

Original Research Article

 Effects of industrial paddy processing on local rice competitiveness in Benin

Abstract

Aims: This research aimed to assess the extent to which public investment in industrial paddy processing increases local rice competitiveness in Benin, and to discuss policy implications of the findings.

Study design: The study was conducted in the Glazoué district using the approach of comparing the outcome of a unique reference case (an industrial facility) with the average outcome of several cases of indigenous private mills.

Methodology: Based on interviews with 26 rice processing-and-trade women and 30 consumers, competitiveness of indigenous parboiled rice produced by the women via private mills, rice produced by state's paddy processing factory, and imported rice were compared. Competitive gains of the factory-processed rice over the indigenous one and vis-à-vis imported rice were assessed using quality index, market-gate cost price, and quality index/cost price ratio.

Results: Imported rice is more competitive than local rice. Nonetheless, the factory-processed rice is more competitive than the indigenous one. The factory reduces market-gate cost price of local rice by 19.1% and brings down its overall competitiveness gap vis-à-vis imported rice from 49.72% to 13.13%, i.e. a more than 4-fold increase in competitiveness.

Conclusion: Therefore, more public investment in such factories should be promoted, provided adequate market linkages are established.

Key words: competitiveness, imported rice, paddy-processing factory, private mills, local rice.

27 1. Introduction

28 1.1. Background, problem and objectives of the study

29 Accelerated agricultural development, food security and poverty reduction in Sub-Saharan
30 Africa (SSA) cannot be achieved without genuine policy interventions to increase farmers’
31 income and enable substantial gains in food value chains. One of the main causes of food
32 insecurity is post-harvest losses that occur along the chains and result in higher prices and
33 lost revenue which reduces real income for producers and consumers, especially the poor [1].
34 Therefore, improving post-harvest methods, especially processing techniques, to raise the
35 competitiveness and to increase market access of locally-produced food is a critical challenge
36 which countries in Sub-Sahara Africa, including Benin, must face [2]. Yet, progress achieved
37 since independence days is little, regarding the impact of agricultural policies on livelihoods
38 and food security of populations. An old debate is still evolving, as to whether governments
39 should invest in large estates and industrial factories, or should they promote small-to-
40 medium farms and enhance indigenous processing capacity through mechanical improvement
41 with small equipment [3]. Various mixes of choices have been attempted, depending on the
42 countries. In general very limited success is observed so far, although interesting policy
43 shifts are being observed in countries such as Ghana, Nigeria, and Ethiopia [4, 5, 6, 7].
44 Today, existing rice production capacities in Africa are low and can meet only 10% of
45 present demand and the continent therefore accounts for 1/3 of global rice imports and spends
46 about US \$1.5 billion annually on rice imports [8, 9].

47 The African rice sector paradox is pictured as follows: “It is ironic that in West Africa
48 – the rice belt of sub-Saharan Africa (SSA) – although 20 million farmers are engaged in rice
49 farming and about 100 million people depend on it directly for their livelihood, almost all the
50 cities of the region are flooded with imported rice of various labels, everything except local
51 rice... Why doesn’t local rice find its way to the local markets? ... Does the unavailability of

52 local rice in the market mean that imported rice is cheaper and local rice cannot compete with
 53 it?" [9]. These two questions among many raised by these authors, are core to the issue of
 54 local rice competitiveness investigated in this paper, with a focus on paddy processing.

55  Local rice's consumption in Benin represents only 10-15% of imports [10]. In order to
 56 revert that trend, the government is striving to boost paddy production and to promote
 57 processing activities with the view to improving local rice competitiveness compared to
 58 imported rice. Domestic paddy production increased at the rate of 5.8% per year, from 16 498
 59 metric tons (mt) in 1995 to 124 975 mt in 2010, as a result of average yield increase from
 60 1.71 to 2.66 mt/ha [11]. Yet, that production is still below the needs. Between 2005 and 2007
 61 about 60 000 mt were imported every year for domestic consumption [12].

62 Cost-effective paddy processing, rice quality and reliable market outlets are issues
 63 pending to be resolved in order to raise the competitiveness of locally-produced rice. That's
 64 why the rice sub-sector is one of the top priority food subsectors in Benin's strategic plan for
 65 boosting the agricultural sector (PSRSA), with the aim of accelerating poverty reduction and
 66 economic development. In that stream, the government installed in 2012 two modern paddy
 67 husking factories, one in Malanville in the upper north and one in Glazoué in the center of the
 68 country. This action is intended to provide an incentive to paddy farmers to produce more and
 69 sell the surplus at pre-negotiated prices, while enhancing quality and affordability of local
 70 rice for consumers in the domestic market and the sub-region. Presently paddy production in
 71 Glazoué is enough to supply the factory to its full running capacity. Yet the following
 72 question comes up: Does this policy intervention of public investment in industrial paddy
 73 processing increase local rice competitiveness in Benin?

