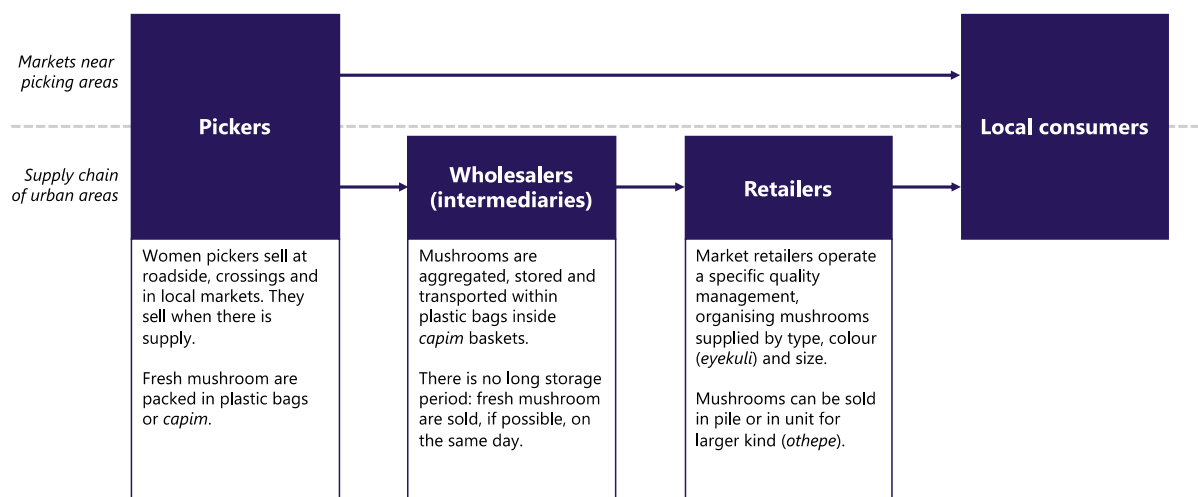


Figure 4 -Fresh mushroom supply chain organisation in Zambezia and Nampula provinces (the same organisation is observed for dry mushroom)

Demand

Local consumers. Market supply is seasonal and irregular due to the nature of the product (picked and depend of weather conditions). Consumers' purchases on local markets tend consequently to be opportunistic and, although market surveys were not exhaustive, we are inclined to think that local demand, for fresh mushrooms, especially in urban markets, tends to be higher than supply during the mushroom season, providing the good quality of the product offered. Dry mushrooms are less sought after, due to the quality of the product available.

Restaurants and hotels. These consumers orientate their purchases towards canned mushroom, as they are available all year long, product quality is standardized and fits their most common use (*i.e* ingredient for pizza). Restaurants that consume larger quantities of canned mushrooms buy from Terra Mar, a wholesaler that supplies hotels and restaurants. Their current weekly canned mushroom consumption was estimated between 1,5 to 5 kg/week (see Annex 5 - Weekly consumption of canned mushrooms of hotels and restaurants that have shown interest in dried local mushrooms), equivalent to a global demand of 15 kg/week for Quelimane and Nampula cities together. Interviews indicated that these actors are interested in local dry mushroom, if certain quality standards are present.



Prices comparison

Table 4 - Summary of mushroom market study in Zambezia, Nampula.

Mushrooms	MZN/kg		
Fresh	min	max	average
Nampula	138	165	151,5
Alto Molocuè	100	150	125
Quelimane	125	150	137,5
Gilé			
Dry	min	max	average
Nampula	150	300	225
Alto Molocuè	50	100	75
Quelimane			
Gilé	100	150	125

Canned mushroom prices are presented in Annex 6 – Mushroom prices in Zambezia and Nampula.

4.1.2. Mushroom Market study in Maputo

Products availability and price survey

During our survey in Maputo, we found the following price range for mushroom:

Table 5 - Summary of mushroom market study in Maputo

Mushrooms	MZN/kg	MZN/kg
	min	max
Canned	340	500
Fresh (white mushroom)	150	150
Dry	270	7200

The table in Annex 7 – Mushroom prices in Maputo gives more detail about these prices collected on the consumer market in Maputo.

Market prospection and culinary tests

Nitidae has shared samples of Khaduve (*Lactifluus edulis*) and Ehi (*Russula Cellulata*) species from the first pilot test conducted in February 2020 to conduct the two culinary tests.



The first test has been realized directly by Nitidae with Mme Teresa Gomes, a professional Chief manager of the Blue Café, a restaurant in Maputo, Mme Gomes confirm the quality of the product as well as its culinary interest and her interests to buy it if available.

A second meeting was organized with Mozambique Good Trade⁷ to present dry mushroom samples, after conduction of a second culinary test with Mr Jonas Belden, chief and mushroom specialist. He confirmed the culinary interests of Gilé mushroom species. Below are some key points about Mozambique Good Trade emphasizing the particular interests the project could have to work with such a partner:

- Branding based on local products: Its branding is based on the Mozambican origin, healthy products and related to conservation efforts (distributors of Gorongoza and Micaia foundation products). This is totally aligned with GNAP products including potential fair trade or organic certification. Moreover, Mozambique Good Trade presents a strong interest regarding local dry mushrooms supply as retail demand is increasing.
- Distribution: Mozambique Good Trade is a distributor and will prospect itself the market for fresh, dry and further processed (such as prepared powder for sauce etc..) product in Maputo for individual consumers or hotels and restauration, meaning that it can possibly represent important volume and could possibly spare many efforts of market prospection to GNAP.
- Quality management and packaging: Mushroom should arrive dry and well protected, meaning that we can focus efforts on the ground to select the cheapest/easy hermetic packaging without considering consumers' criterion. Mozambique Good Trade will ensure a quality control and packaging as appropriate. Mozambique Good Trade is interested to sell it dry and raw but also to develop transformed secondary products for distribution directly to consumers or to hotel and restaurants.
- Logistic: Mozambique Good Trade already has a logistic solution to supply products from Nampula or Quelimane to Maputo (paid per kg).

Further considerations about this potential partnership are presented in paragraph 6.

