

Analysing the market environment for açai (*Euterpe oleracea* Mart.) juices in Europe

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Abstract — Introduction. Growing demand in Europe for healthy and nutritious food and beverage products with new flavours creates opportunities for supplying the European market with novel fruit juices including tropical fruits like açai (*Euterpe oleracea* Mart.). **Materials and methods.** One tropical fruit species from Brazil, *i.e.*, açai, was selected as a case species. Via expert interviews, a review of consumer studies regarding tropical fruit consumption, field visits and literature research, a SWOT analysis was conducted in order to map the opportunities, threats, strengths and weaknesses related to açai and its potential in the West European fruit juice industry. **Results.** Opportunities stem from growing consumer interest in natural, healthy and nutritious fruit juices, the need for health-oriented innovations in the food industry and growing interest in variety, novel tastes and ethnic foods. Unfamiliarity, health claim credibility and European market access requirements constitute the main threats. Strengths pertain to the nutritional value of açai and its tropical origin, and the existence of well-established national açai markets and processing industries. Weaknesses result from the irregular supply and inconsistent açai quality, lack of advanced know-how in cultivation and processing issues, and scant insights into the fruit's nutrient profile. **Conclusion.** The findings indicate that açai, which has outstanding nutritional values and health-related benefits, could have substantial potential in the West European fruit juice market. Key attention points pertain to creating awareness among consumers and building familiarity with açai and its products, and obtaining in-depth knowledge about its nutritional characteristics and concomitant health benefits.

Europe / Brazil / *Euterpe oleracea* / fruit juices / markets / socioeconomic environment

Analyse de l'environnement du marché du jus d'açai (*Euterpe oleracea* Mart.) en Europe.

Résumé — Introduction. La demande croissante en Europe des aliments et boissons saines et nutritives offrant de nouvelles saveurs, crée des opportunités pour l'approvisionnement du marché européen avec des jus de fruits nouveaux, dont certains jus à base de fruits tropicaux comme l'açai (*Euterpe oleracea* Mart.). **Matériel et méthodes.** Une espèce fruitière tropicale du Brésil, l'açai, a été choisie comme étude de cas. Partant d'interviews d'experts, d'une synthèse des études des consommateurs vis-à-vis de leur consommation de fruits tropicaux, de visites de terrain et de recherches bibliographiques, on a mené une analyse SWOT pour évaluer les forces, faiblesses, opportunités et menaces liées à la transformation de l'açai et à son potentiel dans l'industrie des jus de fruits en Europe de l'Ouest. **Résultats.** Les opportunités résideraient dans l'intérêt croissant du consommateur pour les jus de fruits naturels, sains et nutritifs ; dans le besoin d'innovations de l'industrie alimentaire orientées vers la santé ; dans l'intérêt croissant pour la diversification, les goûts nouveaux et les nourritures ethniques. Le manque de familiarité, la crédibilité des allégations relatives à la santé et les exigences européennes d'accès au marché constitueraient les principales menaces. Les forces porteraient sur la valeur nutritive de l'açai et sur son origine tropicale, ainsi que sur l'existence de marchés nationaux et d'industries de transformation d'açai bien établis. Les faiblesses résulteraient d'un approvisionnement irrégulier et d'une qualité d'açai inégale, du manque d'un savoir-faire avancé dans la culture et les produits de transformation, ainsi que d'une connaissance limitée du profil nutritif du fruit. **Conclusion.** Les résultats indiquent que l'açai, qui a une valeur nutritive et des avantages exceptionnels relatifs à la santé, pourrait avoir un réel potentiel sur le marché des jus de fruits en Europe de l'Ouest. Les points principaux à prendre en compte seraient la familiarisation des consommateurs avec l'açai et ses produits, et l'acquisition de connaissances précises sur ses caractéristiques nutritionnelles et ses avantages concomitants pour la santé.

Europe / Brésil / *Euterpe oleracea* / jus de fruits / marché / environnement socioéconomique

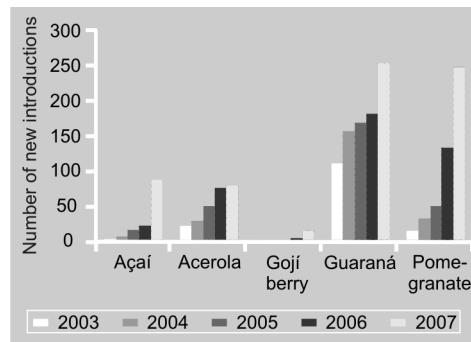
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Received 20 October 2008
Accepted 13 January 2009

Fruits, 2009, vol. 64, p. 273–284
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DOI: 10.1051/fruits/2009022
www.fruits-journal.org

RESUMEN ESPAÑOL, p. 284

Figure 1.
Number of new beverage introductions worldwide with açai, acerola, goji berry, guaraná and pomegranate for the period 2003 to 2007 (adapted from Greeve [4]).



