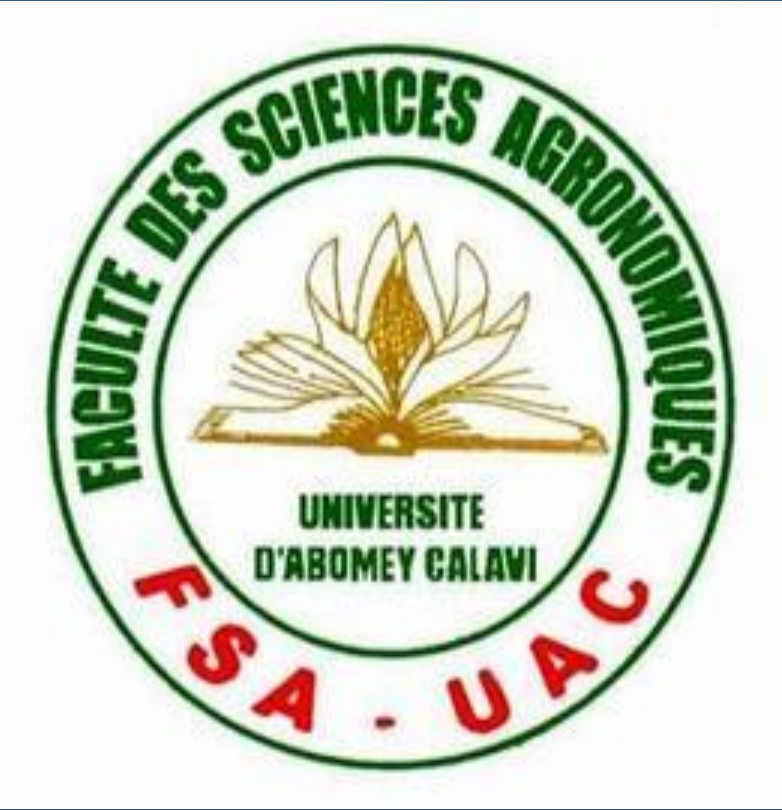




Eco-design of biodegradable food packaging from corn husk for local food packaging in Benin



Mahutondji Cédric AGBESSI¹; Schadrac D. AGOSSEVI¹; Pr. Thierry G. Godjo²; Pr. Joseph DOSSOU¹

¹Laboratory of Food Process Bioengineering, University of Abomey-Calavi

²National University of Sciences, Technologies, Engineering and Mathematics, Benin

Abstract



- Increasing development of industrial activities has led to a proliferation of various types of packaging used in the agri-food sector.
- A proliferation of plastic packaging in the world, mainly in the food industry which absorbs about 65% against about 35% for other sectors.
- The environmental and sanitary dangers induced by plastic packaging are constantly increasing and are proven by scientific studies.
- The government of Benin has adopted the Law N°2017-39 of December 26, 2017 on the prohibition of the production, import, export, marketing, possession, distribution and use of non-biodegradable plastic bags in the Republic of Benin.
- Considering the thousands of tons of agricultural and agro-industrial waste rich in fibers that are produced each year in Benin and that are neglected, our study aims to design a biodegradable food packaging from corn spathe.
- A field survey was conducted to study the availability of corn husk. The functional analysis method was implemented for the development and fabrication of packaging prototypes. Parameters such as opacity, strength, permeability, water absorption, tensile strength at break were the main characteristics evaluated.
- So, the physical, mechanical and economic parameters of the eco-designed packaging show that packaging is economically and technically profitable, contributing to the Sustainable Development Goals 8, 12, 13 and 15.

Objectives

General objective

Eco-design a biodegradable food packaging from corn husk for local food packaging in Benin.