4.2. Market study key findings

- ✓ Local consumers prefer fresh to dry mushroom.
- ✓ At provincial level, dry mushrooms are only sold at cheap prices on local markets and are usually of poor quality (boiled, impurities, etc...). Alto Molocue is an important supplier of dry mushrooms to other markets such as Nampula.
- ✓ In Zambezia and Nampula, professional end users (hotels and restaurants) relies on supermarket supply or a wholesaler specialized in imported goods. Canned mushrooms are available all year long and limit risks linked the quality of product, contrary to the local market supply where quality may vary. More precisely:

⁷ <https://web.facebook.com/mozgoodtrade>



- In Alto Molocue and Mocuba, restaurants and hotels did not share any interests in buying local fresh or dry mushrooms.
- In Nampula, and Quelimane, some hotels and restaurant express interest for fresh or dry local mushrooms and asked for samples.
- In Maputo, the professionals interviewed (restaurant and retailer) confirmed interests and are waiting for next steps.

5 Cost analysis of mushroom processing with improved solar dryer

5.1. Assessment methodology

In order to assess the potential market for the dried mushroom on improved solar dryer we followed the steps above:

- 1) Key variables: yearly output of improved solar dryer, man-day necessary for picking and processing
- 2) Materials cost assessment, based on material amortization
- 3) Cost price per kg assessment, including a daily wage for workers
 - a. based on local daily wage (*ganho-ganho*)
 - b. based on minimum national wage
- 4) Comparison of estimated cost price and current market prices

5.2. Key variables: yearly output and total man-day

- *Yearly output*

In order to model cost prices and potential profit margin, hypotheses were made on the yearly output of dried mushroom.

In full capacity, a unit with 14 drying racks can process up to 100 kg per month. Above that quantity, it would require more drying racks (see drying rack use model in annex 8). We also considered that the processing unit would be able to work in full capacity during 6 weeks and in half capacity during another 6 weeks (see table 4). According to these hypotheses, about 225 kg of fresh mushroom can be processed in a year. The total yearly output per processing unit would be 20,25 kg of dry mushroom per year (dry/fresh ratio has been estimated at 9% during experiments).

Table 6 - Periods of full and half processing capacity, according to mushroom availability

Months	D	D	D	J	J	J	J	F	F	F	F	M	M	M	
Weeks	3	4	5	1	2	3	4	1	2	3	4	1	2	3	Total
Picking capacity (kg, fresh mushroom)		25				150					50				255
Processed mushroom		2,25				13,5					4,5				20,25



(kg, dry mushroom)

- *Total man-day*

Field enquiries and observations indicated that 3 persons working during 3 days are necessary to achieve 25 kg of fresh mushroom processed per week, meaning a total of 9 man-days per week to reach full capacity. We extrapolated that 2,5 persons during 3 days will be necessary per week outside full capacity period⁸, equivalent to 7,5 man-days when in half capacity. Considering the calendar above (see yearly output), we estimate the total necessary workforce to be 99 man-days in a year.

This workforce calculation includes picking and processing activities. Marketing activities have not been considered.

5.3. Materials cost assessment

We defined a list of materials necessary from the standard processing steps (table 5, as described in the mid-term report of June 2020). Their unitary cost and lifetime are available in table 6. We estimated materials cost for processing (referred afterwards as material costs) through their yearly amortization, that is to say the potential savings that needs to be done in order to reinvest in the materials when out of use. This approach does not consider the first material investment done by the GNAP that is necessary to launch the processing activity.

Table 7 - Standard processing steps.

Steps	1. Cleaning	2. Slicing	3. Drying	4. Packing
Description	Brushing and rubbing smoothly the fresh mushroom	Cutting them in 5mm thick slices	Sun drying 3 days on grates.	Dried mushroom stored in airtight plastic or glass containers

Table 8 - Material costs, considered in yearly amortization (= savings to be done in order to replace the existing material considering its lifetime).

Picking	Unit price (MZN)	Quantity	Lifetime	Cost per year (MZN/year)
Basket (<i>cesto de capim</i>)	100	3	2	150
Knife	3	10	2	12
Pen	15	3	0,5	90
Total				252

⁸ During half capacity period, picking (half a day) will require the same amount of workforce than in full capacity period but for a lesser harvest. 2 persons will be enough during the other half of the day for processing the harvested mushroom.



Furniture	Unit price (MZN)	Quantity	Lifetime	Cost per year (MZN/year)
Bench	200	4	5	160
Table	1000	1	5	200
Closet	2460	1	5	492
Total				852

Dryer (14 clays)	Unit price (MZN)	Quantity	Lifetime	Cost per year (MZN/year)
Wood*	2800**	1	5	560
Nails	120	0,5 kg	5	12
Undulated metal sheet	400	8,6 m2	5	690
Green plastic grid	100	8,8 m2	2,5	352
Construction labour	1000	1	5	200
Total				1814

Packing	Unit price (MZN)	Quantity	Lifetime	Cost per year (MZN/year)
Basin	50	5	2	125
Balance	1500	1	6	250
Sealer	1200	1	5	240
Plastic bag	15	20,25	1	304
Total				919

Consumables	Unit price (MZN)	Quantity	Lifetime	Cost per year (MZN/year)
Sponge	10	4	1	40
Soap	10	24	1	240
Total				280

Grand total (MZN/year)	4177
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* 14 racks at 200 MZN per rack