1. Introduction

Fruit juice consumption has increased over the past ten years in Europe. In 1998, fruit juice consumption reached 9.5×10^9 L or 19.7 L per capita and increased to 11×10^9 L in 2007, meaning an average per capita consumption of 23.7 litres [1]. Due to increasing consumer interest in a healthier lifestyle, fruit juice consumption outlooks are forecasted to be favourable. Consumption is expected to grow further by 1.5% annually, reaching 13.5×10^9 L by 2012 [1].

Orange and apple juice remain the most important fruit juices consumed in Europe, representing, in 2007, 40.5% and 18.1% of the fruit juice market, respectively. Besides a steady growth in the consumption of 'traditional' fruit juices based on orange and apple, there has been a dynamic and increasing demand for innovative fruit juices with novel and exotic fruit combinations in recent years [1, 2]. This is reflected by the increasing number of new product introductions in the novel fruit beverage category. For example, the number of fruit juice innovations in Belgium increased from 14 to 40 between 2000 and 2005 [3]. Worldwide, introductions of novel beverages with tropical flavours increased by 60% between 2003 and 2007, and amounted to approximately 2 200 new tropical fruit beverage introductions during 2007 [4]. Concrete examples are increased fruit juice introductions containing açai, acerola, goji berry, guaraná and pomegranate (*figure 1*).

Within the current consumer trends of healthy eating and drinking, considerable interest from the European fruit beverage

industry has been evoked for açai owing to its nutritional characteristics and concomitant health benefits. As a result, açai may offer perspectives for usage in novel tropical fruit juices targeted to satisfy contemporary consumers' wants and demands.

The objective of our paper was to investigate the use of açai and its potential in the West European fruit juice industry through the evaluation of the external market environment (opportunities and threats) and the identification of the inherent strengths and weaknesses of açai, and its respective production and supply chain.

2. Materials and methods

Our study applied a SWOT methodology for evaluating the potential use of açai pulp in the West European fruit juice industry. The SWOT acronym stands for "Strengths, Weaknesses, Opportunities and Threats". SWOT analysis is a strategic planning method used to systematically evaluate the external opportunities and threats, and the internal strengths and weaknesses related to a project or business venture [5]. It involves specifying the project's objective and identifying the internal and external factors that are favourable and unfavourable for achieving the specified objective; and it provides options and guidance for the identification of key attention points for further strategy development [6, 7].

Our study was performed in three stages. In the first stage, the external market environment was evaluated using information gathered from literature review and data issued from conferences and consultations with stakeholders involved in the West European fruit juice industry.

Semi-structured interviews were conducted with delegates from the Belgian and European associations of fruit juice companies, and with representatives from relevant fruit juice industries in Belgium and the Netherlands. Six interviews were realised out of 12 contacts. Although both written and oral communication was used to inform about the research topic and to arrange personal interviews, response rates were rather

Table I.

Summary of the guideline used for interviews conducted with delegates from the Belgian and European associations of fruit juice companies, and with representatives from relevant fruit juice industries in Belgium and the Netherlands in order to analyse the market environment for açai (*Euterpe oleracea* Mart.) juices in Europe.

- Can you describe the fruit juice market in West Europe?
What are the observed trends?
Is there an evolution noticeable regarding the demand for tropical fruit juices?
What are the expectations for the near future in this market?
- What are, according to you, the most important reasons for introducing novel fruit juices with new, exotic flavours and tastes in the European market?
What are the evolutions at industry, retail and consumer level that justify such introductions?
- Can you describe the current consumer trends in the West European fruit juice market?
Which opportunities do tropical fruit juices offer relative to these observed trends?
- Nutrition and health claims are often used for communicating the nutritional content and health-related benefits of fruit juices. To what extent do they affect consumers' intention to purchase tropical fruit juices? In what sense?
What are the problems faced when claiming certain characteristics?
- What are the threats you are faced with for a successful long-term introduction of novel tropical fruit juices into the European market?
- Which criteria (with respect to production, raw materials, supply chains, others) do you use when prospecting potential novel tropical fruits for the development of innovative tropical fruit juices?
- What are the threats faced when purchasing the raw material?
Which criteria do you maintain when selecting your suppliers of tropical fruits?
What are the most occurring problems you are faced with?

low, particularly in Belgium. Reasons for non-participation were “lack of time”, “not interested” or “topic is not part of core business”. The interviews lasted between one and two hours and were characterised by a free-flowing exchange of information about consumer trends in the fruit juice sector, the current position of (novel) tropical fruits in this market segment and perceived prospects and problems regarding the use of novel tropical fruits in fruit juices. A topic list (*table I*) was used to guide conversations. Interviews were transcribed for content analysis.