74 This study addresses the issue of market access and competitiveness of local rice
 75 produced in Benin. It aims to assess the competitive gains of the modern paddy
 76 processing/husking factory installed in Glazoué compared to private mills that were already

operating in the area before the government's action. For that purpose, the competitiveness gap of local rice vis-à-vis imported rice is assessed for each type of processing facility. This means imported rice is taken as the referenceⁱ, and the study investigates whether the factory – which produces dry polished rice – enables a significant competitive gain over the indigenous system (women and existing private mills) – which produces parboiled polished rice.

The underlying development issue is to know if the Government has made a right decision by investing in the modern factory rather than promoting the multiplication of private millsⁱⁱ through technical and financial assistance to rural paddy processing cooperatives and entrepreneurs. Indeed, producing rice for local consumption or high quality rice for export may not always have the same relevance for rural communities, although both options would contribute to poverty reduction. The first option aims primarily to enhance food security whereas the second targets a substantial increase in farmers' income. The coexistence of both types of processing facilities may be justified if there is enough evidence that resources are economically used in either case. As far as competitiveness of local rice is concerned, which perspective and which indicators would be more relevant?

Development issues such as the effects of modern factory operations (paddy purchasing at guaranteed prices, application of quality grades and other contract specifications and market arrangements) on farmers' and private mill owners incomes, and the overall rural transformation (labor dynamics, competition outlays) in local rice value chains will not be addressed in this paper. Indeed, the above development issue – promoting modern factories vs. artisanal private mills – would involve more impact assessment variables (farmers' incomes, total added value and its distribution in the local rice value chain, community-level food security, etc.) than product competitiveness indicators. Considering that market is the driver of production and economic growth [13], the paper

102 analyzes competitiveness of local rice rather from the angle of sustained access to domestic
103 market where competition by various sorts of imported rice has become very tough [14].

104 Market-gate cost prices (i.e. production and marketing costs) and quality attributes are used
105 to derive simple competitiveness indicators, and compare local rice produced by each type of
106 processing facility to imported rice.

107 *1.2. Literature review*

108 The theoretical background of the study includes the relationships between trade,
109 industrialization, economic development and poverty reduction on the one hand, and the
110 implications of competitiveness for agricultural trade in Africa on the other hand. These
111 concepts and relationships are briefly reviewed in order to indicate how the study will
112 contribute to enhancing their understanding through empirical application.

113 *Trade, industrialization, economic development and poverty reduction*

114 Most countries in Sub-Saharan Africa (including Benin) are characterized by weak
115 economies and a growing poverty, in spite of their natural resource endowment. That
116 situation is due to low wealth creation capacities, including weak production, processing and
117 trade capacities. In particular agricultural trade, which is due to be a source of wealth and
118 autonomous growth for poverty alleviation [13], is still at its infancy and deals with raw or
119 crude farm products. Openness to trade is key to economic development, as it improves
120 people's living conditions [15, 16]. Trade enables developing countries to get access to
121 technologies that will help them to increase productivity, competitiveness and employment
122 opportunities, especially for the poor [13]. It is believed that the 6% annual growth in the
123 agricultural sector by 2015, recommended by the African Union (AU) to achieve the first
124 millennium development goal, will not be possible without accelerated industrialization,
125 especially modern processing of locally-produced crude farm products, and trade
126 mechanisms that promote quality standards to attract foreign exchangeⁱⁱⁱ. Trade will revert

127 wealth losses that occur through massive imports of basic goods that can be produced locally.

128 As illustrated in figure 1, a dedicated support of the industrial sector is required in developing

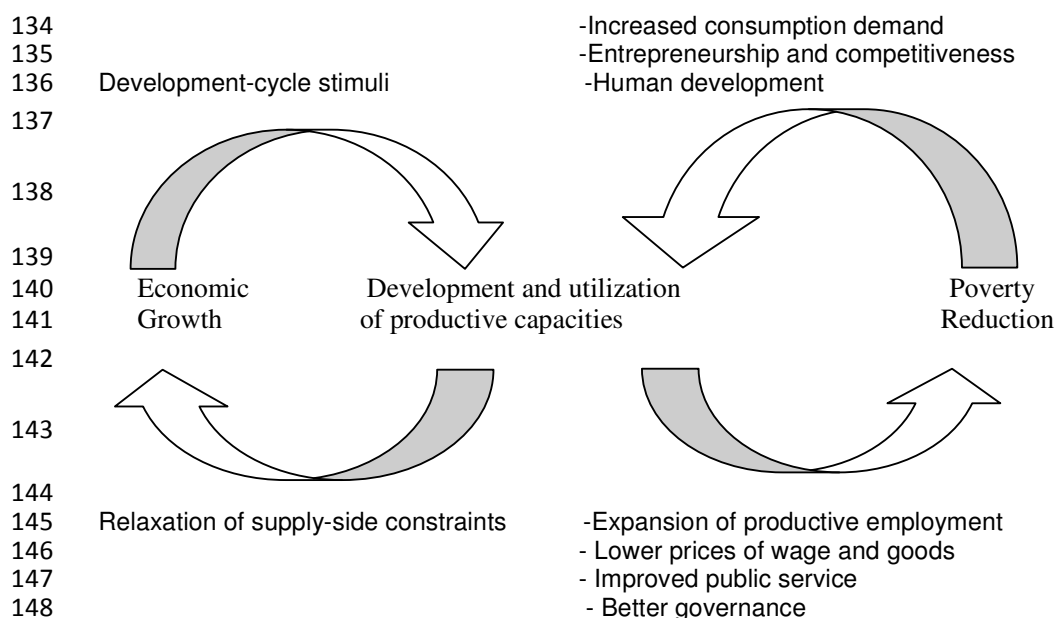
129 countries to improve trade and payment balances and boost economic growth [13].