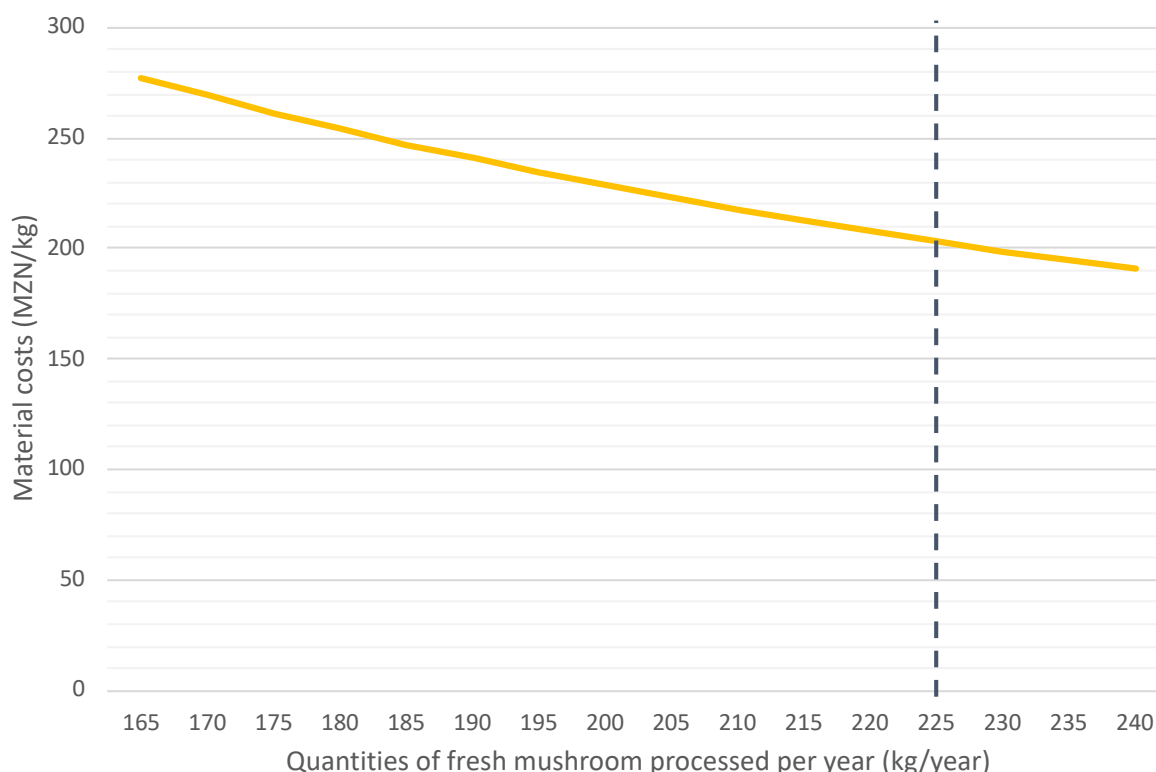
** To CDD Team : wood still constitute a very important costs, important to investigate cheapest options if possible. Nitidae can suggest some contacts

We estimate the total material cost for production to be close to 4 177 MZN/year. Considering the output of 20,25 kg/year, the material cost for processing is about 205 MZN/kg of dry mushroom produced by the standard method.

As there are few consumables in the process (except plastic bags for packing), the material costs are tightly linked to the output of drying unit: a decrease in productivity (*i.e.* less picking and lower final output) will lead to a quick increase of material costs per kg processed (see graphic 1).



Graph 1 - Material costs per kg processed according to the quantity of fresh mushroom processed via the improved solar dryer, in MZN/kg



5.4. Cost price of dry mushroom including a daily wage

The total of man-day necessary in a year of activity (without considering marketing activities) has been estimated to 99 man-days (see above).

In order to calculate a final cost price that includes a daily wage, we consider two options:

- Local daily rate (*ganho-ganho*): 100 MZN/day
- National official daily rate: 165 MZN/day

We modelled cost prices of final dry mushroom according to quantities of fresh mushroom processed in a year and labour daily rate⁹. Results are shown in graphic 2. For 225 kg of fresh mushroom processed a year (initial assumption), cost price of dry mushroom is 692 MZN/kg for a daily salary of 100 MZN and 1010 MZN/kg for a daily salary of 165 MZN.

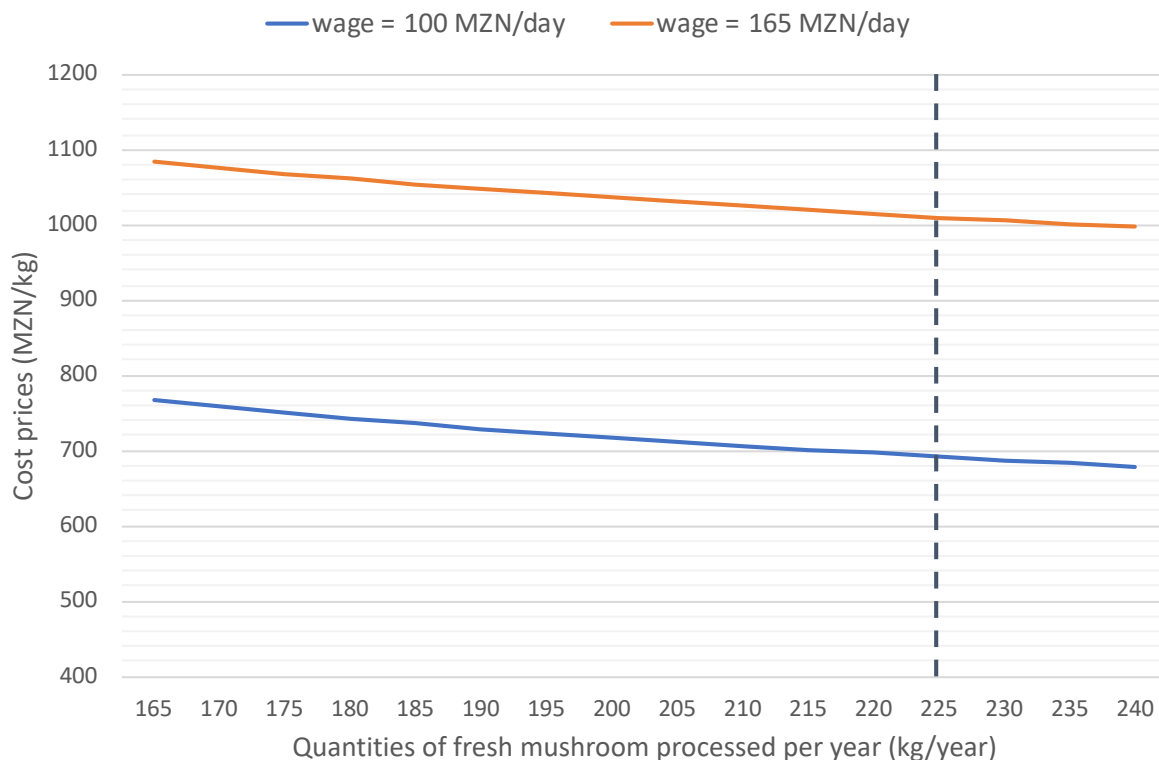
692 MZN/kg of dry mushroom (for a total annual output of 20,25 kg) should be considered as the floor price. Below this price, the daily wage for picking and processing will be lower than local and

⁹ For this model, we considered that a lesser quantity of fresh mushroom to be processed will cause a decrease of total man-day (less workforce needed). This relationship between workforce needed and fresh mushroom to be processed has been modelled linearly (see Annex 9 - Calculation of total man-day necessary according to the total quantities of fresh mushroom processed (based on linear regression)).



accessible daily salary as rented labour, which can make the mushroom processing activities less economically attractive than other rented labour activities though opportunities are quite scarce around the PNAG.