Additionally, previous studies performed by the authors, in which consumer perceptions and determinants regarding the consumption and purchase intention of tropical fruits were explored (results presented in Sabbe *et al.* [8–10]), constituted other useful sources in identifying characteristics of the external market environment. A questionnaire-based survey ($n = 290$) was performed [8] to gain general insights into consumer attitudes, beliefs and familiarity towards tropical fruits, and their role in the

intention to purchase fresh and processed tropical fruit products. Furthermore, Sabbe *et al.* explored consumer motives and barriers for the purchase of tropical fruit juices through focus group discussions ($n = 15$) [9]. Finally, by means of sensory tests, the impact of sensory experiences on the acceptance of fresh tropical fruits ($n = 281$) and derived products ($n = 290$) was assessed [10]. The detailed methodology and findings of these studies have been reported elsewhere. Conclusions from those studies are integrated into the present paper insofar as these are relevant for the identification of the market environment for açai.

In the second stage, the internal strengths and weaknesses of açai and its respective production and supply chain were identified. Information was gathered from a combination of observations during field visits, findings from an exploratory market study on açai performed in Brazil within the scope of the research project PAVUC [11] and completed through literature review.

In the third stage, the collected information was synthesised in a SWOT matrix and

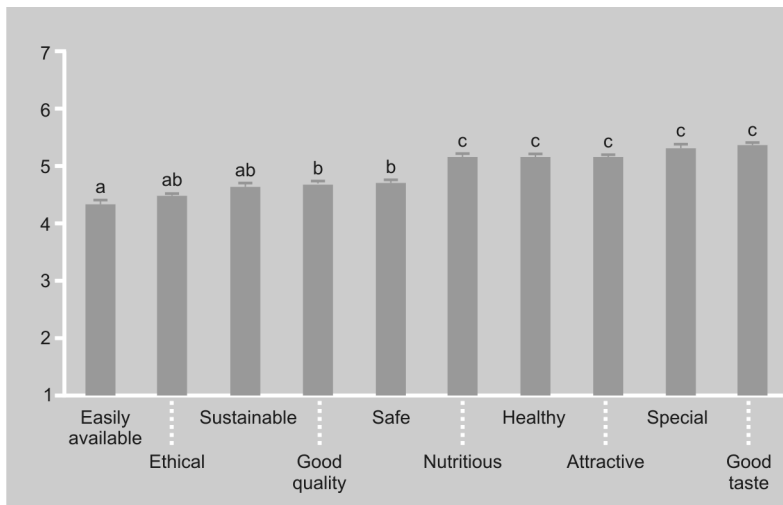


Figure 2. Consumer mean attribute belief scores on a 7-point interval scale for processed tropical fruit products ($n = 290$) (mean \pm sem). a, b, c indicate significantly different attribute belief scores.

evaluated to determine the extent to which the identified facts constitute opportunities, threats, strengths and weaknesses for the use of açai pulp in the West European fruit juice industry. This analysis finally resulted in the formulation of key attention points for strategy development.

3. Results

3.1. External market environment

3.1.1. Opportunities

Innovative fruit juices with new flavours and fruits are gaining market presence throughout Europe. The interviewed fruit beverage companies mentioned that they are under increasing pressure to create innovations through the use of novel flavours and tropical fruit species in order to differentiate from the fierce competition and to maintain market share and shelf space in retail outlets.

Consumers have also become more aware of and interested in the consumption of tropical fruits and their juices as they are increasingly being exposed to other cultures and foods through international travel and global communication [2, 12]. Von der Linden [13] reported that the tropical fruit juice market in Europe is also stimulated by a steady growth of ethnic minority groups

wanting to consume fruit juices they know from their home countries. Exploratory research regarding consumer perceptions of tropical fruits and their products, performed by Sabbe *et al.*, revealed that consumers show a positive general attitude towards tropical fruit consumption [8]. Moreover, in that same study, consumer attribute beliefs towards tropical fruit products were analysed. As can be seen from *figure 2*, consumers have overall positive beliefs. They have the strongest beliefs that processed tropical fruit products are healthy, nutritious, good in taste, attractive and special. Consumers have equally strong beliefs towards the products' safety and quality, which are significantly higher than their beliefs towards the products' availability. Focus group discussions performed by Sabbe *et al.* revealed that pleasure-seeking emerges as the main stimulus for tropical fruit juice consumption [9]. In addition, the juices' naturalness, their perceived healthiness and convenience were found to be the most convincing elements for consumers to purchase tropical fruit juices.