130 Industrialization will contribute to reducing consumer prices of such goods and raise market

131 accessibility for the poor [17] (Grain de Sel, 2012). In Benin, the Agenda for Economic

132 Emergence called Benin Alafia 2025 put emphasis on the industrial push that is needed to

133 boost agricultural productivities and farmers' incomes.



150 Figure 1: Relationships between economic growth, productive capacities and poverty
151 reduction

152 Source: Hayashikawa (2008), reporting UNCTAD.

153

154 **Competitiveness**

155 Lachaal [18] provides a comprehensive economic literature review on

156 competitiveness, covering concepts, definitions and application. Competitiveness is the

157 capacity to provide goods and services at the time and place and in the form desired by

158 national and foreign buyers, and at prices equivalent to, or better than those of other

159 providers, while recovering at least the opportunity costs of resources used [19]. An industry
 160 is competitive when it has the capacity to make profit and keep a certain share in the
 161 domestic and/or international market [20]. Therefore, farmers and domestic firms will need to
 162 raise their competitiveness to meet the demand of mass consumption goods such as rice.
 163 However, competitiveness (of a nation, a sector or a firm) is dynamic and closely related to
 164 its economic conditions as well as to international market conditions. An entity will remain
 165 competitive as long as it can continuously adjust in response to forces and factors that
 166 determine its position or competitive advantage in a liberalized market [18]. Most of previous
 167 assessments of competitiveness addressed static cases and they vary largely in their level of
 168 analysis (international, national, sector/sub-sector, and firm level). At the international level,
 169 the main determinants of competitiveness include exchange rate, international market
 170 conditions, fares of international freight, and preferential arrangements between countries. At
 171 the national level, the determinants include resource endowments (human and natural
 172 resources), technology, product attributes or quality grades, economies of scale, trade policies
 173 and regulations [21, 18]. At that level, balance deficits and factors' productivity growth are
 174 used to assess competitiveness [22, 18].

175 At sector or industry level, production costs, factors' productivities, trade patterns are
 176 used for the same purpose, whereas market share and profit are the indicators frequently used
 177 at firm or micro-economic level [18].

178 A few previous studies assessed the competitiveness of locally-produced rice in
 179 Benin. A one-season paddy production and low market supply [23], weak mechanization of
 180 paddy production and processing with negative impacts on rice quality [24], and non-
 181 attractive quality/price ratio are the main factors that limit the competitiveness of local rice.
 182 Adégbola and Singbo [10] found that local rice will not be competitive until paddy yields are
 183 increased, post-harvest operations are improved and marketing strategies are developed.

184 Indeed, food prices are made  70% of post-harvest operations costs and only 12% of
185 production costs [25]. At a same quality grade, local rice in Benin is sold at prices 10-20%
186 higher than those of imported rice [23]. However, trade margins should have been removed
187 from those prices, in order to righteously compare market-gate cost prices of local rice with
188 import parity prices of imported rice. The market-gate cost price of a locally-produced good
189 includes its production and distribution costs at the specified market point/location. The
190 import parity price of a good purchased in a foreign country is its unit value at a given
191 location in the importing country if it would equally compete with the same good locally-
192 produced [26].

193 Previous competitiveness studies in Benin rarely used import parity prices in their
194 assessment. This paper attempted to fill that gap to enable a valid comparison between
195 imported rice and local rice. It also paid attention to several quality attributes that are relevant
196 to consumers in order to calculate quality grade values that would permit a valid comparison
197 of the two types of rice using the quality/price ratio, which is a key empirical indicator of
198 competitiveness.

199 **2. Materials and methods**

200 Assessment of the competitiveness of both types of local rice and of imported rice is
201 done using two main indicators: the market-gate cost price and the quality/cost price ratio. In
202 so doing, the study anticipates a broader research that would apprehend whether public
203 investment in the modern paddy husking factories was a right decision or not, especially in
204 Glazoué where an indigenous paddy-processing industry (women and private mills) existed
205 before.

