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Consumer Perception and Acceptability of Tomato-based Fruit Pulp Mixes

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study determined the perception of consumers on the acceptability of tomato-based fruit pulp mixes with a view to establishing the commercial viability of the production process. Three product alternatives earlier established in the laboratory were considered for the study. Product A contained (33.3% tomato + 33.3% watermelon + 33.3% pineapple). Product B contained (50% tomato + 25% watermelon + 25% pineapple) while Product C contained (25% tomato + 25% watermelon + 50% pineapple pulps). The perceptions of the potential consumers and producers of the products were assessed using two sets of questionnaire. For the consumers, 265 respondents were purposively selected from southwestern Nigeria. Majority (72.0%) of the respondents would like to consume the tomato-based fruits pulp mixes if they are available in the market while 0.8% would not and 27.2% were not sure. Majority (68.7%) of the respondents would prefer Product A while 18.9% and 12% preferred products A and B respectively. Among the factors responsible for the consumers' willingness to consume the products, high nutritional (3.58) and anti-oxidant (3.10) contents were rated significantly higher ($P=0.05$). The fruit companies were also willing to produce the product provided the raw materials are available.

Keywords: *Consumer perception; marketing; tomato; watermelon; pineapple; fruit pulp mixes; fruit juices.*

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1. INTRODUCTION

Tomato is one of the most widely consumed vegetable crops in the world, not only in terms of quantity, but also as a result of its nutritional value to human health. Tomato generates income and makes a large contribution to food security. The nutritional components of tomato are of particular concern to researchers and producers throughout the world. Tomato has a limited storage life and cannot be stored over extended periods. This problem is further compounded by lack of cold chain system. Conversion of tomato into paste provides a way of extending its shelf life/storage periods. Although ripening makes fruits edible and tasty, it also initiates the gradual deterioration of fruit quality, especially in climacteric fruits in which the onset of ripening is considered to be initiated by endogenous ethylene.

The awareness about healthy foods and drinks is on the increase and consequently people consume fruit juices to gain health benefits. The shift is slowly changing from usual fruit juices to vegetable fruit juices, such as tomatoes. Tomato is also an essential ingredient of the very common and popular tomato sauce. They contain high levels of vitamins and minerals along with essential dietary fibres [1].

Tomatoes also contain enzymes that prevent blood platelets from clumping together and forming blood clots. It is rich in antioxidant lycopene that is known to be an effective guard against breast cancer, prostate cancer, coronary artery diseases and atherosclerosis. Tomato is high in calcium, vitamin C, carbohydrates and phosphorus. It helps wash out toxins and other contaminations from the body and acts as a gentle stimulant for kidneys. Tomatoes are also rich in vitamin A and their regular consumption can prevent eye diseases such as short sightedness, night blindness, and other eye diseases caused due to vitamin A deficiency [1]. Effects of tomato juice supplementation on the carotenoid concentration in lipoprotein fractions and the oxidative susceptibility of low density lipoprotein (LDL) were investigated in 31 healthy Japanese female students. The result showed that alpha-tocopherol is a major determinant in protecting LDL from oxidation, while lycopene from tomato juice supplementation may contribute to protect phospholipid in LDL, from oxidation. Thus, oral intake of lycopene might be beneficial for ameliorating atherosclerosis [2].

According to [1] tomato juice is ideal for those who wish to reduce weight, as it contains less calories and negligible amount of fats. It is also ideal for diabetes patients because it reduces and controls sugar percentage in urine. This helps diabetes patients to reduce weight and maintain sugar levels in the body. Tomato juice is also effective in curing morning sickness, excessive gas formation in the intestine, gastro-intestinal diseases and indigestion as well as in preventing joint pain problems and respiratory disorders. Fresh tomato juice, mixed with pepper and salt, can be helpful in reducing nauseating feeling and could serve as a tasty drink as well [1,3].