Graph 2 - Cost prices of dry mushroom (material costs + labour costs) according to the quantities of fresh mushroom processed per year and the labour daily rate, in MZN/kg



5.5. Estimated cost price and current market prices

As shown in table 7, the estimated cost price of dry mushrooms from improved drier is well above the current market prices at the local and provincial level but remains lower than imported and higher quality dry mushroom found in supermarkets of Maputo. This observation strongly suggests that a niche market, aiming at consumers aiming for higher-quality products, will be more suitable for the dry mushroom produced from improved solar drier.

Table 9 - Comparison of cost price to dry mushroom prices.

Location	Product	Price (MZN/kg)
Alto Molocu�	Local dry mushroom	50-100
Gil�	Local dry mushroom	100-150
Nampula	Local dry mushroom	150-300
Maputo	Imported dry mushroom	270-1300*



Gilé/ improved drier process	Estimated cost price with ganho-ganho daily wage	560-565
Gilé/ improved drier process	Estimated cost price with minimum daily wage	825-830

*To note that in Maputo we found dry mushroom up to 7200 MZN /kg, but this specie, *Boletus edulis*, is really famous and we should be cautious about considering that Gilé mushrooms have the same culinary value. Nevertheless, Chinese dry mushroom Shiitake are sold around 1300 MZN/kg, and it can be considered that Gilé mushroom have the same or more culinary value (see paragraph 4.1.2).

5.6. Discussion about the limits and hypotheses of the cost price analysis

Key variables and model limits

It is important to point out several potential limitations of this exercise. The estimated cost price of our dry mushroom depends on several hypotheses:

- **Man-day:** labour is the most import cost in this model (around 80% of the price if 270 kg of fresh mushroom processed by year). The total man-day has been calculated based on a few field observations. Though we think this model is quite accurate, we encourage a closer survey to refine the assumptions of total man-day necessary for picking and processing
- **Material costs:** material costs have been estimated based on prototypes. They account to a lesser extent for the final cost but a finer monitoring and a revision of these costs during the 2020/2021 campaign will help to get a more precise view on costs.
- **Quantities processed per year:** a monitoring of the quantities processed during the 2020/2021 campaign is necessary to this the real potential output of an improved solar dryer, giving the local conditions (women availability for the activity, weather conditions).
- **Product differentiation:** in this model, we consider all type of mushroom similar, with a homogeneous price. This might not be true, as final users might prefer specific kinds and others types of mushroom might have less appeal for consumers. This could lead to a price differentiation, according to available supply and consumers demand.

No first material investment considered

The material cost is based on amortization, meaning that the first investments in picking, processing and storage material were not included in the model.

Mushroom sales at the processing unit premise

The cost price analysis was calculated based on dry mushroom sales at the women organisation premises, which means that no marketing and transport costs have been included in the final cost



price (see table 8 for estimated transport costs). This model hypothesis has strong implication, namely that buyers will manage the transport of the product to their facilities or that an intermediary, such as a trader or the GNAP, will work between the processors and the final buyers.

Table 10 - Estimation of transport costs for dry mushroom from Gilé.

Transport	Unit price (MZN)	Quantity	Transport price (MZN/kg)
Parcel Gilé to Nampula	60	10 kg	6
Parcel Gilé to Maputo			30

6 Strategic recommendations for Mushroom value chain roadmap

6.1. Market strategy: targeting a high-quality market

Fresh mushroom market: several important constraints

There is a potential market for fresh mushroom, especially in urban markets. Nevertheless, several difficulties and constraints emerged from this business:

- **Fresh product, quality management and logistic:** the main market for fresh mushroom is Nampula, which is far from Gilé. On the other hand, Fresh mushrooms have a short shelf life and should be send in a day to the retailers or other final consumers. This requires a really good management of the logistic, such as a good partnership with a transporter and timely mushroom picking and preparation to fit the available transport schedule.
- **Client relationship management:** women have, for most, no existing commercial relationship with potential buyers in Nampula and limited experience in such negotiations. Time and building experience will be needed to develop such skills.
- **Working capital:** with increasing quantities of fresh mushroom sent per week, transport costs can reach quite a high level and processors' organisations will have to have and manage a significant working capital so that to pursue this kind of commercial activity.

For the time being, we thus don't consider feasible this activity. **Therefore, all the recommendations below support the development of the dry mushroom value chain in the Gilé National Park buffer zone.**

Dry mushroom market: existing potential if niche market targeted

Regarding the potentiality of marketing dry mushroom, decisions should be done according the following observations:



- The current consumers of local dry mushrooms get them at a very cheap price on local markets with very low-quality expectations. We can assume that these same consumers would certainly be eager to access better quality product but their willingness to pay or their financial capacity to pay for higher quality product is regarded as quite to very low (lower in urban market than village markets) and not matching the cost price estimated in the previous section (see 5.4).
- We also recognise that, at this stage, it is hard to assess middle class consumers' interests for higher grade local dry mushroom, as there is no local dry mushroom of good quality available in urban markets. In Maputo dry European and Chinese mushrooms are available, nevertheless they are only sells in few shops and the marketed volume seems quite limited.
- There is a solid interest for higher grade dry local mushroom from hotels and restaurants in Nampula, Quelimane and Maputo, as well as from enterprises such as MozGoodTrade in Maputo.

We therefore recommend the GNAP to focus its strategy towards the development of the dry mushroom production and marketing, providing the main target is high value end market, such as hotels, high end restaurants or specialized retailers. This target presents the challenge to meet quality requirements of final buyers but the potential buying prices on such markets match the estimated cost price of the small-scale production from the improved solar dryer.

