

## APPRAISAL OF PAPER EGG TRAY USAGE IN SOUTHWESTERN NIGERIA

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### Abstract

Challenges of quality and quantity of Paper Egg Tray (PET) in south western Nigeria called for attention. Though the region holds 60% of Nigeria's industrial capacity, yet, the pattern of usage and preferences in paper egg trays by its numerous users in the region were still unknown due largely to communication gap between the manufacturers and the users. Therefore, there was need to appraise the usage pattern and preferences in P.E.T by its several users in the region.

Consequently, a survey was conducted among more than 500 paper egg tray users in the six states of Southwest Geopolitical Zone of Nigeria, between the months of March and May of 2016. The purpose of the survey was to discover the preferred parameters and usage pattern of paper egg trays in the region. The choice of the zone was as a result of its popularity and proficiency in poultry farming, poultry egg merchandize, hatchery business, and paper egg tray utilization.

Based on the data obtained during the survey, the usage pattern and preferences by P.E.T users in South Western Nigeria were established. Profiles of P.E.T users and their opinions on both local and imported paper egg trays (P.E.T) were also discovered. It was revealed that egg traders (merchants) were the leading users of P.E.T in the region, in terms of frequency and volume of purchase. The level of confidence and acceptance of locally-produced P.E.T in the region were shown to be stable.

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**Keywords:** paper egg trays (P.E.T), respondents, opinions, profile, sample population, southwest Nigeria.

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## INTRODUCTION

Challenges of quality and quantity of paper egg tray in south western Nigeria called for attention. Influx of various brands of egg trays into the region's market is not even solving the problem. Many paper egg tray-producing companies in the region have gone into liquidation due partly to communication gap between the manufacturers and the users. The problem is becoming compounded day in, day out. Yet, the region is acclaimed to be the egg trading and poultry farming hub in the country due to favourable weather conditions for the growth of the businesses (Abubakar M.D, 2015). Despite the location of top-rank commercial poultry sector players; and presence of two of the three largest cities of Nigeria in the region, the paper egg tray users are still helpless. Though the region holds 60% of Nigeria's industrial capacity, hitherto, the pattern of usage and preferences in paper egg trays by its numerous users in the region are still unknown (*gamji.com*).

In Nigeria, 14 million people are directly or indirectly engaged in commercial poultry sector. It contributes about 25% to Agricultural Domestic Products of the Nigerian economy. Nigeria is rated number one egg-producing nation in Africa. In 2011 alone, Nigeria produced about 553,000 metric tonnes of eggs (Onallo Akpa, 2013). It also has about 180 million birds out of which 120 million are in rural poultry, and 50 million (i.e layers and broilers) are in commercial poultry in formal poultry outfits (Ahmed Mohammed, 2015). Meanwhile about 75.3% of the birds in Nigeria were egg layers as posited by T. Omodele and I.A Okere, 2014.

Notwithstanding, distribution of eggs within Nigeria and its neighbours faces the main difficulty of safe egg packaging. Different packaging methods have been adopted in the past, and the commonest and most sustainable among these are the use of plastic and pulp egg trays. Plastic egg trays are more durable, washable, fanciful, but costlier and lacks air permeability, hygroscopicity, eco-friendliness, and shock absorbing qualities needed for egg safety, thereby

aiding eggs cracking on transit. Meanwhile, PET provides adequate protection, and guard for eggs on transit. It absorbs excess natural moisture hence reduces the risk of mould, rot and the spread of micro-organism. PET is more economical; can be recycled and fully biodegradable. It is strong yet soft enough to protect eggs against breakage during haulage and storage. Paper egg trays, as the chief packaging materials, are made from 100% recycled wastepaper; and are eco-friendly, soft, strong, shock-proof, air-permeable and hygroscopic.

Egg is the single animal protein that is most consumed and prepared in variety of ways by vast majority of people around the globe (*Surai and Sparks, 2001*). Yet, they are naturally breakable and require careful handling and protection especially during supply sequence. Eggs travel a long journey from farm through packers, wholesalers, retailers, depots, supermarket, and finally to the consumers, yet the eggs must be intact, fresh and attractive. From the spot of laying to the final destination, more eggs are broken during transportation than in any other step during processing and distribution; therefore, losses due to breakage are greatest during transportation (*Thompson and Hamilton, 1986*).