Pineapple is a good source of manganese (91% DV in 1 cup serving), and also contains significant amounts of vitamin C (94% DV in 1 cup serving) and vitamin B1 (8% DV in 1 cup serving). Pineapple contains a proteolytic enzyme bromelain which breaks down protein and aids digestion [4,5]. Consumers of pineapple have claimed that pineapple prevents intestinal disorders, sore throat, and bronchi infection and serves as a pain reliever and induces childbirth when a baby is overdue. Fresh pineapple juice has many other uses, the juice was found to be effective in dissolving mucus and aiding recovery from the once dreaded tuberculosis disease. They are useful as providers of vitamin C with 19mg per 100g (4oz)

and the quantity of the vitamin may vary considerably with variety. Canning or bottling denatures the vitamin C.

In Nigeria, watermelon grows well both in the humid and drier savannah agro-ecologies, but foliar diseases are less destructive in the drier climates. This is because it requires warm climate and relatively long growing season. In order to obtain high yield of watermelon, there is need to augment or boost the nutrient status of the soil to meet the crop's need and thereby maintaining the fertility of the soil. This could be done by the use of organic materials such as poultry manure, animal waste, use of compost and inorganic fertilizers [6]. Watermelons are in nature an excellent source of magnesium, potassium as well as vitamins A (in the form of beta carotene), B and C necessary for energy production. They are also a great source of potassium which is known to control blood pressure and extremely low in sodium. A cup of watermelon contains only 48 calories. The juice contains more nutrients per calories. This is an outstanding health benefit [7].

An acceptable tomato-based fruit pulp mixes had been developed from blends of tomato, watermelon and pineapple juices [8]. The economic viability of these fruit pulp mixes using Engineering Economy methods was also established [9]. The objective of this study is therefore to determine the perception of consumers on the acceptability of tomato-based fruit pulp mixes with a view to establishing the commercial acceptability of the products.

2. METHODOLOGY

The study covered six states in Southwestern Nigeria namely Lagos, Oyo, Ogun, Osun, Ekiti and Ondo. A total of 265 respondents were randomly selected across the states. These respondents were identified as regular consumers of fruits juice pulp mixes. The research instruments used were questionnaire and interview techniques. This combination was adopted to ascertain reliability of responses. The questionnaire was designed for potential consumers of tomato-based fruits pulp product. The questionnaire elicited information on socio-economic characteristics of respondents, frequency of taking fruit juice, willingness and advantages of taking tomato-based fruit pulp mixes as well as factors influencing tomato-based fruit pulp mixes production and consumption. The questionnaire was pre-tested in Ile-Ife, Osun state. The outcome of the pre-test led to further modifications of the questionnaire in order to succinctly address the research objectives. The second set of questionnaire was administered on the fruit juice companies and elicited information on their willingness to manufacture tomato-based fruit pulp mixes. Data were analysed using descriptive and inferential statistics such as percentages, analysis of variance (ANOVA). Duncan Multiple Range Test was used to separate the mean ratings. Limitations to the study include reluctance of fruit juice manufacturing companies to disclose information about their operations which might be considered strategic to their operations. Also, potential consumers could not be provided with samples of the fruit juice mixes, their choices were based on description of the products by content. However, future studies could include actual sample product tests by potential consumers before full commercialisation.

3. RESULTS AND DISCUSSIONS

Table 1 shows the overall response rate to the questionnaire administered to the potential consumers of tomato-based fruits pulp mixes in the study area. The table indicated that 54% were males, while 46% were females. Majority (46.8%) of the respondents were within age range 21-30 years, followed by 13.6% of them whose age range was 31-40 years, while

13.6%, 6.4% and 4.2% were within 41-50, 12-20 and above 50 years respectively. About 59.6% of the respondents had bachelor degrees and HND, 19.6% had Masters degrees and 2.6% had Ph.D while the remaining 9.4%, 8.3% and 0.4% had college/Senior Secondary School; OND/NCE and Modern School/JSS III respectively.