206 ***2.1. Sampling and data collection methods***

207 A survey was done using structured questionnaires to conduct interviews with a
208 sample of 56 local rice value-chain actors, including 26 “indigenous paddy processors” in

209 Glazoué (center of the country) and 30 rice consumers in Glazoué (15) and Cotonou (15).
 210 The women process paddy using the indigenous parboiling technique, and sell parboiled rice
 211 after paddy is husked by private mills operators and cleaned.
 212 The 26 women paddy processors-and-traders were randomly chosen in 6 sub-districts,
 213 which were randomly selected from the 10 sub-districts that compose the district of Glazoué.
 214 They were selected on the basis of household random pointing or random draw from a list of
 215 household where paddy processors are known to extension agents as residents. The 30
 216 consumers were met and selected using a kind of “boule-de-neige” or snowball sampling
 217 method^{iv}. They were selected based on their knowledge of the three types of rice: local
 218 parboiled rice, factory-made local rice, and imported rice. A “yes” answer for the three types
 219 of rice, in terms of having heard about, qualifies a consumer for the survey. Then on the same
 220 basis a next consumer is selected and interviewed on the spot (or after an appointment), until
 221 the required number of interviewees is obtained and surveyed using the appropriate
 222 questionnaire. Consumers in Cotonou were included in the sample in order to capture the real
 223 influence of various sorts of rice available in the metropolitan city on their preferences for
 224 rice quality attributes.

225 Data used for calculating the market gate cost price were collected from interviews
 226 with the women/indigenous processors. They include: paddy purchasing price and costs of
 227 transportation, parboiling (and related works), taxes, etc. The factory also faces these costs,
 228 except those related to parboiling. On the other hand, the indigenous processors do not pay
 229 for packaging which are diffused in family labor whereas hired labor is paid by the factory to
 230 cater for that. Otherwise, indigenous parboiled rice is sold in bulk to city wholesalers who
 231 handle packaging themselves. Regarding the import parity price, data used include CIF price^v
 232 of imported rice, handling costs, taxes and port fees, and local transportation costs from port
 233 to the domestic selling point or market. They were collected from rice importing companies,

and trade facilitation organizations such as the national handling company (SOBEMAP) and the Customs Directorate in the Port. The import parity price was calculated for imported rice delivered in Glazoué market.

Data collected from consumers concern mainly their evaluation of the quality attributes of each type of rice, including physical and organoleptic characteristics of crude or cooked rice based on their tastes and preferences. There were 7 distinct attributes, including: cleanness, rate of broken rice, degree of whiteness, cooking speed^{vi}, boldness after cooking or water absorption ability at cooking^{vii}, taste/palatability, cohesion/grains' **gluing** or texture of cooked rice.

2.2. Method of data analysis

Cost-wise competitiveness is evaluated first, using service costs and product price data. A comparison is made between market-gate cost prices of rice locally-produced by each type of processing facility, and the import parity price of imported rice. The import parity price is also the cost price of the imported good delivered at the market point where the local one is sold. However, cost-wise competitiveness assessment is not enough. Indeed, one should consider at least the 'quality/price' ratio commonly used in marketing and public discourses for a more meaningful assessment of competitiveness^{viii}. Here, an empirical application is made of the concept of 'quality/price' ratio, using the 'quality index/cost price' ratio. Full price of final product (including production and distribution costs, and profits along the value chain) is not used because declared profits data are usually unreliable and would not be comparable between local actors operating informally and importers who are registered traders and are exposed to domestic taxes and uncertain foreign business environments.

Therefore, the following variables were calculated for the different types of rice: quality average scores and quality indexes for each type of rice; market-gate cost prices and

259 ‘quality index/market gate cost price’ ratio for locally-produced rice; import parity price at
 260 Glazoué market and ‘quality index/import parity price’ for imported rice. Primary survey data
 261 were codified and entered with Epi data 3.1 and processed with Excel and PASW statistics
 262 (SPSS 18.0).

263 The quality index was computed with the view to compare the three different types of
 264 rice over the above-mentioned 7 quality attributes and a range of quality grades. Therefore,
 265 consumers were requested to give points to each attribute using the scale 1 – 3. For example,
 266 the attribute ‘cleanness’ was assessed as follows: 1=not clean, 2=moderately clean, 3=very
 267 clean). A total score was then calculated for all the 7 attributes, paying well attention to
 268 reverse gradient attributes such as ‘rate of broken rice’ or ‘cohesion’ (too much gluing is not
 269 accepted). The quality average score (AS) is the weighted average of percentage of
 270 respondents (P_i), the weights being the declared quality grades (G_i). The quality index is the
 271 ratio: ‘average score (AS)/maximum score’, the maximum score being 50 (Table 1). This
 272 method of index calculation derives from the formula: Index = (Observed score – Minimum
 273 score)/(Maximum score – Minimum score) [27, 28]. In this research, the observed score is
 274 the calculated average score, and the minimum score is zero.

