Factors Influencing the Patronage of Coconut Fruit Case Study: Cape Coast Metropolis—Ghana

Irene Kafui Amponsah

Department of Mathematics and Statistics, University of Cape Coast, Cape Coast, Ghana

Abstract: Majority (80%) of people worldwide may not be aware of the numerous invaluable benefits of "the tree of life": the coconut palm especially the fruit. Some benefits include: its juice for weight loss, cure of hung-over, diarrhoea, balance of body's pH level, among others. None-the-less, its availability and continuity to support life is hindered by the Cape St. Paul disease. To buttress government's efforts, this paper seeks to find out whether people are aware of some of the benefits of the coconut palm and the disease that attacks it. The survey revealed that, although awareness level of respondents' on some facts about the coconut fruit was moderate (40%-69%), majority (97%) of respondents consumed both the meat and juice. Respondents (70%) patronized coconut fruit weekly. Consumers' patronage of coconut fruit was influenced by three factors: health benefits, availability and packaging. The development of the CPS (coconut patronage scale) was a major contribution.

Key words: CPS, health benefits, Cape St. Paul disease, factor analysis, tree of life.

1. Introduction

One of the most useful plants is the coconut palm, known botanically as *cocos nucifera* where nucifera means "nut bearing" [1, 2] is grown around the world in lowland tropical and subtropical habitats. In Ghana, the coconut palm is one of the most important cash crops in the four coastal regions of Ghana (Greater Accra, Central, Volta and Western Region). Before 1920 [3], coconut cultivation was confined to the Keta area. Its cultivation then spread to other areas of Ghana particularly along the coast.

In Sanskrit, this palm is rightly labeled as *Kalpavriksha*. It means a tree which gives all that is necessary for living [4]. This is because all the parts of the tree are useful in some form or the other. There are many uses of the coconut fruit as well. There are many food uses, which include milk, meat, sugar and oil. Research has shown that the coconut also functions as its own dish and cup. The husk is also beneficial, as it is

Corresponding author: Irene Kafui Amponsah, master, main research fields: queuing theory and simulation, general data exploration. E-mail: decwed@yahoo.com.

burned by the natives and is also used to make coir, which is then used to make brushes, mats, fish nets as well as ropes. Oil is also derived from dried coconut and is used for commercial frying as well as for cooking at home. It is also used in candies, margarine and in non-edible products such as soaps and cosmetics. Its juice for most of us is just a tropical drink that claims to be a good source of nutrition.

The invaluable benefits derived from the coconut palm and more especially the fruit is underestimated. Most people are either not aware of its benefits or they have little knowledge regarding its numerous importance. Though people may not be aware of its invaluable benefits, some claim that certain factors hinder its patronage even in areas known to cultivate the fruit. According to the Ghana News Agency, in just a period of three years, the price of fresh coconut has tripled rising from as low as 20 Ghana pesewas (20 Gp) in 2007 to as high as 60 or more Ghana pesewas (60 Gp) in 2011 [5], especially in the capital city of Accra and Cape Coast.

Coconut sellers also attribute the hike in the price to

rising cost of transportation of the produce from the farm gates and more importantly the declining supply of the produce due to the devastating nature of a disease called, Cape St Paul Wilt disease was named from an eastern coastal location (Volta Region-Woe) in Ghana where reports of dying coconuts apparently date back to the 1930s. Despite only being reported from one area for 40 years, the disease did spread to other parts of the country like the Western Region at Cape Three Points and later to neighbouring Ivory Coast.

Subsequently, reviving commitments this year to help save the globally acclaimed: "The tree of life" the coconut tree [6], the government of Ghana through its sector Ministry of Food and Agriculture, has instituted measures to help resuscitate the coconut sub sector. Given the nutritional value and importance of coconut and the critical role that the coconut sector plays in improving food security in Ghana, Government has decided as part of the measures to give prominence to the sector for the celebration of this year's World Food Day.

To buttress government's efforts, this paper seeks to find out whether people are aware of some of the benefits of the coconut palm and the disease that attacks it—Cape St. Paul. Subsequently, factors that influence the patronage of the fruit (juice, meat) would be identified and the scale will be called the CPS (coconut patronage scale). This scale will help to enhance further research and follow-ups on awareness creation on the benefits of coconut fruit; for knowledge is power.