Most of the respondents were either civil servants (32.1%) or students (31.7%) while others were accountants (2.36%), administrators (1.1%), architects, bankers, food technologists, nurses and statisticians (0.8% each), corpors (5.7%), engineers (3.1%), lecturers (2.6%), legal practitioners (1.5%), research officers (3.5%), chemists, pharmacists, veterinarians, sales officers, secretaries, senior technical officers, and soldiers (0.4% each), teachers (7.6%) and traders (2.3%). This shows that the respondents were drawn from various occupations, age groups and educational background.

Table 2 shows the preference of tomato-based fruit pulp mixes by the respondents. Majority (72.1%) would like to consume tomato-based fruits pulp mixes if they are available in the market while 0.8% would not and 27.2% were not sure. Majority (68.7%) of the respondents would prefer Product C, i.e. a blend of 25% tomato, 25% water melon and 50% pineapple while 18.9% and 12% preferred products A and B respectively. The preferred consumption levels of the products by the respondents are also shown in Table 2. About 46.4% of the respondents would consume 1 litre of Product C per day, while 16.6%, 2.3% and 3.4% would consume 2 litres, 3 litres and 4 litres per day respectively. About 18.1% and 10.2% would consume 1-2 litres of Products A and B respectively. This shows that people will consume the tomato-based fruits pulp mixes if made available in the market in Southwestern Nigeria. The above implies that customers have a good perception of the product. Perception is concerned with how a consumer sees and interprets a product in order to arrive at a decision concerning it [10] (Fill, 2002). It has been argued that customers' perception may lead to customers' satisfaction and loyalty to the product [11]. Customers' loyalty may create competitive advantage for the product [12]. It has also been observed [13] that the first stage in influencing the consumer perception of a product is to ensure that the product falls into their awareness set. It is only when they are aware of the product that it can form part of the option set for purchasing decision.

The factors responsible for the willingness of the respondents to consume the fruits pulp mixes were identified as good taste, good flavour, anti-oxidant (lycopene) content, carotenoid content, colour and high nutritional value of the products (Table 3). These reasons were rated significantly different ($P=0.05$) from each other. High nutritional content (3.58) was rated highest, followed by anti-oxidant content (3.10), good flavour (2.80), good taste (2.84) while colour was rated least (2.57). It was reported [14] that tomato is a good nutritional source rich in vitamin C, antioxidant, mainly lycopene, carotenes, organic acids and phenolic compounds. This therefore corroborates the assertion that the key factors in determining consumer behaviour are the perceived value of purchase and the perceived probability of satisfaction ([13]. It has been observed [15,16,17,18, 19] (that whether the buyer is satisfied after the purchase depends on the offer's performance in relation to the buyer's expectation. As a matter of fact, customers measure their experiences against a benchmark of the service they expect to receive [20,21]. Table 4 presents the impact of commercial production and consumption of tomato-watermelon-pineapple pulp mixes. About 50.9% of the respondents disagreed that commercial production of tomato-based fruits pulp mixes will affect negatively the marketing of other fruits juice/pulp mixes, 14.3% were undecided, while 34.7% agreed that it will affect the marketing of other fruit pulps. The mean rating of this factor was 1.92 which implies that the production of the tomato-based fruits pulp mixes would not have negative effect on the marketing of other fruit juice/pulp mixes.

Table 1. Socio-economic characteristics of respondents

S/No.	Description of Item	Respondent	
		Frequency	Percentage
1.	Gender		
	Male	143	54.0
	Female	122	46.0
	Total	265	100.0
2.	Age Group (in years)		
	12 – 20	17	6.4
	21 – 30	124	46.8
	31 – 40	77	29.1
	41 – 50	36	13.6
	> 50	11	4.2
	Total	265	100.0
3.	State of Origin		
	Lagos	60	22.6
	Ogun	54	20.4
	Osun	46	17.4
	Oyo	51	19.2
	Ekiti	25	9.4
	Ondo	29	10.9
	Total	265	100.0
4.	Educational Background		
	Modern School/JSS III	1	0.4
	College/Senior Secondary III	25	9.4
	OND/NCE	22	8.3
	B.Tech/B.Sc./B.A./B.Ed./HND	158	59.6
	M.A./M.Sc.	52	19.6
	Ph.D.	7	2.6
	Total	265	100.0
5.	Occupation		
	Accountant	6	2.3
	Administrator	3	1.1
	Architect	2	0.8
	Banker	2	0.8
	Chemist	1	0.4
	Civil Servant	85	32.1
	Corper	15	5.7
	Engineer	8	3.1
	Food technologist	2	0.8
	Lecturer	7	2.6
	Legal Practitioner	4	1.5
	Nurse	2	0.8
	Pharmacist	1	0.4
	Research Officer	9	3.5
	Sales Officer	1	0.4
	Secretary	1	0.4
	Senior Technical Officer	1	0.4
	Soldier	1	0.4