Practical recommendations regarding dry mushroom outlets

we identified 2 market opportunities:

1. High-end hotels and restaurants in Quelimane and Nampula: even if their consumption is limited and is not expected to grow it could still represent an interesting market depending on the share of canned mushrooms that they could substitute with dry local mushroom and new mushroom usage they can have. The next step with these stakeholders is to provide them samples to confirm their potential interest.
2. MozGoodTrade: as presented in paragraph 4.1.2, Mozambique Good Trade is a retailer company based in Maputo. Further discussions should take place so that to confirm the first volume with which the women group and the GNAP could engage with Mozambique Good Trade for market linkage. This said **Mozambique Good Trade confirm its strong interest for Gilé dry mushroom and offered to Nitidae and GNAP to partner for a first commercialization test during the next 20/21 mushroom season, as pointed above a more detailed market study is a crucial step to confirm potential volume and consumer's interests for this new niche market product. Nitidae firmly back this proposal and is highly interested to continue facilitating linkage between women groups, GNAP and Mozambique Good Trade to pursue development of the value chain.**

The paragraph 6.2 (below) detailed further practical implications for the GNAP strategy to work on the ground to ensure the production and market linkage.



6.2. Scale up approach based on priority area, advanced women groups and partnership with potential buyers

Focus on more advanced groups, set and meet the quality standards

Targeting high quality market and niche food market present the challenge to ensure a good product quality but presents the interest for the GNAP to develop a realistic step by step strategy on the field.

We recommend first to work with the most advanced women group (4-5 groups maximum). By more advanced, we mean women groups that present 1) the best capacities to meet quality requirements and the recommended best practices and 2) are able to ensure supply the volume necessary to secure the identified market opportunities.

Mushroom is a very sensitive product and buyers could be cautious to try little known local species. It is therefore central to create a strong confidence about the product quality. The topic of product quality covers two aspects:

- Harmlessness of the product: final consumers should have the guarantee that the product is safe to consume. The type of dry mushrooms sold is well defined (based on local knowledge) and the process from picking to packaging ensures no potential health problem if consumed.
- Organoleptic quality of the product: the drying and packaging process guarantees that the flavour and aroma of the mushroom is preserved and that different processed batches will have the same organoleptic qualities. This last observation lays down the issue of product homogeneity, meaning that, if mixing of different types of mushroom is done, the ratio between the different types needs to be more or less the same.

Women groups must be aware of these questions and we think a good approach on this subject would be to work closely with Mozambique Good Trade in order to define the quality standards.

Mozambique Good Trade is not a final consumer and is concerned to develop the best product quality in order to meet final demand. Hotels and restaurants will hope for a finish product and we can expect a low implication on their side to get involved with women groups to set quality standards. We list below the topics on quality for which Mozambique Good Trade will be a good interlocutor:

- Management of the type of mushroom: should mushroom be sold mixed or separated?
- Best practices for packaging: what kind of package to use? How to properly do the packaging for wholesale?
- Best practices for processing: while best practices are already set and disseminated with the DPO's technical assistance activities, discussions with MozGoodTrade could lead to see opportunities to improve the drying process so as to get the best product quality (drying time and conditions for instance).

This potential implication of MozGoodTrade strengthens our leaning towards a first collaboration with this company in order to set the first stages of the value chain development.



Promote best practices to other processing groups

If successful with the pilot women group, the work done could be scale up in a second phase with additional women groups to market bigger volumes.

If we recommend to focus first the commercial strategy on high quality niche market, we don't underestimate the benefit to promote the same best practices that ensure the preservation of the full **nutritive potential** of dry mushroom.

Therefore, even if the GNAP should focus work on some specific pilot group of women for commercialization in a first phase, the GNAP should also promote the same best practices to all the established women groups at CGRNs because of their nutritive benefits.

6.3. Dry mushroom marketing

6.3.1. Marketing strategy

Regarding the marketing strategy, we think that the development of the value chain should first aim at bulk sales for partner such as MozGood Trade, meaning that most of the retail management (final packaging) will be let to the trade partner. This offers the advantage of a lesser focus on cost intensive retail packaging activities, at the beginning of the marketing activity.

Retail sales demand that the packaging fits consumers' expectations: clean packages with clear, informative and appealing labels. This said, the retail package must be adapted to possibilities in Gilé, meaning that sourcing labels in Nampula might not be a long-term solution for women (managing distance and commercial relationships with printers).

We however think it will be valuable to work on retail format during the first season, but for low volume. On this topic, hotels and restaurants can be could target and retail format, as samples of the product, can be a good way to interest them in the production, which could lead to bulk sales (meaning lesser volumes that for companies such as MozGood Trade but less work and investment on final packaging than for final non-professional consumers).

For a start, a good ratio between bulk sales and retail sales should around 80 to 90% of bulk sales of the total volumes produced during the 2020/2021 season.

6.3.2. Market linkage

The field technical assistance to set best practices and pilot activities is already an ongoing part of the DPO project. Next steps for the 2020/2021 season will be the actual commercialisation of the product and the recommendations in paragraph 6.1. and cost price model and considerations in section 5. raise the questions about the commercialization model.

The cost price model considers no trade costs. We did so as we consider that marketing management requires a set of skills and social capital (for market linkage) that might be missing in women groups:



- Potential buyers (Nampula, Quelimane, Maputo) are far, used to trade and, for some of them, part of another social class, which can create strong asymmetric situation in trade, averse to women's benefits,
- Managing the trade (keeping the business relationship, determining costs linked to the transaction, dealing with the negotiations, managing the logistic...) is a particular set of skills for which women must be trained and supported in a first place. Aiming at this particular market is not the same as the local spot marketing around the GNAP.

For these reasons, we first considered in the model that marketing can be done in bulk at the premises, meaning that potential buyers have to manage the logistic or a local trader do the link. A third possibility is the involvement of FFS/IGF and GNAP in the marketing, providing the missing link between women groups and the potential buyers. There is a risk of dependency for women groups with this setting, as women need to learn the trade but it is also a good support for the start while women are trained on marketing.

FFS/IGP can be involved for the first steps in the logistic and market linkage through the aggregation of the dry mushroom batches made by pilot women groups and the transport to Quelimane (or Nampula). This organisation could ensure in the first phase i) a quick product quality control at women's group level (already part of planned CDD work to ensure best practices) and ii) timely delivery of the product to interested buyers. Being a dry product, aggregation and transport to Quelimane could rely on the regular GNAP logistic which should not involve significant extra costs.