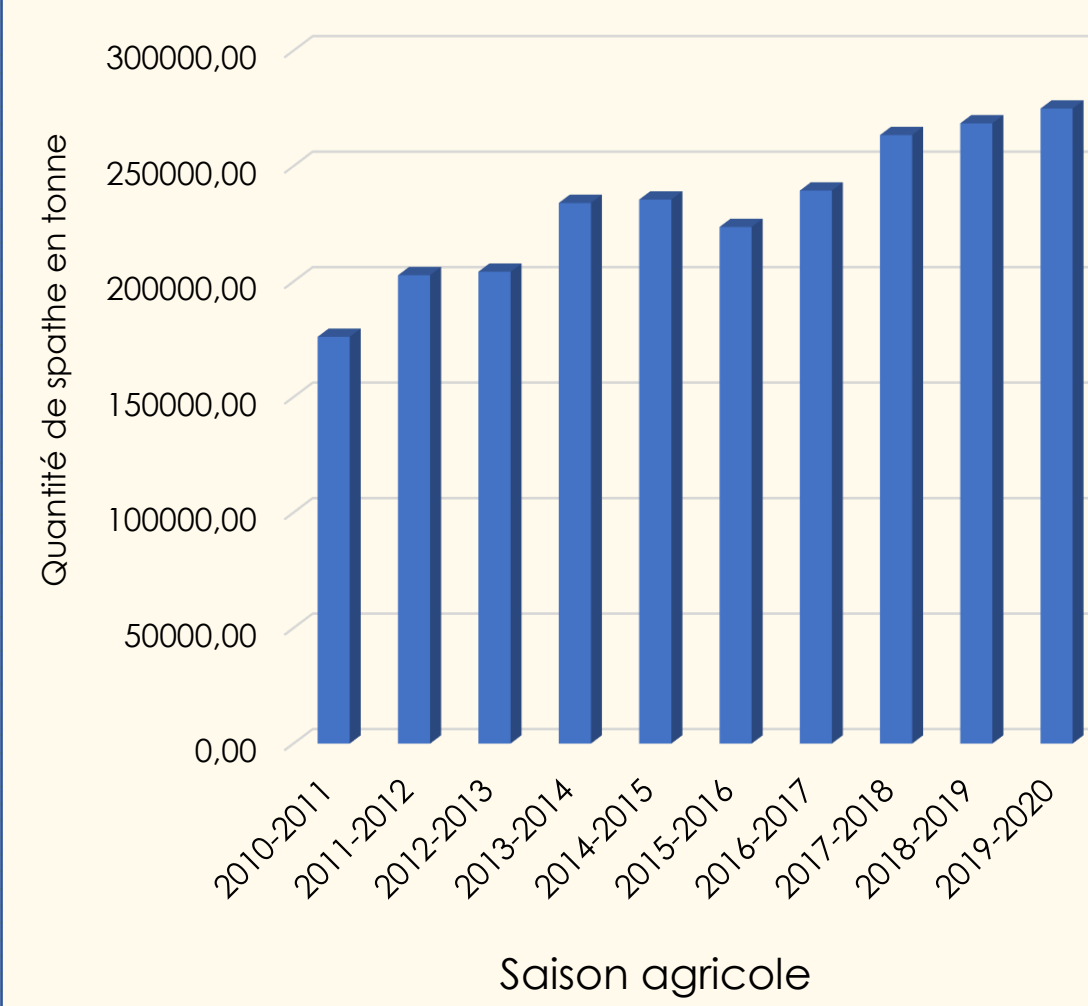
Specific objectives

In a specific way, it is about :

- OS1:** To carry out a diagnosis of the potential of available corn husk for the eco-design of biodegradable food packaging from agricultural residues.
- OS2:** To evaluate the physical/mechanical and sensory properties of the designed food packaging.
- OS3:** Perform the economic analysis of the designed food packaging.