Egg trays are frequently called filler trays and typically have 30 cells i.e., for 30 eggs. They can be customized to meet customer's demand appropriate mould. The expanded polystyrene (EPS) has been the foremost viable alternative materials to pulp molded products; followed by plastic and corrugated die-cut inners. With respect to price, delivery time, outlook and physical strength characteristics, EPS has minor advantages over other materials, its poor environmental qualifications make it vulnerable on eco-friendliness and sustainability considerations. This provides replacement and alternative opportunities to pulp moulded trays (*IDRG Consultancy Services, 2011*). This paper therefore, appraised the usage pattern and preferences of paper egg trays (P.E.T) by its abundant users in South-Western region.

## **MATERIALS AND METHOD**

### **The Study Area**

The study was conducted in the South West Geo-political zone of Nigeria which comprises Lagos, Oyo, Osun, Ondo, Ogun and Ekiti states respectively; and inhabited predominantly by Yoruba native speakers (Fig 1 and Fig.2). The choice of the zone was as a result of its popularity and proficiency in poultry farming, poultry egg merchandize, hatchery business, and paper egg tray utilization. The zone is one of the six geopolitical zones of Nigeria. It has a population of about 25 million people, land mass of about 76852km<sup>2</sup>, and has control of about 60% of Nigeria's industrial capacity, (*gamji.com*). Also, it is a national and intercontinental economic hub, and home to two of the three largest cities in Nigeria; Ibadan and Lagos (*AOAV and NWGAV, 2013*). The zone is also the custodian of large commercial players in poultry sector in the country (*Sahel Capital, 2015*)

### **Data Collection**

Between the months of March and May of 2016, a survey was conducted among more than 500 paper egg tray users in the six states of Southwest Geopolitical Zone of Nigeria (Fig 1 and Fig.2). The purpose of the survey was to discover the desirable parameters and usage pattern of paper egg trays usage in the region. The survey was conducted by means of structured and unstructured questionnaire accordance with the approach of *Keith G.D (2002) and Thomas F.B (2001)*. The first part of the questionnaire dealt with the pattern of preferences in paper egg trays; the second with opinions on local and imported paper egg trays; while the third was on profile of the respondents.

The tools used during the survey were structured and unstructured questionnaire, oral interview and visual (*Priscilla A. G, 2005*). After conduct of pilot survey and ratification of questionnaire contents, they were administered and the completed questionnaires were collected by hand. Observation of activities on the field, and face to face and oral interview were also conducted. Questionnaires were both structured and unstructured, and the total of 520 completed questionnaires were received and sorted. 500 of the received were used for data collection and analysis. The rejects were either uncompleted or mutilated questionnaires. The total of completed questionnaires fell among the respondents in the proportions of 40%, 30%, 16%, 10% and 4% for egg traders, poultry farmers, egg retailers, egg tray distributors and hatchery owners respectively.

Due to large population size, an extreme sample size of 500, at 95% confidence level,  $\pm 5$  confidence interval and 50% percentage level was arrived at, using an online calculator ([www.surveysystem.com](http://www.surveysystem.com)). The non-probabilistic sampling techniques used during the survey for data collection were judgment technique, convenience technique, and quota technique respectively (*Winnie Mugara, 2013*). After data collection, they were edited and coded using SPSS statistical package (*Daniel Arkkelin, 2014*). They were then analyzed and presented using descriptive statistics.

