VIABILITY OF RICE FLOUR PRODUCTION: A CASE STUDY

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ABSTRACT

In the rice production process, by-products are obtained, most of which are low profitability compared to the main product, usually because they are considered "waste".This situation encourages the possibility of the production of a new product for the company: "Rice flour". In addition, the consumption of this type of product is increasing, mainly by the demand of celiac people (who use it as a binder of soups, breaded steak, pastas, etc.). There is, therefore, a growing market niche, in which rice flour can have a marked participation. In the present paper, a market study is carried out to determine the viability of the elaboration and commercialization of rice flour by a company dedicated to the industrialization and commercialization of rice in its different presentations, located in the province of Santa Fe, Argentina. First, the potential buyers are evaluated, considering the characteristics of the product and the area selected to market it. Then, a forecast of the demand is made and finally a marketing policy is defined considering the variables price, promotion and distribution. The main conclusions are that: (i) the project has commercial viability, (ii) the demand forecast indicates an increasing consumption of the product, and (iii) the market structure, because the company is not known in the item of flour, is a condition for the price and promotion strategy, both designed with the aim of achieving a greater penetration in the market of the new product.

Keywords: *Market Study, Viability, Rice Flour.*

1. INTRODUCTION

In the rice production process, by-products are obtained, most of which are low profitability compared to the main product, usually because they are considered "waste". This situation encourages the possibility of incorporating a new product: "rice flour", to generate a more efficient use of waste, taking advantage of the facilities that companies have. On the other hand, the consumption of this type of products is increasing, mainly by the demand of celiac people. Rice flour has the main application as an ingredient in the pre-mix formulations to prepare various gluten-free bakery products, as well as in the manufacture of drugs as excipients. It should be noted that different authors have investigated the application of rice flour for the manufacture of food for celiac, mainly to improve the appearance, texture, taste, etc. [1, 2, 3, 4, 5]. Also, other research groups are engaged in establishing rice flour processes and/or derivatives, in order to obtain better functional, nutritional properties, etc. [6, 7]. In addition, rice flour is a product that is used as a binder for soups, sauces, hamburgers, breaded steak, pastas, etc. In this sense, there is a growing market niche, in which the product can have a strong participation.

In the present paper a market study is carried out to determine the possibility of producing and marketing rice flour by a company dedicated to the industrialization and commercialization of rice in its different varieties, located in the province of Santa Fe, Argentina. The company has sowing fields, a collection center and a production site where the industrial warehouse is located. As the final stage of its marketing chain, it acquires the service of two wholesale distributors.The company manufactures three types of rice, which differ by type grain size, all of quality 0000 with more than 90% whole grains. The products are offered in the presentations of 500 grs and 1 kg. On the other hand, the company has a presence in large districts of the region, such as Gran Santa Fe and Gran Rosario, in which it operates with wholesale distributors. It can be estimated that in these urban centers is among the most consumed brands of rice, emphasizing that the populations of the interior of the province has a higher demand. In order to carry out the market analysis, it is necessary to take into account the four fundamental pillars of this study: analysis of demand, supply, prices and commercialization [8, 9, 10, 11]. A survey of secondary information is begun on the basis of reports from official agencies of celiacs, ministries and public organisms (INDEC, ACELA, ASSAL, among others), magazines and specialized articles, as well as data obtained from companies related to the production of rice flour and the production of gluten-free products [12, 13].

Then, the final consumers are surveyed, with the aim of: (i) determine preferences in the consumption of alternative flours, (ii) estimate direct real consumption of rice flour from the celiac population in the zone of influence, (iii) determine the preferred purchase points by consumers, in order to establish the most appropriate distribution channels, (iv) determine the most suitable type of presentation for the sale, (v) recognize the main current competitors, (vi) recognize the most important aspects that consumers take into account when buying a product and (vii) determine the

potential customers who would be willing to buy rice flour, and what the maximum price they would pay for the product in question.

2. PRODUCT ANALYSIS AND INFLUENCE ZONE

2.1 PRODUCT DEFINITION
According to Article 696 of Chapter IX of the Argentine Food Code "with the name of rice flour, it is understood the product of the milling of the clean and healthy grain, free of its cellulosic sheaths, of Oriza sativa L. in its different varieties. Its water content shall not exceed 12% at 100 ° -105 ° C, the crude fiber not exceeding 0,5% and the fat shall not exceed 0,5% [14]. This product will be labeled: rice flour". The process to obtain the product is simple, since it only involves the physical transformation of the grain.

The raw material to be used, in terms of quantity and quality for grinding, are split grains, as they are more efficient and represent a lower cost compared to whole grains. When referring to split, the grains of ¾ and ½ of the whole grain size are considered (less than half a grain are considered as arrocín)[12, 13].