Table 1. Continued

Statistician	2	0.8
Student	84	31.7
Teacher	20	7.6
Trader	6	2.3
Veterinarian	1	0.4
Writer	1	0.4
Total	265	100.0

Source: Field Survey (2011).

Table 2. Preference to consume tomato, watermelon and pineapple pulp mixes by the respondents

S/No.	Description of Item	Respondent	
		Frequ-ency	Percen-tage
1.	Preferred Tomato, Watermelon and Pineapple Pulp Mixes		
	Yes	191	72.1
	No	2	0.8
	Not Sure	72	27.2
	Total	265	100.0
2.	Blend Preference		
	Blend 35.3% Tomato, Watermelon and Pineapple (Product A)	50	18.9
	Blend 50% Tomato, 25% Watermelon and 25% Pineapple (Product B)	33	12.5
	Blend 25% Tomato, 25% Watermelon and 50% Pineapple (Product C)	182	68.7
	Total	265	100.0
3.	Preferred consumption per day of:		
	Blend 33% Tomato, Watermelon and Pineapple		
	1 litre	38	14.3
	2 litres	10	3.8
	3 litres	1	0.4
	4 litres or more	1	0.4
	Preferred consumption per day of:		
	Blend 50% Tomato, 25% Watermelon and 25% Pineapple		
	1 litre	12	4.5
	2 litres	15	5.7
	3 litres	3	1.1
	4 litres or more	3	1.1
	Preferred consumption per day of:		
	Blend 25% Tomato, 25% Watermelon and 50% Pineapple		
	1 litre	123	46.4
	2 litres	44	16.6
	3 litres	6	2.3
	4 litres or more	9	3.4
	Total	265	100.0

Source: Field Survey (2011)

Table 3. Impact of commercial production and consumption of tomato-watermelon-pineapple pulp mixes

S/No.	Reasons	Rating	Respondent		Mean Rating
			Frequency	Percentage	
1.	Good Taste				
	Not a Reason	1	2	0.8	
	Low	2	5	1.9	
	Moderately High	3	101	38.1	
	High	4	82	30.9	
	Extremely High	5	75	28.3	
	Total		265	100.0	2.84 ^c
2.	Good Flavour				
	Not a Reason	1	1	0.4	
	Low	2	9	2.3	
	Moderately High	3	86	24.5	
	High	4	115	43.0	
	Extremely High	5	54	20.4	
	Total		265	100.0	2.80 ^c
3.	Antioxidant Content (lycopene)				
	Not a Reason	1	1	0.4	
	Low	2	6	2.3	
	Moderately High	3	65	24.5	
	High	4	114	43.0	
	Extremely High	5	79	29.8	
	Total		265	100.0	3.10 ^b
4.	Carotenoid				
	Not a Reason	1	2	0.8	
	Low	2	8	3.0	
	Moderately High	3	89	33.6	
	High	4	117	44.2	
	Extremely High	5	49	18.4	
	Total		265	100.0	2.77 ^c
5.	Colour				
	Not a Reason	1	6	2.3	
	Low	2	9	3.4	
	Moderately High	3	123	46.3	
	High	4	81	30.6	
	Extremely High	5	46	17.6	
	Total		265	100.0	2.57 ^d
6.	High Nutritional Content				
	Not a Reason	1	-	-	
	Low	2	1	0.4	
	Moderately High	3	21	7.9	
	High	4	65	24.5	
	Extremely High	5	178	67.2	
	Total		265	100.0	3.58 ^a