Results

The average amount of corn husk available per year in Benin



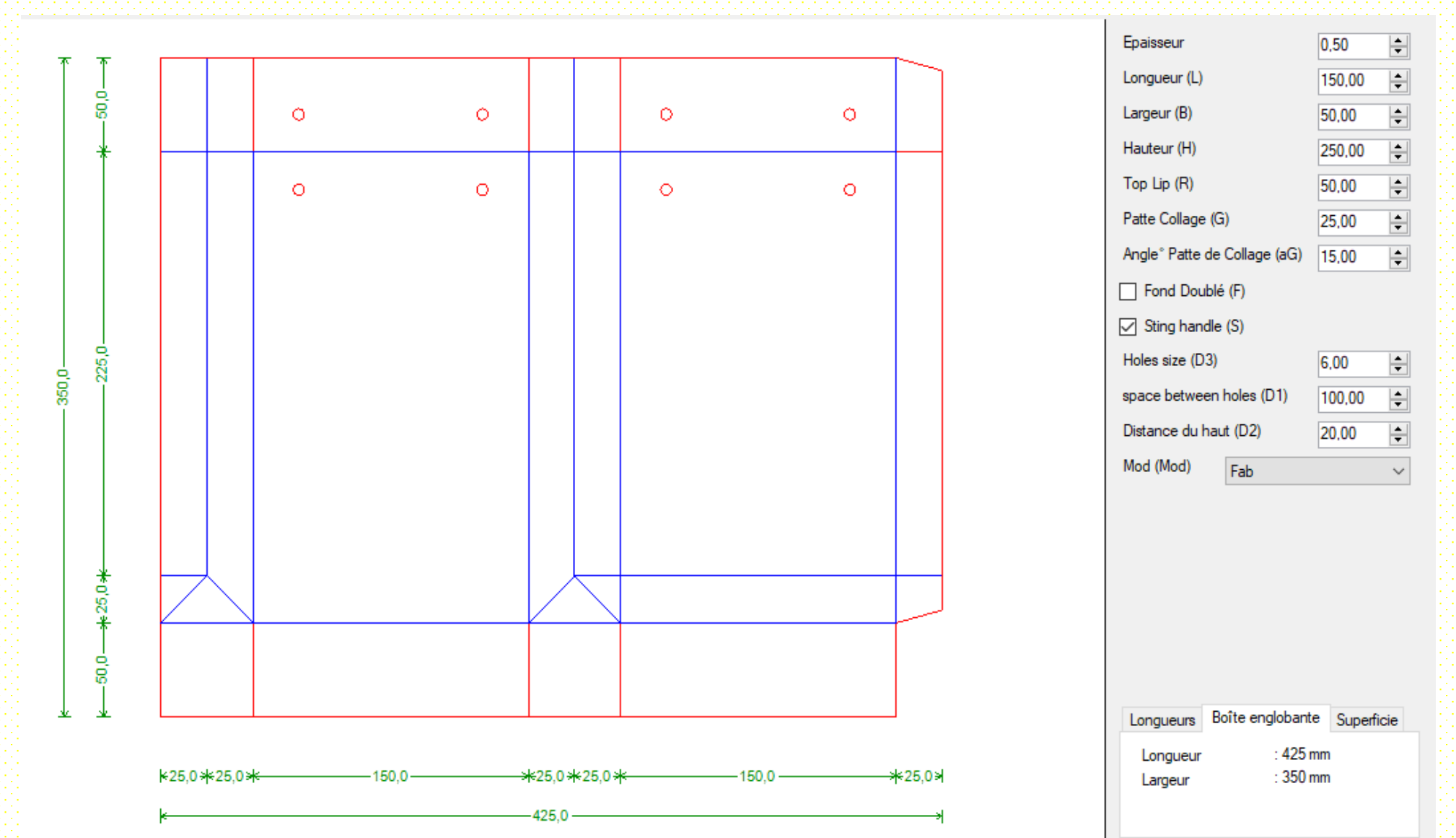
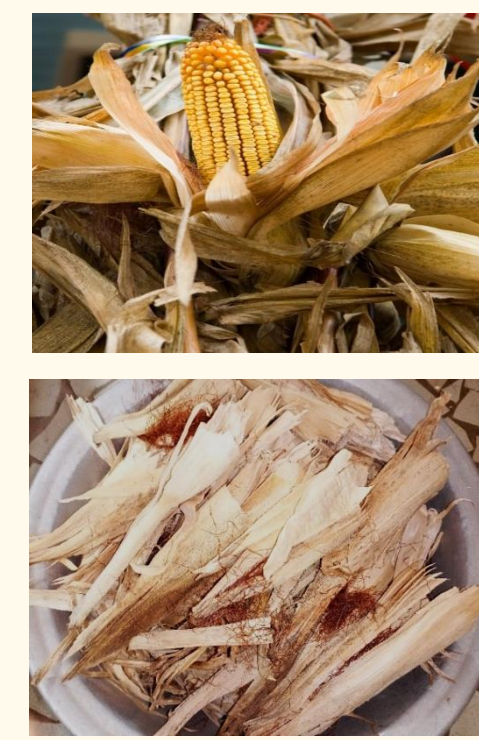
Physical-mechanical performance

- Opaque especially to ultraviolet rays (OP = **262,10 ± 1,71**);
- Grammage between **96 - 241 g/m²** with a breaking stress of **4,45 ± 0,35 Mpa**.
- Water absorption capacity of : **200 g/m²**.