275 Table 1: Method of quality index (%) calculation for a given quality attribute Y of rice type X ^{1/}

Quality grade (G_i)	% of respondents (P_i)	Observed scores ($P_i G_i$)
Not good		
Moderately good		
Very good		
Total observed score ($\sum P_i G_i$)		
Average score (AS)	$AS = \frac{\sum_{i=1}^3 P_i G_i}{\sum_{i=1}^3 G_i}$	
Quality index (%) =	$100 * AS / 50 = 2AS$	

100*Average score/Maximum score^{2/}	
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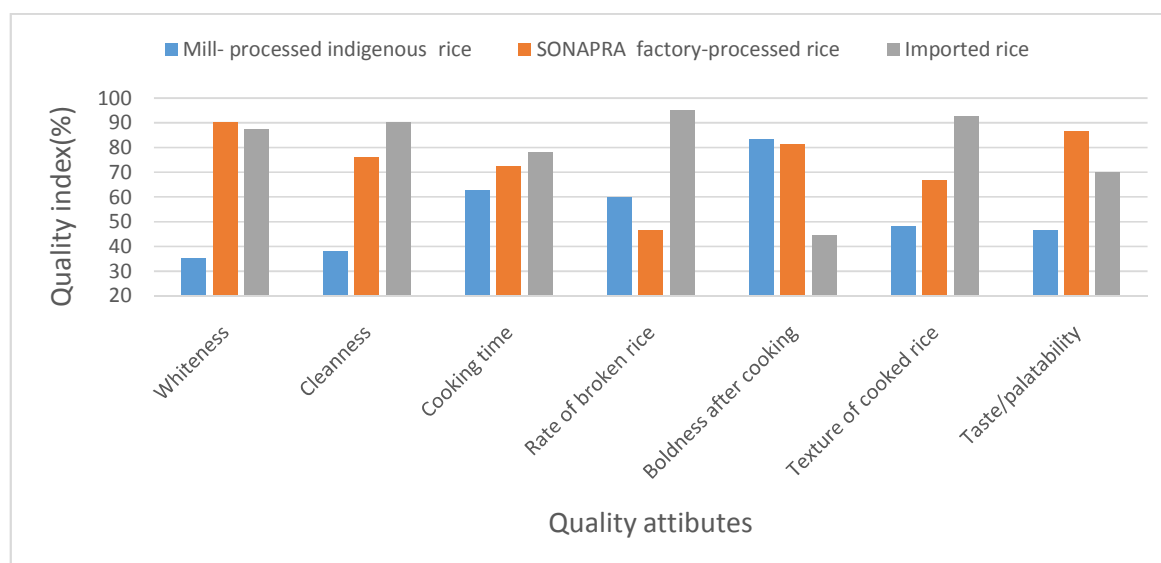
1/ X = private mill-processed indigenous parboiled rice, factory-processed white rice, imported rice; Y = any of the following attribute : cleanness, rate of broken rice, degree of whiteness, cooking speed, boldness after cooking or water absorption ability at cooking, taste/palatability, cohesion/grains' gluing or texture of cooked rice. Blank cells are data filling zones.

2/ Maximum score is: (maximum percentage of respondents*maximum quality grade)/sum of grades = 100*3/6 = 50.

3. Results and discussion

3.1. Quality-wise competitiveness

The quality assessment survey revealed that rice consumers usually prefer clean and white color rice, with low rate of broken rice. They would also like to eat delicious rice i.e. with very good taste/palatability, and with high water absorption ability at cooking or **boldness** after cooking. A short cooking time is also desired, as it allows time and energy saving. Figure 2 summarizes the findings in terms of quality index comparison between rice types by quality attribute.



294 **Figure 2: Comparison of the three types of rice for quality index by quality attributes**

295

296 It appears that the factory-processed rice (SONAPRA rice) overtakes the private mill-
 297 processed indigenous parboiled rice regarding whiteness and cleanness which are highly
 298 valued by consumers for the choice of crude/non-cooked rice. Likewise, the SONAPRA rice
 299 overtakes the indigenous parboiled rice for taste/palatability and texture of cooked rice which
 300 are key for the choice of cooked rice by consumers. On the contrary, the indigenous parboiled
 301 rice is better than the SONAPRA rice regarding the 'broken rice ratio' attribute. Finally over
 302 the 7 quality attributes, the average quality index was 74.2%, 53.2%, and 79.6% respectively
 303 for SONAPRA white rice, indigenous parboiled rice and imported rice (Table 2).

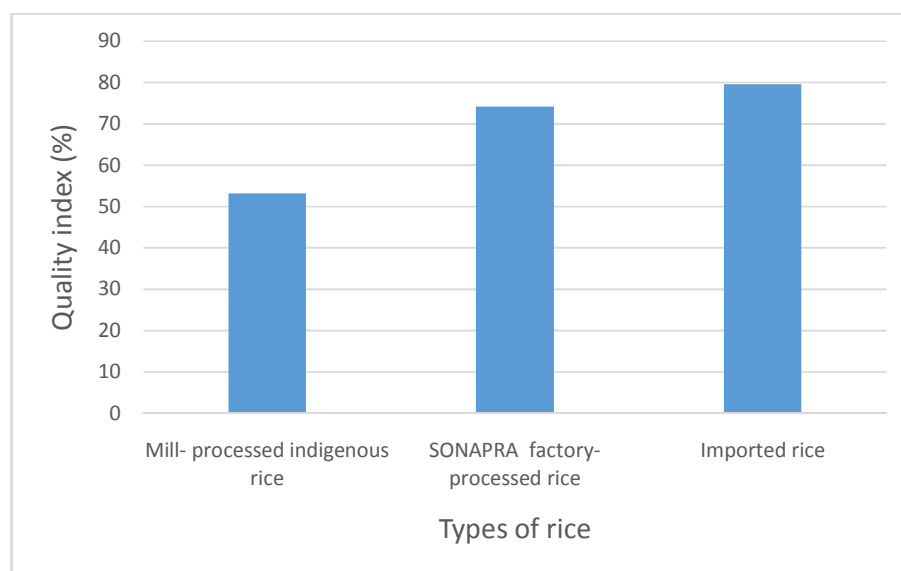
304 Table 2: Quality index (%) of the three types of rice by quality attributes