2.2 MARKET AND INFLUENCE ZONE
The company analyzed has a well-defined market. The departments Capital and Garay are two districts located in the center-east of the province of Santa Fe, bordering each other. In them, is found the second most populated city of the province, the city of Santa Fe, as well as: Santo Tomé, Recreo, San José del Rincon, Laguna Paiva and Helvecia, and other smaller towns. According to data from the National Institute of Statistics and Censuses (INDEC) the population estimated for 2016 in the area under study was 571,195 inhabitants. Table 1 shows the population growth and a projection for the period 2017-2021 [15].

Table 1 - Evolution of the population in the zone of influence

Data	Year	Department La Capital	Department Garay	Total Population
Census Population	2010	525093	20890	545983
	2011	527924	20975	548899
	2012	532159	21103	553262
	2013	536439	21236	557675
	2014	540764	21370	562134
	2015	545127	21510	566637
	2016	549544	21651	571195
Estimated Population	2017	554001	21797	575798
	2018	558505	21946	580451
	2019	563060	22099	585159
	2020	567660	22255	589315
	2021	567710	22415	590125

3. MARKET STUDY
In order to carry out the market analysis, the four main pillars of this study are taken into account: analysis of demand, supply, prices and marketing. First, potential buyers are evaluated, whether current or potential, considering the area chosen to market the product, as well as the characteristics that the rice flour should have in relation to the target market. Then, the volume of the product to be produced is quantified through the demand forecast. Next, a marketing policy is defined, considering which distribution channels are the most convenient, the time to market and the selling price of the product [16, 17, 18].

3.1 DEMAND ANALYSIS

3.1.1 CONSUMPTION OF RICE FLOUR IN THE ZONE OF INFLUENCE
In order to determine the consumption of rice flour in the zone of influence, the amount of product that is destined for industrial and final consumer is stipulated.

Product for final consumer (PFC): To determine the amount of PFC is taken into account how much a celiac person consume, projected in the amount of habitants of the area. According to the Argentine Celiac Association, the consumption of a celiac person is 43.72 gr/day of rice flour (www.celiaco.org.ar). In turn, it is known that for every celiac someone from the social environment will be affected by this condition of consumption. On the recommendation

of professionals in the area, it is decided to contemplate the consumption of the relatives of celiac person. So if is consider a family of four, each celiac consumes at least 2 to 3 times a week the same amount of rice flour as a celiac person. This assertion is contemplated in the calculation made to determine the demand for rice flour for the final consumer, product called PFC. Taking into account the data in Table 1 and taking that 1% of the population is celiac, according to information collected on the website of the Ministry of Health of the Republic of Argentina, consumption of rice flour for the final consumer can be obtained from the following equations:

Daily consumption of celiac:

$$DCC = P \times 0,01 \times 43,72 \text{ gr/day} \tag{1}$$

Monthly family consumption:

$$MFC = 3 \frac{family}{celiac} \times 2,5 \frac{times}{week} \times 4 \frac{weeks}{month} \times DCC + 30 \frac{days}{month} \times DCC \tag{2}$$

Annual demand for the final consumer product (PFC):

$$DFCP = MFC \times 12 \tag{3}$$

Where: P: total population of the zone of influence, DCC: daily consumption of celiac, MFC: monthly family consumption, DFCP: annual demand for the final consumer product.

The values shown in Table 2 are obtained from the application of equation 3. The table shows the annual demand for PFC.

Table 2 - Annual demand for the final consumer product (PFC)

Year	Demand PFC [tn/year]
2010	171,87
2011	172,78
2012	174,16
2013	175,55
2014	176,95
2015	178,37
2016	179,80

Industrial input product (IIP): Another aspect to be taken into account in determining the level of production of rice flour in the planned plant is the consumption of said product as an industrial input, known as "industrial input product" (IIP).

From the data provided by the company, the main competitors in the area of influence are determined, as well as the demand that these rice flour companies have. It should be noted that the data provided by the company do not differentiate between PFC demand and IIP. Table 3 shows the historical evolution of the demand for rice flour in the period 2010-2015, which presents the set of competitors mentioned above. It should be noted that the demand for rice flour does not present seasonality or randomness to throughout the year, therefore demand data are established per year.

Table 3 - Historical evolution of demand for rice flour, period 2010-2015

Year	Demand IIP [tn/year]
2010	2900
2011	3850
2012	4090
2013	4650
2014	5840
2015	5880

3.1.2 FORECAST OF DEMAND

Total demand forecast: In this case, the forecast of the demand for rice flour is obtained, based on the historical data presented in Table 3. It can be noticed that the historical data of demand of rice flour, in the zone of influence that have the competing companies, possess an increasing tendency. On the other hand, the exponential smoothing method of second order is more convenient for the estimation of the demand in the time period 2016-2021, since it is better adjusted to the characteristics of said data. In Table 4, the values obtained from the forecast of the rice flour demand in the area under study are shown in the mentioned time period. In this table, it is observed that by 2021 the demand for rice flour would be 66% higher than the last value recorded in 2015. This increase of almost 70% in demand represents a favorable aspect for the strategic business plan of the company.

