

**LOCALLY MANUFACTURED FOOD EQUIPMENTS AND THEIR IMPACT IN THE TECHNOLOGICAL DEVELOPMENT OF CAMEROON: CASE OF THE CITY OF MAROUA****Gilles Bernard NKOUAM*, Lionel KARGA TAPSIA, Carine Bertille TCHANKOU LEUDEU, César KAPSEU**

* Department of Refining and Petrochemistry, Faculty of Mines and Petroleum Industries, The University of Maroua, P.O.Box : 8 Kaele, Cameroon

Department of Mechanical and Electrical Engineering, Faculty of Mines and Petroleum Industries, The University of Maroua, P.O.Box: 8 Kaele, Cameroon

National Advanced Institute of Agronomy and Biotechnology, The University of Sciences and Technics of Masuku, P.O.Box: 941 Franceville, Gabon

Department of Process Engineering, National Advanced School of Agro-Industrial Industries, The University of Ngaoundere, P.O.Box : 455 Ngaoundere, Cameroon

DOI: 10.5281/zenodo.841198**KEYWORDS:** food equipment, local manufacturing, technological development, industries, Maroua, Cameroon.**ABSTRACT**

An analysis of the main food equipments manufactured in Maroua was carried out with the aim of highlighting their impact in the technological appropriation by the local populations and the industrial development of the city. Research carried out enabled the researcher to administer survey forms and to observe the design and realisation of the equipment models. Results indicate that the main equipments are mills for cereals (millet, sorghum, corn) and fruit, huskers, ginners (grains removers) and oil expellers. These equipments are mainly operated at the level of the village units. They suffer from low spread. The technological parameters of the dimensioning are not always controlled (capacity, temperature, input and output particle size), as well as the technical parameters (shape, materials used, maintenance). The scale of manufacture and the lack of innovation in the design of these equipments do not allow the installation of real “small industries”. This situation delays the technological development not only of the city and the region, but also of Cameroon because the Far-North region is a great supplier of agricultural products (cereals, tubers, vegetables, oilseeds, fruits) of economic importance.

INTRODUCTION

The Far North region is the northernmost region of the country, bordering Chad and Nigeria. It has a Sudano-Sahelian climate. The rainy season lasts from May to October and the annual rainfall is between 400 and 900 mm. The average rainfall is about 750 mm and rains are very irregular at the beginning and at the end of the season (Soutou, 2004). They are very stormy and of very short duration. The vegetation cover is made of savanna on large expanses of plains. The soil is predominantly sandy-clay gray. It is rich in minerals and contains little organic matter.

Agricultural products in the Far-North region are varied and diverse. There are cereals (corn, millet and sorghum), fruits and vegetables (tomato, watermelon, lemon and mango) and oilseeds (sheanut, kapok, mahogany, cotton and neem). Though seasonal, speculations can stimulate a genuine industrial development of the region in general and of the city of Maroua singularly. Indeed, it is known that the processing of agricultural products is a source of wealth creation. It is therefore paradoxical that the diversity of agricultural products does not lead to the establishment of industries in the region, even on a semi-industrial scale, as is the case in the southern regions of Cameroon. While it is understandable that imported processing equipments are not readily available, the impact of such locally manufactured equipment, which can also be industrially efficient, is questionable. Indeed, the design and construction of agro-food equipment must take into account technological and technical characteristics (Atienza, 2003; PSP Engineering, 2007; Agrinova and IRDA, 2013; Debongnie, 2013). To the best of our knowledge, no study on this subject has been carried out in Maroua. The aim of this work is to examine the impact of locally produced equipments on the technological appropriation by the local populations and the industrial development of the city of Maroua and its surroundings.

**METHODOLOGY**

A preliminary investigation has revealed the main local manufacturers of agro-food equipment in the city of Maroua and its surroundings. From these manufacturers, we have eliminated those whose main activity was to produce equipments for domestic use such as simple tomato and spice crushers for households. The reasons which have prevailed are the rate of use and the low quality of the equipments, as well as the low expertise of these manufacturers. The selected manufacturers were subjected to a questionnaire previously tested to highlight the ambiguities. The corrections were made to produce the final version which was to be used during the field expedition. The participatory approach was used during the surveys. A translator was available in anticipation of communication difficulties.

The questionnaire included general information about the respondent (age, gender, technical qualification and level of study, location), the main food equipment manufactured, processed agricultural products, the scale of manufacture, the applicants for such equipments, feedback on the equipments manufactured, parameters considered in the design and realization of the equipment models and constraints related to the development of this technological activity in the city of Maroua.

RESULTS AND DISCUSSION**The quality and the quantity of food equipment manufacturers**

Table 1 presents the main manufacturers of food equipments in the city of Maroua. They can be categorised into two broad categories. The first category consists of urban workshops and includes almost all manufacturers (Mbere Group, BIMERI and others who operate occasionally). The second category includes specialised centers, one example being the Maroua Technical Center. It should be noted that many other isolated manufacturers are found in the manufacture of "small equipments". Indeed, they manufacture only small electric shredders for domestic use (tomato and condiments shredders).