Means with the same letters are not significantly ($P=0.05$) different along the same column
Source: Field Survey (2011). Key: 1- Not a reason 2- Low 3- Fairly High 4- High 5- Extremely High

As many as 96.2% of the respondents perceived that commercialization and consumption of tomato-based fruit pulp mixes would improve the nutritional status of the consumers, while 3.0% and 0.8% strongly disagreed and were undecided respectively. About 78.5% of the respondents agreed that commercialisation of the fruit pulp mixes will make the product available for consumption to reduce stress among the consumers. However, 10.8% of them disagreed and 10.9% were undecided whether the product will reduce stress or not. The result also showed that 48.3% and 24.5% of the respondents agreed, and strongly agreed respectively that consumption of the pulp mixes will reduce ageing among the consumers. Majority (81.1%) of the respondents agreed that the production of the fruit pulp mixes will reduce drastically the annual wastage of these crops, while 14.7% disagreed with the statement (Table 4).

Table 4. Measurement of Impact of commercial production of Tomato-based fruit pulp mixes by the respondents

S/No	Description of Item	Rating	Respondent		Mean Rating
			Frequency	Percentage	
1.	Affect negatively the marketing of other fruit juice/pulp mixes				
	Undecided	1	38	14.3	
	Disagree	2	56	21.1	
	Strongly Disagree	3	79	29.8	
	Agree	4	72	27.2	
	Strongly Agree	5	20	7.5	
	Total		265	100.0	1.92 ^e
2.	Improve the nutrition status of the consumers				
	Undecided	1	2	0.8	
	Disagree	2	-	-	
	Strongly Disagree	3	08	3.0	
	Agree	4	130	49.1	
	Strongly Agree	5	125	47.1	
	Total		265	100.0	3.42 ^b
3.	Reduce stress of the consumers				
	Undecided	1	29	10.9	
	Disagree	2	11	4.2	
	Strongly Disagree	3	17	6.4	
	Agree	4	139	52.5	
	Strongly Agree	5	69	26.0	
	Total		265	100.0	2.78 ^d
4.	Reduce ageing of the consumers				
	Undecided	1	45	17.0	
	Disagree	2	11	4.2	
	Strongly Disagree	3	16	6.0	
	Agree	4	128	48.3	
	Strongly Agree	5	65	24.5	
	Total		265	100.0	2.59 ^c
5.	Reduce the annual wastage of these crops				
	Undecided	1	11	4.2	
	Disagree	2	9	3.4	
	Strongly Disagree	3	30	11.3	
	Agree	4	92	34.7	

Table 4. Continued

	Strongly Agree	5	123	46.4	
	Total		265	100.0	3.16 ^c
6.	Provide job in the down stream of the production				
	Undecided	1	-	-	
	Disagree	2	1	0.4	
	Strongly Disagree	3	8	3.0	
	Agree	4	115	43.4	
	Strongly Agree	5	141	53.2	
	Total		265	100.0	3.49 ^{ab}
	Negatively affect other food uses of tomato				
	Undecided	1	19	7.2	
	Disagree	2	61	23.0	
	Strongly Disagree	3	99	37.4	
	Agree	4	51	19.2	
	Strongly Agree	5	35	13.2	
	Total		265	100.00	2.08 ^e
8.	Earn foreign exchange for the country				
	Undecided	1	5	1.9	
	Disagree	2	5	1.9	
	Strongly Disagree	3	12	4.5	
	Agree	4	110	41.5	
	Strongly Agree	5	133	50.2	
	Total		265	100.0	2.08 ^e
9.	Improve the income of the farmers				
	Undecided	1	-	-	
	Disagree	2	1	0.4	
	Strongly Disagree	3	2	0.8	
	Agree	4	83	31.3	
	Strongly Agree	5	179	67.5	
	Total		265	100.0	3.66 ^a