2. Methodology

This section outlines the data sampling techniques, collection method and statistical techniques employed for data analysis.

2.1 Data Collection and Sampling Technique

Thousand and thirty-four (1,034) respondents were interviewed using a well structured questionnaire but after data screening and cleaning a total of 1,021 was used which is 21 extra on the intended 1,000. The target population was the people of Cape Coast in Ghana and quota sampling was employed since this is an opinion poll. The region is largely made of floating respondents (students of all ages and level) and this gave some general perspective regarding views from the whole country. The quotas comprise geographical areas on student, worker and non worker basis. Quota sampling is analogous to stratified sampling in which the selection of the sample was made by the interviewers who have been given quotas to fill from specified sub-groups of the population though the proportional selection was entirely based on the interviewers' discretion but care was taken to make the method of selection as representative as possible.

2.2 Statistical Technique

Data was summarized using frequency distribution tables, descriptive statistics and graphical representations for both qualitative and quantitative variables. In order to further summarize the 19 items of the Coconut Patronage Scale, PCS would be subjected to principal component analysis.

Principal component analysis is one of the families of FAT (factor analytical techniques). The factor analytical techniques serve the purpose of data reduction in that relationship among sets of many interrelated variables are examined [7] and represented in terms of a few underlying factors. Researchers are involved in the development and evaluation of tests and scales [8]; the developer starts with a large number of individual scale items and questions and by using FAT, refine and reduce these items to smaller number of coherent subscales. Stevens [9] argues that principal component analysis is psychometrically sound and simpler mathematically and it avoids some of the potential problems with "factor indeterminancy" associated with factor analysis. There are three crucial steps involved in factor analysis: assessment of the suitability of data for factor analysis, factor extraction and factor rotation and interpretation. Development of

the CPS will enable fellow-up research (confirmatory analysis) into the factors identified.

3. Results and Discussion

This section presents results of data analysis in two parts: preliminary analysis and further analysis.

3.1 Preliminary Analysis

Majority (97%) of respondents consume either both the meat and the juice (87%) and one out of every five persons either consume the juice or the meat of the coconut fruit. Various reasons were given by respondent regarding why they do/do not consume coconut.

Fig. 1 shows that consumers take the fruit because it gives them nutritional and medicinal value, it's refreshing and natural, but mostly due to other reasons (no response, responses below 1%, etc.). Respondents who do not take the fruit mostly refuse to give reasons and the few who responded stated they did not eat fruit or the fruits were too expensive, scarce and some had health complications when they take the fruit (Fig. 2).

Respondents stated some benefits they derive from the patronage of coconut fruit but this research seeks to verify whether their knowledge cut across various uses of this "tree of life". 20 items (facts about coconut fruit) comprise the awareness basket. An awareness level for the purposes of this research was categorized into three parts namely: low (below 40%), moderate (40%-69%) and high (70% and above). Respondents scored high on eight facts, moderately on nine facts and low on three facts about coconut fruit as shown in Table 1. It must be stated emphatically that respondents may not have been sincere on their awareness since the cross-check with the patronage scale was inconsistent. These may be attributed to non sampling error due to respondents been embarrassed that they are ignorant. Generally, awareness level of respondents' on some facts about the coconut fruit in totality was moderate. This calls for awareness creation on these facts so that some natural remedies for certain health implications can be solved.

The next sub-section outlines the processes in the coconut patronage scale development to enhance further research into the factors that were identified.