Moreover, GNAP involvement in commercialization of dry mushroom presents many interests to secure as much as possible market linkage, this is especially needed in the early development of the value chain to avoid any adverse impacts of unreliable third partners that could jeopardize efforts and activities conducted on the ground. It would open a window for the development of others products and constitute an important milestone regarding GNAP's community development strategy.

6.3.3. Branding and commercial licensing

Commercial licensing

As presented in *Regulations related to the Provincial Level*, the commercialization could be done under a "simplified licensing" for the Exercise of Economic Activities, approved by Decree No. 5/2012, of 7 march. It is key to establish a commercial structure able to integrate the potential large and progressively growing number of communities and women groups involved in the commercialization of mushrooms, therefore it seems appropriate to have the GNAP playing this central role for mushroom but also for potential others NTFPs as honey. Experiences of Gorongosa and Chimanimani National Park stress the interests of such approach to boost community development.

Creating a GNAP brand

GNAP involvement in commercialization ensure the control of a brand for GNAP products which is strategic to secure niche market opportunities. As presented MozGoodTrade is clearly interested by



this kind of products as already distributor of Gorongosa and Chimanimani National Park products. Also, GNAP participation could ease the development of fair trade of organic certifications schemes that could allow to access high rewarding market.

If Commercial licensing and branding are important considerations to keep in mind, they remain nevertheless secondary for the GNAP that should first of all secure a market and for this ensure production of dry mushroom that respond to quality criteria's during the 2020/2021 collection campaign.

6.3.4. Revenue management

It is key to ensure a transparent management of mushroom revenues and avoid any mistrust between the stakeholders. In the first phase, the GNAP involvement in the commercialization could avoid some possible risks associated to third party (transporters, middleman, delayed payment etc...) between women's group and final buyers that could prejudice GNAP's efforts on the ground. We also encourage to create rapidly a relationship between women groups and buyers so that to avoid this kind of misunderstandings. This linkage support is part of the women training discussed below.

6.3.5. Traceability

The current organisation for marketing implies that dry mushroom will be collected from different processing groups. It is therefore important to a traceability system so that to trace back the origin of each batch of dry mushroom.

The traceability system does need to be complicated. The following information will suffice for its efficiency: a) women group name, b) type of mushroom, c) date of picking and d) date of packaging/sealing.

Names and phone contacts could be a plus as it provides a more personal identity to the product.

6.3.6. Women training and support

Women training on marketing should be planned. These trainings should cover two topics: a) material amortization and trading costs and material amortization and b) transaction and negotiation modalities management

Training on processing costs, trading costs, labour costs

In order to manage the marketing activities, women should be able to master the costs linked to their processing and trading activities.

Processing costs. The women should know the costs linked to processing material (section 5.) and be supported to adopt a revenue management strategy to amortize and reinvest in this material. This also points out the question of sourcing (for the tools not readily available around the GNAP), costs linked to this sourcing and linkage to get it.



Trading costs. They have not been covered in this report but transport, intermediaries' fees, travel expenses, phones costs should be covered with women groups so that they integrate these costs in their business model.

Trainings on this topic should be planned with the women group.

Adding labour costs consideration, working on these costs enables women to establish what could be their minimum prices, a staple on which negotiations with buyers could take place. Enabling women to determine their cost price should be the ultimate goal of these training session.

Trainings on transaction management

During the first phase, we think the GNAP should take care of the linkage between women groups and buyers but the final objective should be made autonomous women on the trading activities. For this, women should be trained on transaction and negotiation modalities, which encompass the following subjects:

- Agreeing with the buyers on the quality specifications of the product (product and packaging). This will set the marker for price discussion.
- Agreeing on price (seller' argumentation should be based on cost price but also volumes - bulk sales prices can have a small discount)
- Where does the transaction take place? Who pay for transport costs?
- What are the payment modalities? Payment at reception by the buyer, when delivered to the transporter? What delay before payment? How to proceed: mobile money?
- If damages or losses, who take the costs?

All these points of discussion are crucial to set clear modality of transactions and build trust through transparencies (if each party respect its commitments).

Facilitate negotiations

In relationship with the transport activity, the project should, at the beginning, work on the stakeholders' linkage and facilitate and moderate the negotiations, according to the transaction modalities described above.

6.4. Supporting the development of mushroom value chain by and for women

As experienced by Micaia in their work to develop a baobab fruit value chain, when an activity traditionally realized by women turns economically profitable, men do usually try to take a role, usually as representative or negotiators with buyers, and a part of the benefits.

In GNAP Buffer zone, mushroom collection is only done by women, the GNAP should therefore resolutely decide to support the development of a dry mushroom value chain only by and for the benefits of women only.

Such a choice would require awareness campaigns for community leaders by the CDD team and it seems fair to preserve women's interests.



7 Conclusion

The main objective of the consultancy was to structure a business plan for the mushroom commercialization and market linkage at provincial and/or national scale to strengthen a realistic strategy considering different scenarios and the existing legal framework in Mozambique, for the development of a mushroom value chain around the Gilé National Park.

In addition to this Final Report, Nitidae previously produced and submit to FFS / IGF the following documents:

- Nitidae' Mid Term mushroom progress report;
- Comments on the "GNR mushroom roadmap" report;
- Comments on the "mushroom best practices guide" to be submitted by IGF to ANAC
- Pedagogic materials on "mushroom collection and processing best practices"

In summary, the main results delivered along the consultancy are:

- Realization of efficient pilot test of low-technology and relatively cheap solar dryer's easily used by women and
- Elaboration of a set of pedagogic materials on good collection and processing practices to be used by the CDD team.
- A list of options for equipment's and materials and costs for mushroom processing;
- Strategies and innovations for collection and processing the mushroom to meet quality criteria's, including methods such as dry cleaning of mushroom, drying in grates and slicing the fresh mushrooms.
- An analyse of the NTFPs legal framework in Mozambique.
- A clear marketing strategy focused on dry mushroom for high value end market such as hotels, high end restaurants or specialized retailers. This target presents the challenge to meet quality requirements of final buyers but the potential buying prices on such markets match the estimated cost price of the small-scale production from the improved solar dryer and wage for women's.
- Contact of potentials buyers or specialized retailers that confirmed a strong interest on Gilé dry mushroom that has to be confirmed along the 2020/2021 mushroom collection campaign.
- Strategic recommendations for FFS/IGF and CDD team for a scale up approach to ensure successful work on the ground work to secured identified market options.
- Improvement of Mushrooms species knowledge for the Gilé National Park and Mozambique.
- Proposition of a data collection methodology and system using ODK to assess sustainable thresholds of mushroom collection in GNAP buffer zone.