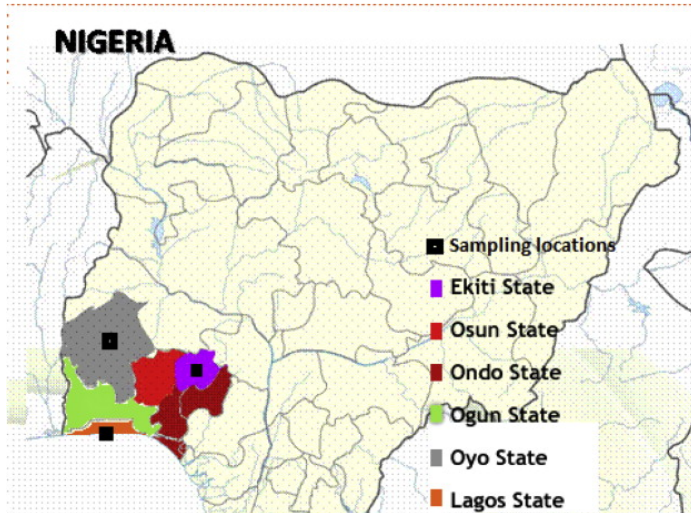


Fig. 1: Map of Nigeria Showing Sampling Locations  
Source: *researchgate.net*



Fig 2: Map of South Western Nigeria  
Source: *www.aoav.org.uk/wp-content.*



Fig 3: Container-Load of Paper Egg Trays  
Source: *Anonymous*



Fig 4: Aesthetic Value of White P.E.T  
Source: *Anonymous*

## RESULTS AND DISCUSSION

### Profile of Respondents

Table 1 shows the profile of the respondents. From the table, about 57% of the entire sample population was female. The age range was between 18 and 54 years. However, 19% of the population was between 18 and 24 years, 29% was between 25 and 34 years, 42% was between 35 and 44 years, and 10% was between 45 and 54 years of age. This implies that P.E.T active users in the region were predominantly between the ages of 35 and 44 years and were predominantly female.

Also, the educational qualification of respondents was in order of about 4% for those with no formal education, 18% for those that had primary education, 46% for those that had secondary education, 17% for NCE/Diploma holders, 12% for OND/HND/BSc holders, and 3% for those having postgraduate degrees. Equally, 60% of the respondents were married, 33% was single, 5% was divorced, and 2% widowed. Meanwhile, weekly usage of P.E.T by respondents was in proportion of 2% for those using below 1 bundle (100 pieces), 14% for those using between 1 and 5 bundles, 28% for those using between 6 and 10 bundles, and 38% for those using more than 10 bundles.

However, 2% of the respondents had less than 1 year work experience in the business, 11% had between 2 and 5 years of experience, 43% had between 6 and 10 years, and 44% had more than 10-year work experience in the business respectively.

Table 1: Profile of Respondents

Profile	Frequency	Percentage
<b>Gender</b>		
Male	215	43
Female	285	57
<b>Age</b>		
18-24	95	19
25-34	145	29
35-44	210	42
45-54	50	10
<b>Education</b>		
No Formal Education	18	4
Primary Education	90	18
Secondary Education	228	46
NCE/Diploma	87	17
OND/HND/B.Sc	62	12
Postgraduate Degree	15	3
<b>Marital Status</b>		
Married	300	60
Single	165	33
Divorced	25	5
Widowed	10	2
<b>Weekly PET Usage</b>		
< 1 bundle	100	20
1-5 bundles	70	14
6-10 bundles	140	28
>10 bundles	190	38
<b>Years of Experience</b>		
< 1 year	10	2
2-5 years	55	11
6-10 years	215	43
>10 years	220	44



## **Opinions on Local and Imported Paper Egg Trays**

Diverse opinions on local and imported P.E.T, by the selected 500 respondents were recorded during the survey as shown in table 2 below. 89% of the respondents were satisfied with the quality, production and distribution of local paper egg trays, 3% was unsatisfied, and 10% was indifferent. Also, 18% was of the opinions that imported P.E.T was stronger than the local trays, while about 84% of them responded otherwise. Meanwhile, 53% of the respondents agreed that local PET are generally better than the imported, while about 47% disagreed about the claim. Similarly, 60% of the respondents were in agreement with the fact that local P.E.T were cheaper than the imported, while about 40% were in disagreement with the notion.