3.2 CPS

Step 1: Assessing data and extracting the factors

19 items of the CPS were subjected to PCA (principal component analysis) using SPSS Version 16. Prior to performing PCA the suitability of data for
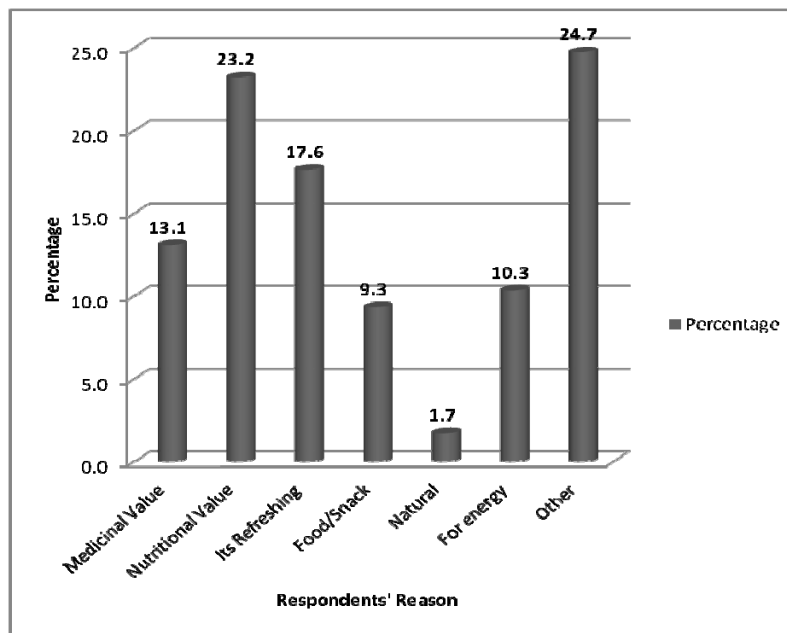

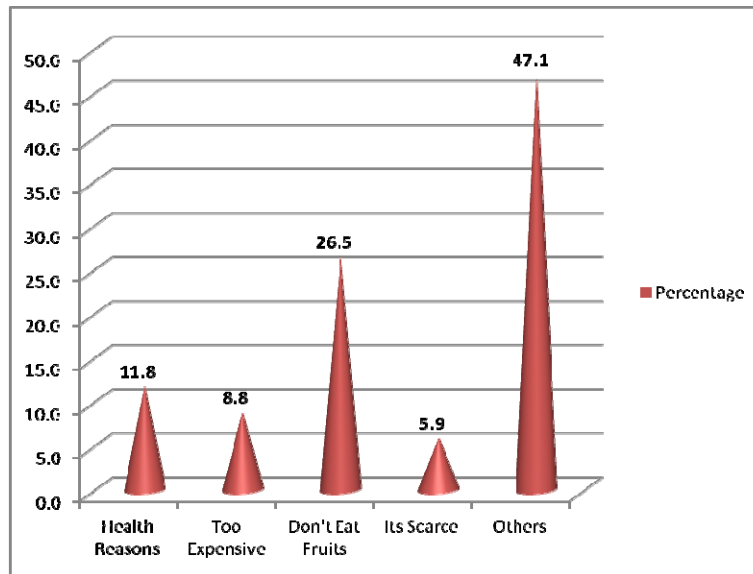**Fig. 1   Reasons for taking coconut fruit.**

Fig. 2   Reasons for not eating coconut fruit.

Table 1   Rating on awareness of coconut fruit.

Coconut fruit awareness basket	Rating
Oil is derived from dry coconut meat.	
The meat and milk is used for soap, cosmetics and pastries.	
Its juice keeps the body hydrated.	
The husk and shell is used for fuel and charcoal.	High
Its juice gives instant energy.	
It is a caffeine free and soda free drink.	
The fruit contains essential vitamins.	
Improves digestion.	
Its juice controls sugar level.	
Its juice perks up metabolism.	
The husk is burnt to make coir which is used for brushes, mats, fish net and ropes.	
Its juice helps relieve urinary tract infections and other urinary ailments.	
Its juice is used as antioxidants (eliminate kidney stones).	Moderate
Its juice is good for weight loss.	
Its juice relieves diarrhoea, stomach upsets, cholera.	
Its juice is a natural hangover remedy.	
Its juice balances the body's pH.	
Its juice removes black marks and pimples.	
Coconut plus olive oil for three days kill intestinal worms.	Low
The tree is attacked by Cape St. Paul disease.	

factor analysis was assessed. Inspection of the correlation matrix revealed the presence of a moderate number of coefficients of 0.3 and above. The Kaiser-Meyer Oklin value of 0.854, exceeding the recommended value of 0.6 and Barlett's Test of Sphericity reached statistical significance ($p = 0.0000 < 0.01$, or 0.05, or 0.10), supporting the factorability of the correlation matrix [10]. Principal component analysis revealed the presence of six components with eigenvalues exceeding 1, explaining 53.7% (22.5%, 8.3%, 6.3%, 5.7%, 5.6% and 5.3%, respectively) of the variability in the data. An inspection of the screeplot revealed a clear break after the second component. According to Catell's scree test [11], the two factors was enough for further investigation whereas Kaiser Criteria would also have retained six factors. An additional technique used was the Horn's parallel analysis [12] which is gaining