Quality attributes	Indigenous parboiled rice (mill- processed)	SONAPRA rice (factory-processed)	Imported rice
Whiteness	35	90.2	87.2
Cleanness	38	76.2	90.2
Cooking time	62.6	72.4	78.2
Rate of broken rice	60	46.6	95
Boldness after cooking	83.4	81.4	44.4
Texture of cooked rice	48	66.6	92.6
Taste/palatability	46.6	86.6	70
Average	53.2	74.2	79.6

305

306 Therefore, the SONAPRA rice is quality-wise more competitive than the indigenous
 307 parboiled rice. The factory-processed rice largely reduces the quality-wise competitiveness

308 gap of local rice vis-à-vis imported rice (Figure 3). Indeed, it corrects the indigenous rice's
 309 weaknesses previously revealed by VECO West Africa [25] and Adégbola and Singbo [10].
 310 However, these authors did not make any quantitative quality assessment. In addition to the
 311 high quality of imported rice, other competitive advantages which local rice producers ought
 312 to strive for would include regular presence of the product on all periodic markets, variety of
 313 rice types, and good linkages with traders.



314
 315
 316
 317 Figure 3: Quality index of local rice and imported rice
 318
 319

320 3.2. Cost-wise competitiveness

321 3.2.1. Cost prices of the two types of locally-processed rice

322 In 2012-2013, indigenous paddy-processing women buy paddy in their villages and
 323 neighborhoods at prices ranging from 120-240.6 FCFA/kg, with an average of 192.92
 324 FCFA/kg. On the contrary, the SONAPRA industrial factory buys paddy at assembly points
 325 in Glazoué district and other districts in the 'Collines' sub-region at a fixed price of 150
 326 FCFA/kg. At mill gate, paddy price may go higher than at factory gate because some women
 327 collect paddy from numerous scattered farms and bear high procurement costs. On the

328 contrary, average paddy processing/husking cost at private mills (17.92 FCFA/kg of paddy) is
 329 lower than that of the factory (30 FCFA/kg) because the latter supports high energy costs and
 330 pays salaries for permanent workers. However, several hand works (including artisanal
 331 parboiling and outsourced services) increase the mill-gate cost of indigenously-processed
 332 local rice (Table 3). On the contrary, the factory realizes economies of scale during paddy
 333 procurement and slightly reduces many hand works at processing stage, through internal
 334 integration via machines instead of outsourcing. Indeed, it does not produce parboiled rice
 335 which entails many hand works. Yet, it bears high packaging costs which paddy-processing
 336 women do not face or pay for. They sell their rice in bulk to wholesalers.

337 Table 3: Market-gate cost prices of mill-processed and factory-processed local rice

338

Cost items	Indigenous parboiled rice (mill- processed)	SONAPRA rice (factory-processed)
	FCFA/kg	
Processing yield from 1 kg of paddy ^a	0.64	0.65
Purchasing price of 1 kg of paddy	192.92	150
Collection and assembly of 1 kg of paddy ^b	3.27	--
Processing-related services for 1 kg of paddy (parboiling, drying, sorting, winnowing)	20.72	0
Husking 	17.92	30
Sub-total for 1 kg of processed rice before packaging ^c	366.92	276.92
Packaging of 1 kg of processed rice		20

Distribution	7.1	5,52
Market-gate cost price of 1 kg of processed rice^d	374.02 (n= 25, s= 45,33)	302,44 (n=1)

- 339 a- Processing yield is the 'processed rice/paddy' weight ratio; thus FCFA/kg does not apply here.
- 340 b- Not applicable. This costs are integrated in the husking cost, as declared by the factory officials.
- 341 c- This sub-total is equal to the sum of above values divided by the processing yield.
- 342 d- Cost price means the processing firm's profit is not included. Here it is average value calculated from the
- 343 sample: n = 25 women, based on declared minimum and maximum values of cost items; s is the standard
- 344 deviation. n=1 means there was only one industrial factory investigated. It is the only one that exist in the
- 345 region.
- 346 --: not available.