As a general recommendation for further work, sustainability of the value chain and protection of the Park would be assured if mushrooms were grown instead of picked. Indeed, a growing and well channelled interest on mushroom could be an asset to promote conservation of forested areas in



the buffer zone. For this, further research shall be engaged / based on the knowledge from other species, i.e. shiitake, oyster mushrooms...that are already applied elsewhere in Africa with proven results.



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9_Annex

9.1. Annex 1 – Contact meetings

Date: 16/03/2020

City: Quelimane

Direcção Provincial da Terra, Ambiente e Desenvolvimento Rural da Zambézia:

Meeting: Director Sr. Marcos and Chefe do Departamento das Áreas Protegidas Sr. Domingos Valia.

Contacts: dominicovalia61@gmail.com Phones: +258 84 02 02 230, +258 82 73 83 760, +258 87 02 02 230

Main topics:

- Presentation of Activities related to DPO project: Sustainable use of Non-Timber Forest Products (NFTP) in Gile National Park.
- Legislation related to NFTP;
- Legal framework for commercialization of perishable products;

Date: 17/03/2020

City: Quelimane

Direcção Provincial da Indústria e Comércio

Meeting: Chefe do Departamento de Comercialização Sr. Anastácio

Contact: +258 84 64 90 947

Main topics:

- Legal framework for commercialization of perishable products
- Decreto 39/ 2017 de 28 de julho (Simplificação de procedimento)
- Decreto 34/2013 de 2 de agosto (Exportação e venda de produtos)
- Legislação âmbito processamento:
- Decreto 22/2014 de 18 de março (Regulamento)
- 1º Alvara 2º Certificação 3º Comércio



9.2. Annex 2 - Requirement for the licenses to the Provincial level

The requirement for the licenses is listed below:

REQUISITOS PARA OBTENÇÃO DA LICENÇA SIMPLIFICADA {Decreto 39/2017 de 28 de julho}

1. Formulário preenchido;
2. Certidão de registo de entidade legal ou cópia da publicação do estatuto da sociedade comercial no Boletim da Republica;
3. Prova de qualidade de requerente, tratando-se de pessoas colectivas;
4. NUIT do requerente e se for uma sociedade também o NUIT da sociedade
5. Licença Ambiental para as atividades de categoria C (atividade que perigam a saúde e o ambiente)

Taxas: Pedido de licenciamento: 2,234,00 MT

REQUISITOS PARA OBTENÇÃO DE ÁLVARÁ COMERCIAL {Decreto 34/2013 de 2 de agosto}

(Exercício de comércio a grosso e/ou de comércio a retalho e/ou de prestação de serviço)

1. Formulário preenchido;
2. Certidão integral de registro de entidade legal ou cópia da publicação do estatuto da sociedade comercial no Boletim da Republica;
3. NUIT do requerente e se for uma sociedade também o NUIT da Sociedade
4. Procuração conferindo poderes do assinante se este não for designado na certidão de registro como administrado ou representante autorizado;

Taxas:

Pedido de licenciamento: 4,468,00 MT

Vistoria e/ou averbamento: 2,234,00 MT

9.3. Annex 3 - Decrees

Decreto 34/2013 de 2 de agosto: - Aprova o Regulamento de Licenciamento de Actividade Comercial	ARTIGO 2 (objeto)	Licenciamento do exercício das atividades de comércio a grosso, comércio a retalho e prestação de serviço de acordo com as subclasses da Classificação das Actividades Economicas – CAE em Moçambique
	ARTIGO 3 (âmbito de aplicação)	Aplica-se a: a. Empresas e empresário comerciais que operam no território nacional; b. Representações comerciais estrangeiras que operam no território nacional
	ARTIGO 8 (Vistoria)	1. A instrução dos processos para o licenciamento de atividade comercial que envolva produtos alimentares, matérias primas, componentes e



		<p>produtos de origem química, biológica que apresentem algum risco potencial à vida, saúde e ao meio ambiente, inclui realização de vistoria para a avaliação da conformidade do pedido com os interesses superiores de segurança, higiene e saúde públicas.</p> <p>2. A vistoria é realizada por uma comissão que integra representantes da autoridade licenciadora que a preside [...]</p> <p>3. [...] disponibilizar ao presidente da comissão de vistoria uma peça desenhada com o traçado das instalações</p>
Decreto 39/2017 de 28 de julho: - Aprova o Regime Jurídico Simplificado do Licenciamento para o Exercício de Actividades Economicas que compreende a Licença Simplificada e a Certidão da Mera Comunicação Prévia	ARTIGO 2 (objeto)	<p>1. [...] tem por objeto o estabelecimento do regime da licença simplificada e da certidão da mera comunicação prévia das atividades econômicas que pela sua natureza, não acarretam impactos negativos para o ambiente, saúde pública [...]</p> <p>2. Categoria C de Avaliação do Impacto Ambiental.</p>
	ARTIGO 3 (âmbito)	Aplica-se a pessoas singulares ou colectivas que pretendam exercer atividade econômica no território nacional
	ARTIGO 7 (impacto ambiental)	<p>1. O exercício das atividades econômicas abrangidas pelo presente Regime Jurídico em regra não se sujeita a Avaliação de Impacto Ambiental.</p> <p>2. Sujeitam-se a Avaliação de Impacto Ambiental na Categoria C (CAE)</p>
ACTIVIDADES CAE – Decreto 39/2017 de 8 de julho de 2017	4721 Classe e subclasse	Comercio a retalho de produtos alimentares, incluindo produtos enlatados, pão, leite e seus derivados, produtos frescos, incluindo frutas e legumes, hortaliças, batatas, tomate, cebola, peixe, mariscos carne e seus derivados, em estabelecimentos especializados.
Decreto 22/2014 de 18 de março: - Aprova o Regulamento do Licenciamento da Actividade Industrial. - Considera-se atividade industrial nos termos do artigo 3 do presente regulamento, as atividades produtivas constantes da Classificação de Actividades Economicas (CAE) em vigor: não consta cogumelos(fungos) e mel (produto de origem animal)	ARTIGO 2 (objeto)	O presente regulamento tem por objeto fixar as condições e procedimentos para o licenciamento e exercício de atividades industriais, sem descurar a salvaguarda da proteção de pessoas, bens e do meio ambiente
	ARTIGO 9 (competências)	A autorização para a instalação de Estabelecimentos Industriais de média e pequena dimensão é da competência do Governador da Província onde se pretende instalar o estabelecimento industrial.
	ARTIGO 11 (pedido de instalação)	Licença ambiental ou Declaração de isenção emitida pela entidade que superintende a área do ambiente;