popularity [14]. This approach to identifying the correct number of components to retain has been shown to be the most accurate, with both Kaiser's criterion and Catell's scree test tending to overestimate the number of components [15, 16]. In the parallel analysis, the 19 variables were selected with 1,021 subjects and for stable results; the results were replicated 100 times. The program then: (1) generates random normal numbers for the quantity of variables and subjects selected; (2) computes the correlation matrix; (3) performs principal components analyses and calculates the eigenvalues for those variables; (4) repeats the process as many times as specified in the replications field; and (5) calculates the average and standard deviation of the eigenvalues across all replications [17]. Three factors were extracted by the results of parallel analysis with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (19 × 1021)

respondents in Table 2.

Step 2: Factor rotation and interpretation

To aid the interpretation of these three factors/components (extracted using parallel analysis) both Varimax and Direct Oblimin [18] were explored and the Varimax rotation interpreted the components better though the two methods gave the same groupings, the variable compositions were slightly different.

The rotated solution revealed the presence of simple structure with all components showing a number of strong loadings and most variables (75%) loading substantially on only one component. The three factor solution explained a total of 37.1% of the variance, while the six components earlier explained only 53.7%. In interpreting the factors, the four variables that loaded on two components were retained on the component they loaded highest on, hence factor (1) was labeled Health Benefits, factor (2): Packaging and factor (3): Availability (Table 3).

Table 2   Number of factors retained.

Component number	Actual eigenvalue from PCA	Criterion value from parallel analysis	Decision
1	4.284	1.2438	Accept
2	1.578	1.1978	Accept
3	1.185	1.1657	Accept
4	1.093	1.1360	Reject
5	1.069	1.1115	Reject
6	1.003	1.0855	Reject
7	0.895	1.0625	Reject
8	0.889	1.0379	Reject
9	0.869	1.0159	Reject
10	0.798	0.9950	Reject
11	0.758	0.9736	Reject
12	0.721	0.9525	Reject
13	0.696	0.9304	Reject
14	0.660	0.9091	Reject
15	0.588	0.8867	Reject
16	0.559	0.8652	Reject
17	0.497	0.8394	Reject
18	0.456	0.8122	Reject
19	0.399	0.7792	Reject

Table 3 Rotated component matrix^a.

	Component		
	1	2	3
It has health benefits.	0.705		
It rehydrates the body.	0.669		
It is food/snack.	0.657		
It has nutrients.	0.655		
It serves as water.	0.635		
It improves digestion.	0.555	0.347	
It gives instant energy.	0.548		
It reliefs diarrhea and stomach upset.	0.541		0.355
Its juice is refreshing.	0.420	0.366	
Its juice stains clothes.		0.625	
Coconut fruit is durable.		0.543	
It is attacked by Cape St Paul disease.		0.478	
It is delicious.	0.431	0.468	
It is associated with bad myth.			0.585
It is scarce.			0.555
It is a natural hangover remedy.	0.467		0.504
It is expensive.			0.354
It is a seasonal fruit.			0.313
It is not well packaged.			

Extraction method: principal component analysis;

Rotation method: varimax with Kaiser normalization;

a. Rotation converged in six iterations.

4. Conclusions and Recommendation

This paper reveales that although awareness level of respondents' on some facts about the coconut fruit was moderate (40%-69%), majority (97%) of respondents consumed both the meat and the juice whereas one out of every five persons either consumed the juice or the meat of the coconut fruit. Respondent (70%) patronized coconut fruit weekly or occasionally and the average price at which the fruit was sold ranged between 50-70 p (Ghana Pesewas) though few areas within the metropolis sold it below 50 p and above ¢1 (Ghana Cedis).

Consumers' patronage of coconut fruit is influenced by three factors: health benefits, availability and packaging. The scale developed to achieve this result was named the CPS.

It is recommended that massive awareness be made on the health benefits of coconut fruit and industries/agric sector should go into its cultivation.

The necessary bodies are also to compliment government and individual efforts on research to cure the Cape St. Paul disease so issues on availability (pricing, scarcity, packaging, etc.) would be addressed. This research would follow-up to investigate coconut juice for weight reduction.

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