In the same vein, about 63% of the respondents agreed that local PET were more available in the market than the imported, while about 37% of them disagreed. While about 54% of the respondents wanted imported PET banned from the country, up to 46% of them wanted continuous importation of PET into the country. Although, on aesthetic value of PET, about 59% of the respondents were of the opinion that imported PET are more physically attractive than the local, while about 41% were in disagreement about the claim. Lastly, about 35% of the respondents were in agreement with the fact that imported PET have dominated the market, but 65% of them responded otherwise.

Table 2: Opinions on Local and Imported Paper Egg Trays

S/N	Questions	Agreed (%)	Disagreed (%)	Indifferent (%)
1	Production, quality and distribution of local PET is satisfactory?	89	3	18
2	Imported PET are stronger than the local trays?	18	84	-
3	Imported PET are generally better than local PET?	47	53	-
4	Imported PET are cheaper than the local trays?	40	60	-
5	Imported PET are more available than the local trays?	37	63	-
6	Imported PET should be banned from the country?	54	46	-
7	Imported PET are more attractive than the local trays?	59	41	-
8	Imported PET have market dominion over local trays?	35	65	-

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## **Preferences in Paper Egg Trays**

### *Pattern of Preference of Various Egg-Packaging Materials*

Fig. 5 shows the patterns of preference of various egg-packaging materials by respondents. The materials are paper egg trays, plastic egg trays and PVC egg trays. It however shows that 65% of total sampled population had preference for paper egg trays, 32% for plastic trays, and 3% for PVC egg trays respectively. Amongst the groups of respondents, only egg traders and trays distributors were major supporters of paper egg trays, with 90% and 82% of their responses respectively; other groups like poultry farmers, hatchery owners and egg retailers were majorly in support of plastic egg trays for packaging with 53%, 55% and 51% of their responses respectively. The preference for PVC was greatly low amongst the respondents. Generally, paper egg tray was the most preferred material for packaging by the respondents.

The reason for P.E.T preference amongst the respondents may be connected to its attributes like cheap price, light weight, shock absorbing and eco-friendliness. However, plastic egg tray, was preferred by some respondents due to its satisfactory strength, durability and wash-ability.

### *Frequency of P.E.T Usage for Packaging*

Fig 6 shows the frequency of P.E.T usage for packaging. It shows that 32% of the sampled population preferred using a particular paper egg tray only once, 23% for twice and 45% for more than 3 times respectively. From the result, egg traders, tray distributors and hatchery owners majorly use a particular PET only once for packaging with 51%, 66% and 60% of their respective responses; while poultry farmers and egg retailers confirmed using P.E.T more than three times for packaging with 83% and 76% of their respective responses. The whole result

indicates that simple majority of the respondents believed in using a particular PET for more than three times for packaging.

The reasons for this diverse trend is because, egg traders do sell eggs with trays, and not expected to be returned back, therefore they tend to request for more paper egg trays than any other egg tray users (Fig.3). Equally, tray distributors as well as hatchery owners do use PET only once as a tradition of their businesses respectively. However, poultry farmers and egg retailers use PET for more than three times because they do not sell eggs with the trays; the trays have to be returned to the seller for reuse. This is achieved due to the fact that both poultry farmers and egg retailers often buy more of durable (brown) paper egg trays irrespective of the cost.

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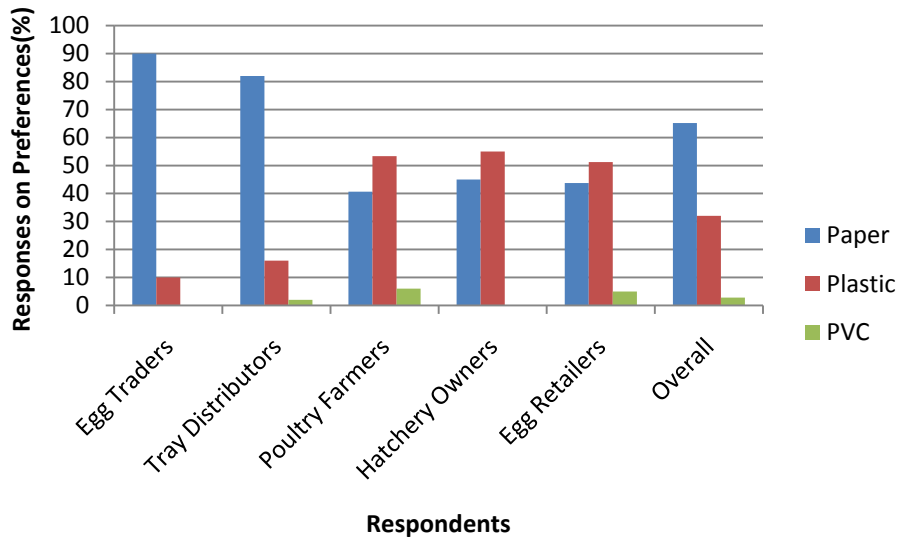