	ARTIGO 13 (isenção de aprovação de projeto industrial e de vistoria)	1. A instalação de Estabelecimentos industriais de media e pequena dimensão está isenta de aprovação do projeto industrial
	ARTIGO 24 (alvará)	

9.4. Annex 4 – Contacts INNOQ & LNHAA

INNOQ – National Institute for Standardization and Quality

Director Adjunto, Eng. Geraldo Albasini

Email: geraldoalbasini@yahoo.com

Contact: +258 84 597 4261 / +258 82 877 7250

Contact: Químico Armando Vilanculos (845713657).

LNHAA – National Food and Water Hygiene Laboratory

Directora Nivalda Bomba

Email: lnhaa@misau.gov.mz

Contacto: +258 214 62715



9.5. Annex 5 - Weekly consumption of canned mushrooms of hotels and restaurants that have shown interest in dried local mushrooms

City	Place	Demand kg/week
Nampula	Plaza Hotel	5 kg
Nampula	Sporting Restaurant	2 kg
Nampula	New Hotel	1,5 kg
Quelimane	Hotel Zambezia Vip	3 kg
Quelimane	Estacao Restaurante	3 kg

9.6. Annex 6 – Mushroom prices in Zambezia and Nampula

City	Shop/market	Type of mushrooms	Especie	Origin	Brand	Price to consumers -AVERAGE (MZN/kg)
Nampula	Local market: Warresta, Padaria, Central, Novo, Belenése	Fresh	Eyúkuli, Entchatxe, Namua, Othepo, Niphipini and Ehi.	Malema, Alto Molocue, Ribaue and on the roads that lead to Nampula.		208,14
Nampula	Local market: Warresta, Padaria, Central, Novo, Belenése	Dry	Mix of Mushrooms	Malema, Alto Molocue, Ribaue and on the roads that lead to Nampula.		225,00
Nampula	Shoprite	Canned	Cogumelos (Agaricus Bisporus)	Portugal	Gourmet	703,5
Nampula	Shoprite	Fresh	Portabellini Mushrooms	South Africa	Freshmark	676,00
Nampula	Shoprite	Fresh	Braai Mushrooms	South Africa	Freshmark	622,5
Quelimane	Recheio Cash n'carry LDA	Canned	Agaricus Bisportu	Portugal	Ferbar	903,23
Quelimane	Number one	Canned	Agaricus Bisportus	Portugal	Gourmet	448,72
Quelimane	Casa das Frutas	Canned	Agaricus Bisporus	Portugal	Gourmet	504,17
Quelimane	Shoprite	Fresh	White Button	South Africa	Freshmark	596,00



Quelimane	Shoprite	Fresh	Portabellini	South Africa	Freshmark	716,00
Quelimane	Local market: Chabeco, Brandão, Sunlight	Fresh	EYUKULI, ENTCHATXE, NAMUTECO, EHÍ	Mopeia, Licuare, Namacura e Maleia; Cruzamento estrada para Maganja da costa		137,5
Alto Molócue	Local Market: sub-estação	Dry	Mix of mushrooms	Alto Molocue		75,00
Alto Molócue	Local Market: Central, 3 de fevereiro, Pista Velha	Fresh	ENTCHATXE, EYUKULI, NIPIPINE	Alto Molocue		125,00

NB: On the local markets, mushrooms are sell by volume and not based on the weight, prices have been extrapolated from weighted samples.

9.7. Annex 7 – Mushroom prices in Maputo

<u>Shop/market</u>	<u>Type of mushrooms</u>	<u>Especie</u>	<u>Origin</u>	<u>Price to consumers (MZN/kg)</u>
Terramar, Game, Supermercado Hilal, Supermercado Horizon Ivato, Divino, Shoprite	Canned	Agaricus Bisporus	Portugal	340 to 500
China City	Dry	Chinese mushroom	China	270
Shoprite	Fresh	Agaricus Bisporus	Portugal	150
Supermercado Lokal	Frozen	Agaricus Bisporus	South Africa	362
Supermercado Deli 968	Dry	Porcini	South Africa	7202
Supermercado Deli 968	Dry	Shiitake	China	1300



9.8. Annex 8 - Number of racks necessary per day according to the mushroom picking pace

During field test, the improved solar dryer has been designed with 14 drying racks. Production costs has been calculated based on the 14 racks model.

Case 1 - Mushroom picking days spaced out ideally (1 picking every 3 days)											max rack used per day
	day1	day2	day3	day4	day5	day6	day7	day8	day9	day10	
	14	7	4				14	7	4		
				14	7	4				14	
Total rack used	14	7	4	14	7	4	14	7	4	14	14

Case 2 - 3 picking days ideally spaced out on 7 days (1 week)											
	day1	day2	day3	day4	day5	day6	day7	day8	day9	day10	
	14	7	4			14	7	4		14	
			14	7	4			14	7	4	
Total rack used	14	7	18	7	4	14	7	18	7	18	18

Case 3 - Worst case scenario: 3 picking days in a row											
	day1	day2	day3	day4	day5	day6	day7	day8	day9	day10	
	14	7	4			14	7	4			
		14	7	4				14	7	4	
			14	7	4				14	7	
Total rack used	14	21	25	11	4	14	7	18	21	11	25

In blue, picking days; in green, peak use of racks

9.9. Annex 9 - Calculation of total man-day necessary according to the total quantities of fresh mushroom processed (based on linear regression)

fresh mushroom processed (kg)	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
man-day	55	59	62	66	70	73	77	81	84	88	92	95	99	103	106	110