Table 4 - Demand forecast for rice flour, period 2016-2021

Year	Demand Forecast for Rice Flour [tn/year]
2016	6678
2017	7290
2018	7903
2019	8515
2020	9127
2021	9740

Demand forecast for the PFC: Table 5 shows the final consumer demand forecast (PFC) values. These values are obtained from the data in Table 2, applying linear extrapolation for the period of time 2016-2021, since this method is the one that best fits the dataset.

Table 5 - Forecast demand for the final consumer (PFC)

Year	Demand PFC [tn/year]
2016	179,82
2017	181,26
2018	182,73
2019	184,21
2020	185,71
2021	187,22

Forecast demand for the IIP: It appear from the difference in forecasts of total demand and the PFC for each year. It should be noted that the consumption of flour in Argentina is constant in the year; therefore, the monthly consumption is estimated. Table 6 shows the summary of all forecasts and Table 7 shows the percentage of participation of each of the products in the period 2017-2021.

Table 6 - Forecast of demand for PFC and IIP in the period 2017-2021

Year	Forecast of total demand [tn/year]	Demand forecast for PFC [tn/year]	IIP demand forecast [tn/year]
2017	6678	179,82	6498,18
2018	7290	181,26	7108,74
2019	7903	182,73	7720,27
2020	8515	184,21	8330,79
2021	9127	185,71	8941,29

Table 7 - Percentage share of PCF and IIP demand in the period 2017-2021

Year	Percentage of PFC demand (%)	Percentage of IIP demand (%)
2017	2,69	97,31
2018	2,49	97,51
2019	2,31	97,69
2020	2,16	97,84
2021	2,03	97,97

3.2 STRATEGIC BUSINESS PLAN OF THE COMPANY (SBP)

Through data provided by the members of the management of the company it is recognized that of the total demand of the sector, only 40% is marketed within the region. Accepting these conditions, the company intends to absorb 30% of the region's market by the end of the horizon, with a progressive growth of 5% per year. This begins with a 10% the first year, 15% for the second year, 20% for the third, 25% for the fourth and finally for the fifth year to reach the projected 30%.

These objectives can be accelerated over time if the company manages to enter the foreign market, in order to export part of its production, but this analysis was not taken into account in the present work. On the other hand, it is highlighted that, as a result of government decisions that are foreseen constant in the planning horizon in function of the announcements of public organisms, since the year 2010 the imports show a marked decreasing tendency, giving a beneficial tendency in the market. Finally, in order to set objectives, it should be mentioned that the supply of the raw material does not present a problem for production, since it is part of the waste generated in the processing of rice. Table 8 shows the values corresponding to the SBP for the period 2017-2021.

Table 8 - Strategic plan for the planning horizon, demand to satisfy

Year	Forecast of total demand [tn/year]	Forecast of the demand in the zone of influence [tn/year]	Projected annual growth [%]	Demand to satisfy [tn/year]
2017	6678	2671,20	10	267,12
2018	7290	2916,00	15	437,40
2019	7903	3161,20	20	632,24
2020	8515	3406,00	25	851,50
2021	9127	3650,80	30	1095,24

Once the demand to satisfy of rice flour is obtained within the stipulated time horizon (period 2017-2021), the quantity of final consumer product (PFC) and industrial input (IIP) that is feasible to produce is established. In order to determine the amount of PFC and IIP to be met, the participation percentages of each of the products presented in Table 7 are taken into account. Table 9 shows the participation percentage of each product and the corresponding demands.

Table 9 - Demand to satisfy by product for the stipulated time horizon

Horizon	PFC Percentage [%]	Demand to satisfy of PFC [tn/year]	Demand to satisfy IIP [tn/year]
1	2,69	7,19	259,93
2	2,49	10,88	426,52
3	2,31	14,62	617,62
4	2,16	18,42	833,08
5	2,03	22,29	1072,95

3.3 SUPPLY ANALYSIS

3.3.1 ANALYSIS OF IMPORTS
Table 10 shows the demand and imports of rice flour in recent years. The import values have been supplied by the Ministry of Production of the Province of Santa Fe, Argentina.