347

348 Overall, average market-gate cost price of mill-processed indigenous rice is 374.02

349 FCFA/kg, and 302.43 FCFA/kg for the SONAPRA factory-processed rice. Figure 4 shows

350 that 28% of women produce the mill-processed rice at high cost price (350-400 FCFA/kg)

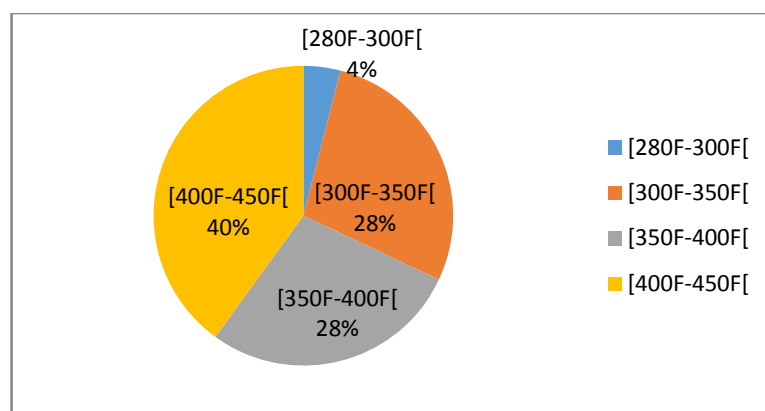
351 and 40% at very high cost (400-450 FCFA/kg), in comparison with the average cost.

352 Therefore, the SONAPRA factory-processed rice is less expensive than the mill-processed

353 indigenous parboiled rice. The industrial factory thus brings down processing costs and

354 enables a 19.1% reduction in market-gate cost price of locally-produced rice.

355



356

357

358 Figure 4: Proportion of women in various cost price ranges of mill-processed indigenous rice

359 Note: Values in square brackets are cost price values.

360 Source: Survey data, 2012

361

362 3.2.2. Import parity price of imported rice, compared to local rice cost prices

363 Table 4 presents the breakdown of the import parity price of imported rice, delivered
 364 at Glazoué market-gate. The average import parity price (281.30 FCFA/kg) is lower than the
 365 cost price of each type of locally-produced rice (374.02 FCFA/kg for the private mill-
 366 processed rice and 302.44 FCFA/kg for the SONAPRA factory-processed white rice). The
 367 Student T test indicates that the differences between these average cost prices is statistically
 368 significant at 5% level. This means the two types of locally-produced rice are more expensive
 369 and thus less competitive cost-wise than the imported one. This result confirms previous
 370 research findings [23, 10]. It also shows that the cost competitiveness gap is about 33% for the
 371 private mill-processed rice and only 7.5% for the factory-processed rice. Therefore, the
 372 modern factory provides a significant cost-wise competitive gain of 25.5 percentage points
 373 over the indigenous paddy processing facilities (indigenous parboiling, private milling, and
 374 several other hand works).

375 Table 4: Import parity price of imported rice, delivered at Glazoué market

Cost items	Cost (FCFA/kg)
CIF price (international import price)	183.30
Port and customs fees	70.00
Port and insurance fees	3.64
Custom fees 35,5%	66.36
Local transport and handling charges	28.00
Transport within Cotonou (importer, wholesaler, semi-wholesaler)	7.50

Transport Cotonou-Glazoué	20.50
Import parity price of 1 kg of imported rice at Glazoué market	281.30

376

377 3.3. The ‘quality index/cost price’ competitiveness assessment

378 Based on the results in sections 3.1 and 3.2, ‘quality index/cost price’ ratio is
 379 calculated for local rice, and the ‘quality index/import parity price’ ratio for imported rice.
 380 Let’s recall that the import parity price is also a cost price of the imported good delivered at
 381 the gate of a specific market in the importing country. From the results in Table 5, it appears
 382 that the ‘quality/cost price’ ratio decreases from 0.28 for imported rice to 0.25 for SONAPRA
 383 factory-processed rice and drastically to 0.14 for the mill-processed indigenous parboiled
 384 rice.

385 Table 5: Differential competitiveness gaps of local rice vis-à-vis imported rice

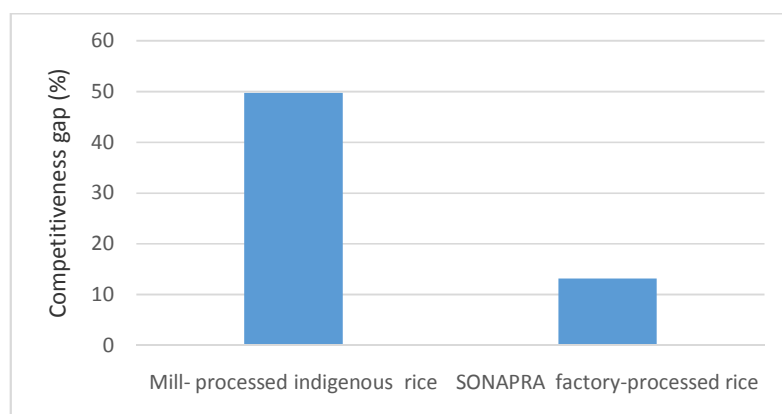
	Indigenous parboiled rice (mill- processed)	SONAPRA rice (factory- processed)	Imported rice
Quality index (%)	53.2	74.2	79.6
Cost price (FCFA/kg)	373.95	302.43	-
Import parity price (FCFA/kg)	-	-	281.3
Quality index/cost price ratio (A)	0.14	0.25	-
Quality index/import parity price ratio (B)	-	-	0.28
Competitiveness gap vis-à-vis	49.72	13.13	-