According to the interviewed industry stakeholders, a significant opportunity lies in the growing demand for fruits with outstanding nutritional characteristics that provide health-related benefits. Although fruit juices are considered as intrinsically healthy [9, 14–16], the interviewed stakeholders remarked that consumers are increasingly opting for fruit juices that have an extra health benefit (so-called “superfruit” juices). Similarly, Datamonitor reported that fruit juices offering health benefits beyond basic nutrition are highly valued among health-oriented consumers [17], who constitute a growing segment of food markets [18, 19]. Besides an increased focus on health by consumers, their search for convenient products also contributes to the growing popularity of tropical ‘superfruit’ juices. Because of time pressure and in order to compensate for poor dietary habits, the consumption of a quick and convenient delivery format of nutrient-rich and healthy juices has become highly attractive [9, 17].

In sum, the main opportunities can be categorised as: (1) need for health-oriented innovation by the food and beverage industry,

Table II.

European market access requirements (adapted from [2, 20, 21]).

Import tariffs and quotas	
Goods entering the EU are subjected to import duties. The level of tariffs depends on the country of origin and product. Common tariffs for the import of juices and concentrates are between 10.5–40% of the CIF (Cost Insurance Freight) value of the product.	
Non-tariff trade barriers	
Quality of the product	Directive 2001/112/EC specifies a definition of fruit juice, nectar and concentrate.
Use of food additives and flavourings	The legislation on application of food additives and flavourings is harmonised in the EU (Directive 94/34/EC). It lays down detailed rules on the use of colours (Directive 94/36/EC), sweeteners (Directive 96/83/EC) and all food additives other than colours and sweeteners (Directive 2001/5/EC).
Presence of contaminants	Regulation (EC) No. 466/2001 lays down threshold limits for contaminants in specific food products.
Hygiene and food safety	Food processing industries in the EU are legally bound, through Directive 93/43/EC, to guarantee food quality and safety by implementing HACCP (Hazard Analysis Critical Control Points). Exporters to the EU are not obliged to have HACCP. As importers are held responsible for the quality of imported food products, they mostly require exporters to have HACCP implemented.
Packaging issues	Minimum requirements for packaging and packaging materials are regulated in Directive 94/62/EC.
Labelling issues	Directives 2000/13/EC and 2001/112/EC apply to labelling requirements for fruit juices and concentrates. Labelling requires specification of content, quantity, Brix level, origin and final destination.
Non-legislative market requirements	
Social requirements	Requirements which are related to human and labour rights. The International Labour Organisation (ILO) has developed minimum standards of basic labour rights.
Environmental requirements	Requirements which have been developed in order to reduce the negative environmental impact of products. They recognise the environmental management system of an individual company [e.g., ISO 14001 (International Organisation for Standardisation) organic labelling].
Quality-related requirements	Requirements which are related to the quality management of the production process. The ISO 9000 standards represent an international consensus on the essential features of a quality system.

(2) consumers' interest in ethnic foods, and
 (3) consumers' search for natural, healthy and nutritious fruit juices.

3.1.2. Threats

Increasing transportation costs together with European market access requirements, *i.e.*, import tariffs and quotas, non-tariff trade barriers, and other non-legislative requisites (*table II*), were reported as limiting factors. One of the interviewees mentioned that the import of açai pulp into the European Union is subjected to an import tariff of 18.4% of the CIF value of the product. When prospecting potential novel tropical fruits, the interviewed stakeholders mentioned that, besides the European import regulation, additional specifications have been established (*e.g.*, compliance with HACCP, ISO 9000 and ILO standards) which should be met by the supplier in order to meet the increasing prerequisites of European con-

sumers with respect to environmental, social, health and safety issues. Another important constraint pointed out by the fruit juice industry is the unfamiliarity of consumers with novel tropical fruits and their exotic flavours. The consumer studies achieved by Sabbe *et al.* confirm that lack of knowledge and lack of familiarity effectively form significant barriers for consumers to purchase tropical fruit juices [8–10]. From the focus group discussions [9], it became clear that consumers prefer juices which contain a mixture of known and unknown tropical fruit flavours. Consumers tend to reject fruit juices containing only unknown tropical fruits as they do not know what to expect in terms of taste. Sabbe *et al.* evaluated consumer knowledge and product-related experiences with a number of tropical fruits as a measurement of familiarity [8]. This study concluded that consumer familiarity with tropical fruits is quite diverse. Consumers are familiar with pineapple, mango, litchi