Table 10 - Imports and demands of rice flour, period 2009-2013

Year	Import [tn/year]	Demand [tn/year]
2009	367,5	-
2010	186,6	2904
2011	275,8	4008
2012	122,2	4500
2013	110,9	4740
2014	-	5736
2015	-	5880

It is observed that in the last years the imports decreased, product of governmental decisions, which caused an increase of the demand of the companies located in the zone of influence, that is to say that they increased their production to cover the needs of the market, giving a tendency beneficial in the market. On the other hand, it should be noted that imports relative to local production have always maintained a low share.

3.4 COMMERCIAL STRATEGY
The commercial strategy is based on a series of decisions related to four fundamental variables: product, price, place and promotion [16].

3.4.1 PRODUCT
In the demand analysis data were obtained on rice flour intended to meet the needs of the final consumer. It is observed that the final consumer product has low values; however, as the study is based on celiac population consumption, the product is intended to be a substitute for any consumer, so in period 2017-2021 a greater percentage of the population is expected to choose alternative flours at prices that are more competitive than which are offered on the market today. On the other hand, the industrial input product is of great importance, because the higher levels of production are oriented to this sector. It is considered important to focus on both market niches, thus defining the need to make two end products.

Products for final consumers (PFC): It is defined that the product intended for the final consumer is 500 gr. This decision is based, in part, according to preferences of the final consumer, information obtained from surveys conducted.

Products for Industrial Input (IIP): Rice flour as an industrial product is marketed in 25 kg bags because the use of the product in this area is taken into account, depending on factors such as rotation index, and malleability.

3.4.2 PRICE
In order to determine the price of the product, market structure, competition price analysis and costs were taken into account. As a commercial strategy for the first two years it is considered to use the market penetration method for low prices, which consists of defining low prices to penetrate quickly and deeply in the market, competing with existing brands. It is intended that buyers choose the product from the price, and added to the combination of excellent quality, end up being the preferred alternative. This decision is supported by the data obtained from the surveys, where 48% of the respondents opt for a competitive product in price. Subsequently, in the following years, this strategy will be modified.

In this way, it is defined that the first year the sale price is 15% lower than the lowest price of the main competitors. For the second year there is a 10% increase in the price of the first year, placing 5% below the lowest selling price of the main competitors. Then, for the rest of the planning horizon, price is compared with the lowest price competitor, allowing some margin to increase the sale price in the future.

3.4.3 PLACE
For reasons of operational convenience and cost, it is decided to continue using the current distribution channel (wholesaler, retailer and points of sale that serve the final consumer). In this way, the product stored in the warehouse is sent to wholesale distributors using the same means of transport. Then, depending on the end user, the product will be sent to the retailer or to the industry, as appropriate.

3.4.4 PROMOTION
Traditionally, the diffusion of the company was based mainly on the placement of the mark on the walls of the sales premises, looking for great visual impact on consumers. In the last years, television advertising was added, with much more significant impacts. With the launch of two products to different market niches it is advisable to opt for a differentiated promotion for each case. For PFC it is suggested diffusion in the various means of television advertising, radial and through screen printing in the products currently marketed by the company, to inform the product to the usual consumers of the brand. For the IIP, it is suggested to carry out visits to the industries, offering the product (at least 10 industries of the area on an annual basis). At the same time, it is planned to participate in annual fairs and exhibitions of gluten-free products (Expo Acela, for example) as well as the incorporation to the Argentine Chamber of Producers of Gluten Free Foods (CAPALiGlu), which works in the awareness and the growth of the supply of gluten-free products; since all this would collaborate in gaining presence in the market.

4. CONCLUSIONS
In the present work, a market study was carried out to determine the possibility of producing and marketing rice flour by a company dedicated to the industrialization and commercialization of rice in its different varieties, located in the province of Santa Fe (Argentina). In order to carry out the market analysis, the four main pillars of the study were taken into account: analysis of demand, supply, prices and promotion. Firstly, potential buyers were evaluated, whether current and/or potential, considering the area chosen to market the product, as well as the characteristics that rice flour should have in relation to the target market. Then, the volume of the product to be produced through the demand forecast was quantified. Next, a marketing policy was defined considering which distribution channels are the most convenient, the time of supply to the market and the selling price of the product.
Once the market study for rice flour has been completed, it can be concluded that: (i) In the forecast of the demand for the product it is detected that the consumption will increase, which represents a favorable aspect for the sale of the product, (ii) The analysis of the historical imports of the sector allows to determine that they do not generate negative impact in the market and are rejected when considering the supply, favoring the growth of the domestic market, (iii) The structure of the market, as well as the fact that the company is not known by consumers in this area, are factors for the price and promotion strategy, both designed with the aim of achieving greater penetration in the market and (iv) The supply of raw material is not a problem for the production of final consumer products (PFCs) and industrial inputs (IIP), because it is part of the waste generated in the processing of rice.

5. ACKNOWLEDGEMENTS

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