Table 1. Major equipment manufacturers in the city of Maroua and its surroundings

N°	Manufacturer	Head/function	Location/quarter
1	Technical Centre of Maroua College of Industrial Technical Education	BETCHE Lambert / Director	Douggoi towards the Senior Divisional office
2	MBERE Group	BIRWE Benoît	SODECOTON opposite FNE
3	BIMERI	BIMERI	Comice
4	Others who occasionally operate		Domayo, Djiguirwo and Douggoi

Manufactured food equipments

The manufactured food products are diverse and varied. There are grinders, threshing machine, cereal pulpers, huskers (peanuts, rice, beans and soybeans), sifting machines, kneaders (for yoghurt production) and expellers (oil extraction). Tractors were manufactured. However, this activity quickly ceased due to the absence of a market. Figures 1 to 4 give an idea of the equipments manufactured in the city of Maroua. The said equipments are prototypes because they are made from a card. Depending on the order, they can be motorised or electric, rolling or not. Orders for cassava rasps are increasingly scarce despite the non-negligible production of cassava in the Far-North region. This equipment covers the exploitation of the majority of agricultural and food sectors. They are essentially designed and carried out at the request of the village communities. However, some individuals are the takers. This situation explains why these equipments are exploited at Community level and suffers from a poor spread.

*Figure 1. Cereal grinder**Figure 2. Electric cereal grinder**Figure 3 : Press for oilseeds**Figure 4 : Groundnut shredder in*

The technological and mechanical parameters of the dimensioning

For the designing and realisation of different equipments, manufacturers take into consideration many parameters. With regard to technological parameters, table 2 presents some of the considered dimensioning factors. The table showed that characteristics such as performance, type of agricultural product, expected yield and processing system are taken into account. They are part of the specifications that the customer entrusts to the manufacturer. On the other hand, other parameters are neglected. These include the water content of the agricultural product which significantly influences the yield and quality of the final product, and the maintenance of the machine. In addition, the input particle size and the duration of the operation are not considered. The MBERE Group considers that for cereal grinders, sizes of the grains are not necessary. Only the final product is important. This could be understood by the fact that their technical qualification is much closer to vocational training or at most to the level of "Certificat d'Aptitude Professionnelle (CAP)". It emerged during the administration of the questionnaires that the future operators of these equipments are not trained or qualified. However, the empirical manipulation of equipments by unskilled operators and the lack or the non-use of the operating instructions can have a serious negative impact on the lifetime of these equipments (Godjo, 2007).

As for the technical parameters, table 3 presents some sizing characteristics of the equipments. Generally, it is observed that the quality of the material used for the manufacturing of the equipment is not rigorously chosen, depending on the price that the applicant is willing to pay for the work. The risk of material/product contamination is neglected because iron 4/10 (sheet steel) is generally used and a layer of paint is deposited on the outer part of the equipment. The form is not considered useful in the sense that builders, especially urban workshops (Mbere group), often take up existing prototypes without a critical eye and attribute to form a purely aesthetic role. The reproduction of the existing prototypes is not specific to Maroua, it was also noted in Benin by Godjo (2007) in the realisation of food equipments. It is however recognised that of the form of the equipment depend on the power system, maintenance and space occupation. The stability of this equipment is generally not taken into account when designing, manufacturing or fixing it to a support. However, this equipment emits vibrations during operation. If these vibrations are not damped, they cause damage to the assemblies of the equipment (for example loosening of the bolted elements) (Lalanne, 1999; Krodkiwski, 2008). It would be necessary to provide devices



for damping or reducing vibrations. However, the equipments can be motorised or not, mobile or fixed, and dimensions are controlled.

Table 2. Some technological characteristics of equipment sizing

Characteristics	Equipment				
	Crusher	Ginning Mill	Sheller	Pulper	Press
Performance (quantity/h)	x	x	x	x	x
Type of agricultural product	x	x	x	x	x
Maximum inlet particle size		x	x	x	
Maximum output particle size	x				
Product temperature					
Yields	x	x	x	x	x
Moisture content of products					
Quality of final products	x				
Grinding system (crushability) : Jaw crushers, cone, percussion (vertical or horizontal), hammers, cylinders	x		x		
Working time					

Table 3: Some technical characteristics of equipment size

Characteristics							
Device mobility	Form	Contamination material/product	Dimensions (length, width, height)	Electric, manual or fuel motor	Space occupancy	Material used	Appliance stability
x			x	x	x		

In general, the price paid by the applicants for the equipment conditions the performance and robustness of the equipments. The type of electric motor, the quality of the material and bearings depend on the price that the customer is willing to pay. If the price is low, the manufacturer will build corresponding equipments with lower quality materials.

CONCLUSION

The objective of this work was to evaluate the impact of the food equipments used in Maroua. It was carried out by conducting a survey of a few local manufacturers. It is clear that people are familiar with agricultural processing technologies but, this remains at the level of village communities. The manufacturers do not always take into account all the technological parameters, the specifications forget the physicochemical characteristics of the agricultural product to be treated and the equipment suffers from poor diffusion. The technical parameters are not all controlled and remain subject to the money available for the realization of the equipment. This situation undermines innovation and technological appropriation by the local populations. It should be noted that socio-cultural constraints, financing difficulties, market limitations (purchasers), inadequate accessory processing workshops (lathes, drills and milling machines) are constraints for builders. The availability of manufacturing materials (stainless steel), local industrial initiatives and advocacy for the local consumption of locally manufactured equipment will be incentives for the technological and industrial development of the city of Maroua.

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