and passion fruit, whereas unfamiliarity towards guava, dragon fruit, tree tomato and persimmon was revealed. Papaya, carambola, avocado and coconut were known by the majority of the respondents, although about half of them claimed to have never bought these fruits. Additionally, Sabbe *et al.* reported that taste greatly influences consumer purchase intention and hence acceptance of fruit juices containing tropical fruits they are not familiar with [10]. In this study, they found that consumers' intention to purchase tropical fruit juices significantly dropped after tasting açai and baobab juice. Similarly, numerous other consumer studies have underscored the primary role of taste in food choices by stating that repeated consumption of a food product will not occur if the first impression of its taste is poor [14, 22, 23]. Taste dissatisfaction among consumers may thus prevent the successful marketing of newly developed tropical fruit juices.

Furthermore, within the current trend of consumers searching for natural, healthy and nutritious fruit juices, nutrition and health claims have become an established way of communicating the juices' healthiness and their benefits. From the focus group discussions, Sabbe *et al.* concluded that, although health motives do not constitute the main motivation for tropical fruit juice consumption, nutrition and health claims seem to influence consumers' decisions to purchase and consume tropical fruit juices [9]. However, they reported that perceived credibility of the claims and their impact on consumers' decisions to purchase tropical fruit juices depend on the nutrient being claimed, its perceived link to the fruit juice, and consumers' individual characteristics. In some cases, the use of nutrition and health claims is perceived as a pure marketing fad by consumers. Additionally, lack of scientific evidence regarding the bioavailability of nutrients and the exact nutrient profile of tropical fruits [24] may hinder the substantiation and legal approval of claims about their health benefits. This threat has been mentioned several times as a major drawback by representatives of the fruit juice industry.

In sum, threats can be categorised as: (1) European market access requirements, (2) consumers' unfamiliarity with tropical

fruits and their flavours, and (3) credibility of nutrition and health claims.

3.2. Internal strengths and weaknesses of açai

3.2.1. Characteristics of açai and its production

Açai, belonging to the family of the *Areaceae*, is a multi-stemmed palm tree widespread in the Brazilian Amazon estuaries and floodplains [25, 26]. The açai fruits, which grow in bunches, are small, black-purple-coloured berries about (1 to 1.5) cm in diameter. Each berry has one large seed – making up 85% of the fruit – which is surrounded by a thin pulp layer and covered by a hard, deep-purple-coloured shell [27].

The Pará state yields 90% of the total Brazilian açai fruit production, whereas – to a much lower extent – the açai palm is also found in the states of Amazonas, Tocantins, Maranhão and Amapá [28]. According to the Brazilian institute for geography and statistics (IBGE), açai production increased by manifold between 1975 and 2007. Whereas, in the late seventies, açai fruit production oscillated around 50 000 t annually, açai production fluctuated between (100 000 and 150 000) t for the period 2001 to 2007¹. However, the reliability of açai production data provided by the IBGE is debatable. Among the problems is its reliance on data

¹ Anon., *Produção da extração vegetal e da silvicultura 2002–2007*, IBGE, Rio de Janeiro, Brazil, 2002–2007, accessed on January 29, 2009 to the URLs:

www.ibge.gov.br/home/estatistica/economia/pevs/2003/pevs2002.pdf

www.ibge.gov.br/home/estatistica/economia/pevs/2003/pevs2003.pdf

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from the açai wholesale market of Belém without systematic data collection in the producing regions. In addition, the informal activities which characterise the commercialisation of açai make açai fruit production barely quantifiable [29]. As a result, enormous mismatches exist between official production data and other estimations. Rogez estimated a total açai production volume of at least 480 000 t annually [30]. Pessoa and da Silva e Silva mentioned an açai production of 350 000 t in 2004, being 35% more than in 2003 [31].

Açai berries are not consumed in fresh form. They are usually macerated with water and separated from their seeds to obtain a thick, purple-coloured beverage (“açai pulp”) [27, 30, 32]. Each kilogram of açai berries yields approximately between (0.3 and 1.5) L of fresh açai pulp, depending on the quantity of water added [29, 33]. Açai pulp is eaten as such or frozen for further uses in food and beverages (*e.g.*, bonbon, ice cream, liquor, juice). Pharmaceutical (*e.g.*, cough syrup) and cosmetic (*e.g.*, shampoo, soap) industries constitute other uses of açai [29].