Means with the same letter along the same column are not significantly ($P=0.05$) different
Source: Field Survey (2011). Key: 5- Strongly agree 4- Agree 3- Strongly disagree 2- Disagree 1- Undecided

The commercialization of the tomato-based fruits pulp mixes on a large scale will provide jobs in the downstream sector of the production as claimed by 96.6% of the respondents. Similarly, about 92% of the consumers perceived that production of the fruit pulp mixes will earn foreign exchange for the country while 98.8% believed that it will improve the income of the farmers through high demand of tomato, watermelon and pineapple by the factory.

Majority (90.6%) of the respondents recommended commercial production of the fruits pulp mixes of tomato, water melon and pineapple (Table 5). Few (10.6%) respondents supported the use of tomato with the other fruits to produce pulp mixes.

Table 5. Recommendation of tomato-based fruits pulp mixes by consumers

S/No.	Description of Item	Respondent	
		Frequency	Percentage
1.	Tomato-watermelon-pineapple		
	Yes	240	90.6
	No	25	9.4
	Total	265	100.0
2.	Tomato with other fruits pulps		
	Yes	28	10.6
	No	265	80.4
	Total	265	100.0

Source: Field Survey (2011)

Table 6 shows that the 2 respondent factories were not producing tomato-based fruits pulp mixes. They produced fruit juices and fruit pulp mixes from other fruits such as mango, pineapple, apple, orange, among others. However, one of them was willing to produce tomato-based fruits pulp mixes if the raw materials are available. Both factories obtained their raw materials locally and through importation from other countries (Table 7). One of the respondents indicated that insufficient supply of raw material to their factory was no problem while the second one believed it was a fairly serious problem (Table 8), and both claimed that transportation of raw materials to their factories won't constitute a serious problem. However, the cost of inventory management as well as seasonal variation in raw materials production was considered a serious problem. Table 9 shows that the average capacity utilization by the 2 factories were between 31-60% and 61-80%.

Table 6. Type of juice/pulp mixes that each factory is producing and willingness to produce tomato-based fruits pulp mixes

Description of juice/pulp mixes	Respondents	
	Frequency	Percentage (%)
Types of fruit pulp mixes		
Production of Tomato based fruit pulp mixes	-	-
Production of other fruit pulp mixes	2	100.00
Willingness to produce Tomato based		
Yes	1	50.00
No	1	50.00

Source: Field Survey (2011)

Table 7. Availability of raw materials

Means of obtaining raw material	Respondents	
	Frequency	Percentage (%)
Obtains raw materials locally	2	100.00
Obtains raw materials through importation	2	100.00
Difficulty in sourcing raw materials		
Yes	2	100.00
No	-	-

Source: Field Survey (2011)

Table 8. Challenges of locally obtained raw materials for the production of fruits juice and fruits pulp mixes

	Respondents		Mean Rating
	frequency	percentage	
Insufficient supply by farmers			
Not a serious problem	1	50.00	
Fairly serious	1	50.00	
Serious	-	-	
Very serious problem	-	-	
Cost of transportation to the factory			
Not a serious problem	2	100.00	
Fairly serious	-	-	
Serious	-	-	
Very serious problem	-	-	
Cost of inventory management of raw materials			
Not a serious problem	-	-	
Fairly serious	2	100.00	
Serious	-	-	
Very serious problem	-	-	
Seasonal variation in production			
Not a serious problem	-	-	
Fairly serious	1	50.00	
Serious	1	50.00	
Very serious problem	-	-	

Source: Field Survey (2011)

Table 9. Method of production and capacity utilization

	Respondents	
	Frequency	Percentage
Method of production of fruit juice/pulp mixes employed in factory		
Highly mechanized	-	-
Semi-mechanized	2	100.00
Manual operation	-	-
Method of sorting out product		
By hand	1	50.00
By machine	1	50.00
Packaging the product		
By hand	-	-
By machines	2	100.00
Average capacity utilization		
10 – 20%	-	-
21 – 40%	-	-
31 – 60%	1	50.00
61 – 80%	1	50.00
81 – 99%	-	-
100%	-	-