imported rice (%) = 100*(B-			
A)/B			

386 - : not applicable

387

388 This means the indigenously-processed rice is not competitive compared to the
 389 imported rice, and it is less competitive than the SONAPRA rice. The core result of this
 390 research is that the industrial paddy processing brings down the competitiveness gap of local
 391 rice vis-à-vis imported rice from 49.72% (indigenous parboiled rice) to 13.13%, i.e. a more
 392 than 4-fold increase in competitiveness (figure 5).



393

394 Figure 5: Differential competitiveness gaps of local rice vis-à-vis imported rice

395

396 However the SONAPRA rice faces serious market linkage problems. Indeed, that rice
 397 is presently sold only by ONASA (the national food security agency) through government
 398 pilot shops where access is restricted to the poor, and huge stocks are left unsold. Some
 399 consumers reported that those stocks are finally sold at low 'rescue' prices. They may then be
 400 captured by illegal traders who practice foreign rice label substitution, and thereby cheat
 401 largely on consumers.

402 4. Conclusion and policy implications

403 This research investigated if public investment in industrial paddy processing 
404 increases local rice competitiveness in Benin. It assessed the competitive gains of the modern
405 paddy husking/processing factory installed in Glazoué compared to private mills that were
406 already operating in the area. Competitiveness of locally-produced rice vis-à-vis imported
407 rice was evaluated, with particular attention to the type of processing facility used.

408 Quality index, market-gate cost price, and quality index/price ratio were used as
409 competitiveness indicators. The results reveal that average quality index was 53.2%, 74.2%,
410 and 79.6% respectively for the mill-processed indigenous parboiled rice, the SONAPRA
411 factory-processed rice, and the imported rice. Therefore, the indigenously-produced rice is
412 not competitive compared to the imported rice, and it is less competitive than the SONAPRA
413 factory-produced rice. The latter is both quality-wise and cost-wise more competitive than the
414 indigenous one. Indeed, the factory brings down processing costs and enables a 19.1%
415 reduction in market-gate cost price of locally-produced rice. However, the indigenous
416 parboiled rice fit to tastes and preferences of consumers in the centre and the north of the
417 country, and in Nigeria, whereas SONAPRA rice seems to meet only the preferences of
418 Cotonou city consumers. Yet, this later observation is not very obvious.

419 The most striking result of this research is that industrial paddy processing with the
420 SONAPRA factory brings down competitiveness gap of local rice vis-à-vis imported rice from
421 49.72% (indigenous parboiled rice) to 13.13% (SONAPRA rice), i.e. a more than 4-fold
422 increase in competitiveness. Therefore, more public investment in such factories should be
423 promoted if rice produced in Benin is to gain large shares in the domestic and regional
424 markets. However, market linkage issues remain to be addressed by the SONAPRA
425 management in order to ensure greater access of consumers to its rice, the quality of which
426 competes quite well with the imported rice. On the other side, processing and marketing
427 capacities of women and private millers need to be enhanced, provided that the parboiled rice

has a growing market. The specific market outlets of each type of local rice should be developed. Finally, for equity concerns, further research is needed to assess the impact of the modern factory on incomes of rice farmers, women rice processors-traders, and private millers, and on overall well-being of rural households.

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506 **End notes**

ⁱ Although certified quality grades established through laboratory calibration of quality attributes are not available, everybody knows that Beninese people have a very high preference for imported rice coming from various countries (Thailand, Vietnam, Malaysia, Pakistan, USA, etc.).

ⁱⁱ This question has a larger dimension connected with the impact of industrial factories on local paddy production, on jobs initially created by women and private mills, on incomes of rice value chain actors and on rice consumption. The present study does not deal with that perspective.

ⁱⁱⁱ See FAO Corporate Document Repository: Comprehensive Africa Agriculture Development Programme, Chapter 1: Underpinning Investments in African Agriculture and trade-related Capacities for improved Market Access: A Continental Vision.

^{iv} **Snowball sampling** is a non-probability sampling scheme through which one begins by (purposely) sampling one person and then –through this person– obtains a list of persons who have the same characteristics as the initial persons selected and so on. In our case, the next person interviewed is not always designated by the previous one. A ‘meet on the spot’ approach was rather used.

^v CIF = Cost, insurance and freight.

^{vi} Slow or long duration of cooking increases energy costs.

^{vii} According to interviewees, rice with high water absorption capacity is perceived as economical as the quantity of crude rice needed to feed one person is reduced.

^{viii} Here we are discussing only product competitiveness and not firm competitiveness. In addition to the former, the latter would also include the firm's market penetration (trends in sale volume, market share, etc.), frequency of market supply, leadership's smartness in market negotiations, and many other business attributes.