Several studies have examined the nutritional composition of açai. Even though a large variability exists between the results – especially due to the use of different analytic methods – all studies agree that açai is a good source of calories, proteins, fibres and minerals, whereas vitamin content is estimated to be rather low. Açai berries are an extraordinary source of anthocyanins and have high antioxidant capacities [30, 34–37]. According to Rogez, açai contains per each 100 g of dry matter 66.3 kcal, 13 g of protein, 48 g of total lipids, 1.5 g of total sugar, 34 g of fibre, 286 mg of calcium, 932 mg of potassium, 124 mg of phosphorus, 174 mg of magnesium and 1.5 mg of iron [30]. Açai pulp is much sought after due to its high anthocyanin content, which varies between (70 and 1 000) mg·kg⁻¹ açai fruits [30], and antioxidant capacity, which is estimated at 27.8 mol Trolox equivalent (TE)·g⁻¹ (analysis performed on açai pulp obtained after depulping the açai berries with water addition in the relation [0.6 vol. of water / 1.0 vol. of açai]) [37]. Kuskoski *et al.* evaluated different commercialised frozen fruit pulps on their antioxidant capacities and revealed that the antioxidant capacity of açai is higher

than that of guava, graviola, passion fruit, cupuaçu and pineapple but lower than the antioxidant capacity of acerola, mango and grapes [38].

Açai berries are harvested by the riparian inhabitants by climbing the palm stems and removing bunches that bear the berries. Average annual açai production is estimated between (5 and 10) kg açai berries per palm tree [29]. As açai constitutes the primary staple food for the riparian inhabitants, a significant share (estimated at 20%) of the harvested açai is auto-consumed. The remaining fruits (estimated at 80%) are collected along the estuary by middlemen and transported by boats to the “ver-o-peso” (literally: see the weight) market in Belém, which concentrates the açai production from all over the estuary [11, 39]. It is estimated that approximately 70 to 120 brokers commercialise about (150 to 180) t of açai berries daily in the market of Belém [29]. Important buyers of fresh açai berries are the processing industries (80%), traders of surrounding regions (30%), and private persons, small retailers, local bars and restaurants (50%). The regional commercialisation of açai is characterised by numerous small açai stalls that process açai berries and sell the obtained fresh açai pulp to the local population. In 2008, the number of açai stalls in Belém was estimated at above 3 000, with a total estimated production of more than 400 000 L açai pulp per day [29, 30].

The highly perishable nature of açai pulp makes commercialisation in fresh form limited to the regional level in Brazil [32]. Large-scale industries process açai berries into frozen açai pulp which is further commercialised, either nationally or internationally. Estimates indicate that the trade in frozen açai pulp to other Brazilian states increased from 8 500 t in 2001 to 20 000 t in 2004 [11]. The USA represents the most important export market, while demand in Europe is also steadily increasing. According to Nogueira, international trade of frozen açai pulp reached less than 400 t in 2001, whereas export amounted to 2 500 t in 2005 [11].

3.2.2. Strengths

Açai belongs to the product category “tropical fruit”, which *in se* forms a strength

since consumers perceive tropical fruits as attractive, special, tasty, healthy and nutritious [8]. A definite strength results from the nutritional value of açai and its health-related benefits. As discussed above, açai berries have high antioxidant properties and anthocyanin content. Besides, the fruits have a high calorific value and are rich in proteins and lipids, whereas vitamin content is rather low [30, 34–37]. Because of its nutritional composition, açai is often categorised as a superfruit [4, 17].

Another strength is to be found in the existence of regional markets, national and some – albeit limited – international markets for açai pulp. This opens perspectives to realise further market penetration and to consolidate (inter)national commercialization of açai products. Pulp processing industries, which are widespread and well-established in the region of Belém, may create new fronts of commercialization and therefore constitute a strength.

In sum, the most important strengths are: (1) the fruit's tropical origin, (2) the nutritional value of açai, (3) the existence of a well-established regional and national market for fresh and frozen açai pulp, and (4) the existence of a national processing industry for açai berries.