Source: Field Survey (2011)

Table 10 shows the reasons for operating at less than of 100% capacity utilization (CU). Some respondents claimed that insufficient electricity supply from the national grid extremely contributed to this low capacity utilization. An earlier study had also shown that the average industrial capacity utilization in Nigeria was about 30% and poor power supply was implicated for this [22]. Water supply was also reported to contribute fairly to low capacity utilization. One of the respondent companies also indicated that the cost of raw materials was a fairly contributory factor while the other one indicated that it was not contributory to low capacity utilization. Similar responses were obtained for the availability of raw materials. It also shows that cost of transporting raw materials and operating and maintenance costs of the facilities were also fairly contributory to their operation below 100% CU. One of the respondent companies was interested in continuous production of tomato-based fruit pulp mixes while the other one was not (Table 11).

Table 10. Factors contributing to less than 100% capacity utilization in some fruit juice processing companies

Factor	Respondents	
	Frequency	Percentage
Electricity		
Extremely contributing	1	50.00
Contributing	-	-
Fairly contributing	1	50.00
Not contributing	-	-
Undecided	-	-
Water Supply		
Extremely contributing	-	-
Contributing	-	-
Fairly contributing	2	100.00
Not contributing	-	-
Undecided	-	-
Cost of raw materials		
Extremely contributing	-	-
Contributing	1	50.00
Fairly contributing	1	50.00
Not contributing	-	-
Undecided	-	-
Availability of raw materials		
Extremely contributing	-	-
Contributing	2	100.00
Fairly contributing	-	-
Not contributing	-	-
Undecided	-	-
Cost of transportation of raw materials		
Extremely contributing	-	-
Contributing	-	-
Fairly contributing	1	50.00
Not contributing	1	50.00
Undecided	-	-

Table 10 Continued....

Cost of labour		
Extremely contributing	-	-
Contributing	-	-
Fairly contributing	1	50.00
Not contributing	1	50.00
Undecided	-	-
Operating and maintenance cost		
Extremely contributing	-	-
Contributing	-	-
Fairly contributing	1	50.00
Not contributing	1	50.00
Undecided	-	-

Source: Field Survey (2011)

Table 11. Interest in continuous production of tomato-based fruit pulp mixes

	Respondents	
	Frequency	Percentage
Yes	1	50.00
No	1	50.00
Total	2	100.00

Source: Field Survey (2011)

4. CONCLUSION

This study assessed the perception of consumers on the acceptability of tomato-based fruits pulp mixes. The perceptions of the potential consumers about the acceptability of the products were established. Though tomato-based fruits pulp mixes production is not common in Nigeria, tomato, watermelon and pineapple are highly abundant for production of pulp mixes in the country. Majority (52.1%) of consumers preferred the product, with the remaining (47.9%) holding negative opinion. Out of the 3 samples, 68.7% respondents preferred sample C while the remaining 18.9% and 12.5% preferred samples A and B respectively. Majority (90.6%) of them recommended the production of tomato-based fruits pulp mixes. The commercial production of tomato-based fruits pulp mixes is not yet popular in the existing fruits juice companies. However, the industry had sufficient capacity to produce enough for the country with the installed capacity of up to 16 million litres per annum. The production of the tomato-based fruits pulp mixes enjoys positive perception and consumer acceptability would not be a serious problem.

5. RECOMMENDATIONS

Tomato-based fruits pulp mixes production despite their nutritional benefits, is not fully produced in Nigeria compared with other advanced countries. However, the following recommendations can enhance consumption and commercial production in the country.

- (i) Government and the private sector should invest more in the agricultural sector to produce more tomato, watermelon, pineapple and other fruits to serve as inputs for the production of tomato-based fruits pulp mixes.

- (ii) Banks of industry and other industrial development as well as commercial banks should provide loan for individuals or groups who are interested in investing in the pulp mix production.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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