Economic performance

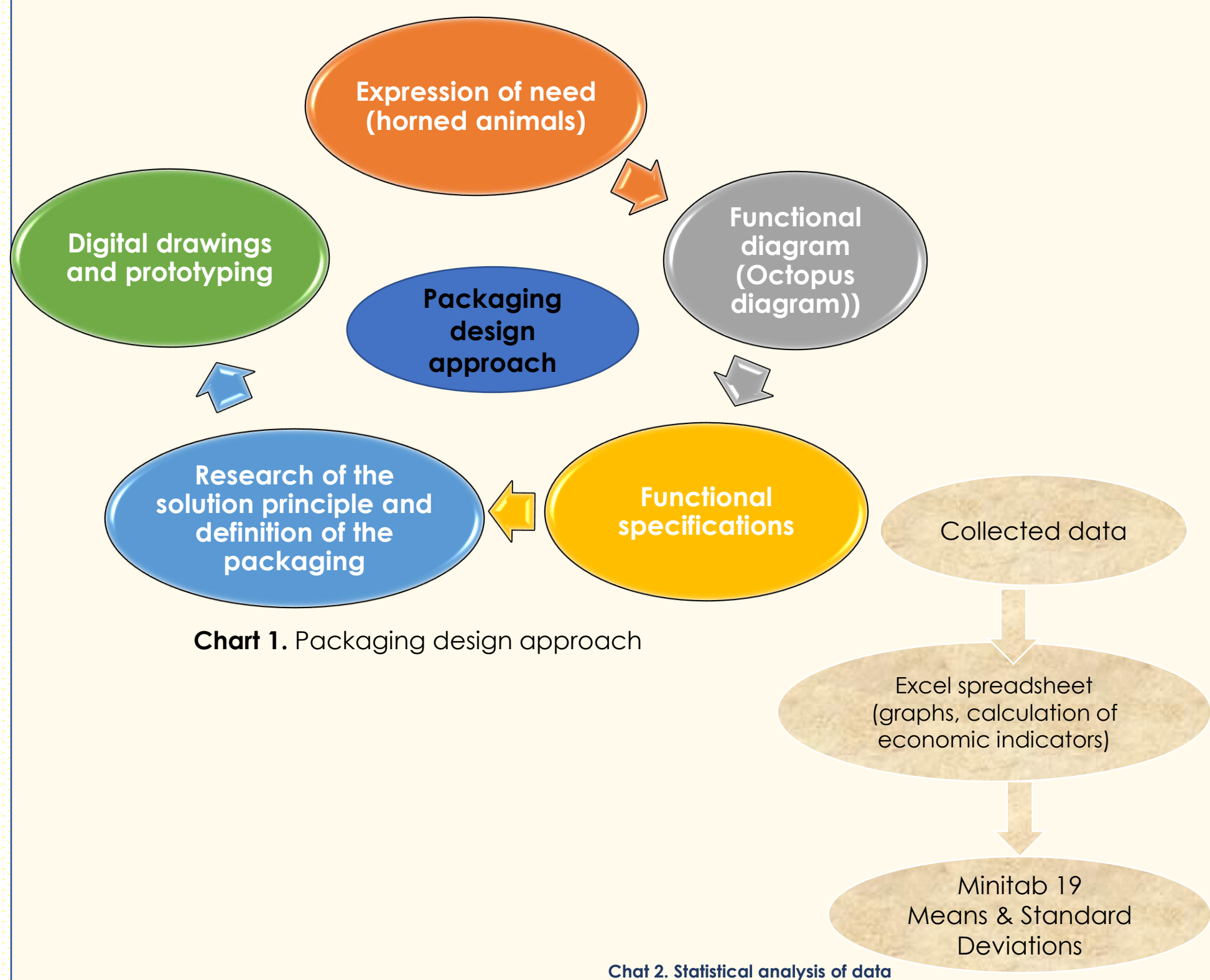
NPV = **6 672 160 FCFA** is positive for 5.3 tons of corn spathe valorized and the IRR is **31.13%**. The profitability index is **1.71**.



Materials and Methods

- Diagnostic study of corn husk availability: Field survey.
- Evaluation of parameters:

Parameters	Methods
Opacity	UV Method
grammage	Cobb's method
Tensile test	Physical method
Heat resistance	temperature measurement



SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS

- Improvement of the income of corn producers through a new source of income;
- Reduction of production costs for local companies and agribusinesses that now have access to lower cost packaging;
- Promotion of new businesses and female entrepreneurship;
- Creation and valorization of value chains;
- Preservation of the environment through the valorization of agricultural and agro-industrial waste;
- Participation in the mitigation of climate change through the reduction of the exploitation of forest species to produce paper and cardboard packaging;
- Offsetting CO₂ through forest conservation, limiting the CO₂ emitted during the combustion of corn spits and reducing the CO₂ emitted by the plastic packaging industries

CONCLUSION

- Study provides a solution to the problems of companies by making available to them the process of manufacturing biodegradable food packaging.
- Environmentally friendly packaging, easy to use, adapted to the local context and at an affordable price.

Contact



[AGBESSI Mahutondji Cédric]
[Laboratory of Bioengineering of Food Processes]
[Faculty of Agronomic Sciences]
[cedricagbessi@gmail.com]
[+22961191755/+22963887786]
<https://www.linkedin.com/in/mahutondji-c%C3%A9dric-agbessi-663a1512b/>

Tropentag 2022
September 14-16, 2022



Acknowledgments