3.2.3. Weaknesses

Açai berries are highly perishable and basically unusable for consumption three days after harvesting [29]. Commercialisation in fresh form is restricted to local and regional markets, whereas commercialisation to national and international markets requires fruit processing. Although processing industries exist, they lack the advanced knowledge and technical skills to improve the processing technologies and to guarantee constant good quality of the final product. Açai pulp is generally obtained by using traditional processing systems. After sanitising and immersing the açai berries in water to reduce the binding forces between seed and pulp, they are inserted in a vertical cylinder with inside rotating rods and a sieve at the bottom. A controlled water insertion in the superior opening of the cylinder facilitates the separation between seed and pulp. A purple-coloured emulsion, or açai pulp, is

formed which flows through the sieve, whereas the seeds are collected separately. The obtained açai pulp is further pasteurised, packaged and frozen for (inter)national trade. The quality of frozen açai pulp is variable as it depends on the water quality, the total water volume added and the rhythm of its addition [30, 31]. Rogez mentioned a variable incidence of microbiological contamination of açai pulp owing to the processing method, the fruit's origin, the water used and the preparation settings [30]. Another frequently occurring problem is inadequate temperature control along the processing chain and during storage of the frozen açai pulp. Additionally, long transport distances between production areas and markets, inadequate storage baskets combined with the highly perishable nature of the berries and their exposure to high tropical temperatures during transport, result in quality deterioration of berries, which has its impact on the overall quality of the final açai pulp.

Only 20% of the berries are harvested from cultivated plantations, whereas 80% are picked from naturally growing açai palm trees, which indicates that little to no attention is paid to plant crop management. In addition, collectors have very basic knowledge with respect to cultivation (*e.g.*, thinning, weeding, pruning, planting, transplanting) and storage activities. Because growers do not dispose of advanced know-how regarding production issues and because technical assistance is hardly available, growers do not succeed in producing high quality açai berries.

Finally, açai is not constantly available throughout the year as it follows seasonal patterns, with peak production concentrated between October and February [29].

In sum, the main weaknesses are related to: (1) inconsistent quality of açai pulp, (2) lack of advanced knowledge regarding production and processing issues, and product-related knowledge, and (3) irregular and insufficient fruit supply.

4. Discussion

The identified opportunities, threats, strengths and weaknesses are presented and

Table III.

SWOT matrix regarding the use of açai and its potential in the West European fruit juice industry.

Properties of the characteristics	Characteristics considered	Opportunities			Threats		
		Search for natural, healthy and nutritious fruit juices	Need for innovation	Interest in ethnic foods	Unfamiliarity	Credibility of claims	European market access requirements
Strengths	Nutritional value of the fruit	1	1		2	2	–
	Fruit's tropical origin	1	1	1	2		–
	Well-established regional and national market	–	–	1	–	–	2
	Existence of national processing industries	–	1		–	–	2
Weaknesses	Irregular and insufficient fruit supply	3	3	–	–	–	–
	Inconsistent fruit quality	3	3	–	–	–	4
	Lack of advanced knowledge about production and processing issues, and product-related knowledge	3	3	–	–	4	4

1, 2, 3, 4 signal the potential match between internal and external factors in the marketing environment: 1 = this strength allows one to benefit from this opportunity; 2 = this strength allows one to cope with this threat; 3 = this weakness prevents one from benefitting from this opportunity; 4 = this weakness prevents one from coping with this threat.

confronted in a SWOT matrix (*table III*). This matrix allows identifying key attention points for strategy development related to açai introduction and expansion in the West European fruit juice market.

European consumers are increasingly concerned about healthy eating and food-related diseases, which is reflected in a growing interest in nutritious and health-beneficial fruit juices. In addition, they search for natural and fresh juices with novel (exotic) fruit combinations. At the same time, health has become an important characteristic in food product positioning strategies. The West European fruit juice industry focuses on innovations, thereby constantly searching for novel food products with a healthy image. Nutritional characteristics of açai and its origin (*i.e.*, tropical and novel) result in strengths that permit one to take advantage of these current consumer trends. However, unfamiliarity with açai and its flavour may form an obstacle. Inadequate supply and inconsistent açai quality may hamper its use in the development of innovative fruit juices. Advanced skills and knowledge about production, transport and

processing issues are hardly available for growers, middlemen and the processing industry, though they are strongly required if one wants to supply international markets with good quality açai products. In addition, the inconsistent quality of açai pulp is a very relevant weakness when considered against the strict market access requirements regarding food quality and safety in the European Union.

Scientific evidence about the fact that açai contains valuable nutrients with potential health benefits and the existent regulation about the use of nutrition and health claims on fruit juice packaging [Regulation (EC) No. 1924/2006] are strengths which entail the potential to improve the perceived credibility of specific 'tropical fruit juice - claim' combinations. However, claim credibility may suffer from the limited knowledge regarding the bioavailability of the nutrients and the fruit's exact nutrient profile.

In Europe, the introduction of novel açai fruit beverages may also benefit from the increased interest in ethnic foods, which might be supported by strengths related to

the fruit's tropical origin and the existence of well-established domestic markets. When travelling, European tourists may enjoy consuming açai-based juices offered at local markets and may want to enjoy similar exotic taste experiences when they return home. Also immigrants, who are familiar with locally consumed açai fruit juices, may want to find these products they know from home in their new environment.

The need for innovation may take advantage of the already existing local processing industries and hence practical knowledge about processing technologies and uses of açai pulp. Because of increased shelf life, frozen açai pulp can be more widely available than fresh açai pulp, offering perspectives for innovation and increased variation in flavours in fruit juice assortments. Experiences from national processing industries and well-developed domestic markets may eventually permit producers to cope with international market environments. For example, profits realised in national markets may compose a buffer for the risks associated with the exploration of international markets with strict regulatory environments and high-quality-demanding end users.

5. Conclusion

Expert interviews, findings from previously performed consumer studies regarding tropical fruits, field visits and literature research indicate that açai, which has outstanding nutritional values and health-related benefits, could have substantial potential for introduction and long-term market presence in the West European fruit juice industry. Scant knowledge regarding the nutrient profile of açai, lack of advanced knowledge about production, transportation and processing issues which results in inferior and/or inconsistent açai quality, irregular and insufficient fruit supply, and unfamiliarity with açai and its sensory profiles are the main challenges that have to be overcome when envisaging successful entrance into the West European market.

Our study faces some limitations inherent to the research method used. A SWOT anal-

ysis aims at aggregating large amounts of information into a manageable number of key issues. This obviously results in a simplification of the reality. Therefore, the identified key issues here may apply to a different degree to particular regions or supply chains. Further analyses considering particularities and specific features of regions and chains are recommended. Since the West European consumer market, as well as its fruit juice industry, is quite heterogeneous and fragmented in many specific sub-markets and as açai has its own specific features, more in-depth quantitative research focusing on selected sub-markets is needed. Within the current consumer trends of accepting tasty fruit juices with additional health benefits, future research is recommended on consumer acceptance of açai-based fruit juices, taking into account health and sensory characteristics. More research should focus on the complete characterisation of the nutritional compounds and concomitant health benefits of açai.

Acknowledgements

This study was performed within the European Sixth Framework programme and fits into the project PAVUC (Producing added value from under-utilised tropical fruit crops with high commercial potential) under contract number FP6-2003-INCO-DEV-2-015279. Funding of the work by the European Commission is gratefully acknowledged. More information on the project can be found on www.pavuc.soton.ac.uk.

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Análisis del mercado Europeo por jugos de açai (*Euterpe oleracea* Mart.)

Resumen — Introducción. La creciente demanda en Europa por productos alimenticios y bebidas saludables y nutritivas con nuevos sabores ha originado oportunidades para proveer el mercado Europeo con jugos novedosos de frutas, incluyendo frutas tropicales como el açai (*Euterpe oleracea* Mart.). **Materiales y métodos.** Una de las especies de frutas tropicales del Brasil, el açai, se seleccionó como caso de estudio. A través de entrevistas con expertos, revisión de estudios de consumidores relacionados al consumo de frutas tropicales, visitas en campo y revisión de literatura, se realizó un análisis SWOT con el objetivo de tener una visión de las oportunidades, amenazas, fortalezas y debilidades relacionadas con el açai y su potencial en la industria de jugos de Europa Occidental. **Resultados.** Las oportunidades existen en vista del creciente interés de los consumidores por jugos naturales, saludables y nutritivos, la necesidad de innovaciones orientadas hacia la salud en la industria alimentaria, y un interés creciente por la variedad, los sabores novedosos y alimentos étnicos. El desconocimiento, la credibilidad de las propiedades saludables y los requisitos de acceso al mercado Europeo constituyen las amenazas principales. Las fortalezas están relacionadas con el valor nutricional del açai y su origen tropical, así como con la existencia de un mercado nacional y una industria procesadora bien establecidos. Las debilidades resultan de un suministro irregular y de una calidad del açai poco consistente, falta de conocimiento actualizado en relación con su cultivo y procesamiento, además de escasa información sobre el perfil nutricional de la fruta. **Conclusiones.** Los resultados indican que el açai, al presentar un valor nutricional y beneficios sobresalientes relacionados con la salud, puede tener un potencial sustantivo en el mercado de jugos de Europa Occidental. Entre los puntos clave que se deben atender se encuentran crear conciencia entre los consumidores, lograr familiarizarlos con el açai y sus productos, y obtener conocimiento real sobre las propiedades nutricionales del açai y sus efectos beneficiosos sobre la salud.

Europa / Brasil / *Euterpe oleracea* / jugo de frutas / mercados / entorno socioeconómico