Fig. 5: Pattern of Preference of Various Egg-Packaging Materials

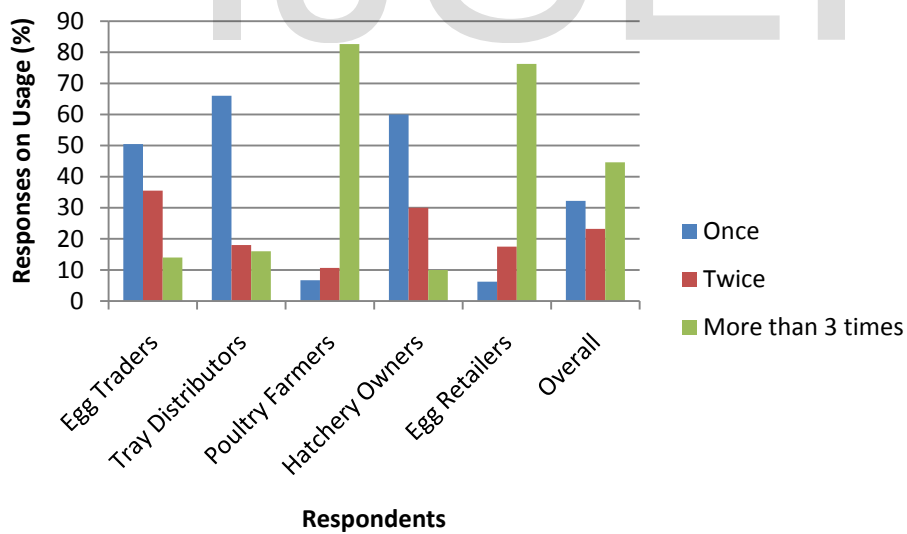


Fig 6: Frequency of Paper Egg Tray Usage for Packaging

### *Factors Influencing P.E.T Selection*

Fig.7. shows the factors influencing P.E.T selection. The factors are durability, attractiveness, light weight and heaviness of P.E.T. The result shows that 83% of the population had preference for durability, 11% for attractiveness, 3% for light weight, and 3% for heavy weight respectively, as the factor influencing their P.E.T selection. This signifies that a very large population of respondents was in favour of durability as the most influencing factor in selecting a particular P.E.T.

### *Preference of P.E.T Cell-Size*

Fig 8 shows preference of PET cell-size. It was a response to the questionnaire question. The cell sizes are extra-large, large, medium and small respectively. The result shows that 3% of total sampled population preferred small egg tray cell-size, 40% for medium size, 52% for large size, and 5% for extra large size respectively. This shows that egg traders and tray distributors were majorly in support of P.E.T with medium cell size, by virtue of 75% and 60% their respective responses; while poultry farmers, hatchery owners and egg retailers were in major support of large cell size by virtue of their 91%, 65%, and 75% respective responses.

The reasons for the trends may be as a result of the fact that; the majority of the chicken eggs being produced and traded by egg merchants are of medium size, so P.E.T of medium cell-size will appropriately accommodate medium and other sizes of eggs and make them look bigger and attractive. Poultry farmers, hatchery owners and egg retailers, however, preferred large cell-size because a P.E.T with large cell-size will freely accommodate all sizes of eggs and therefore guard against egg cracking.

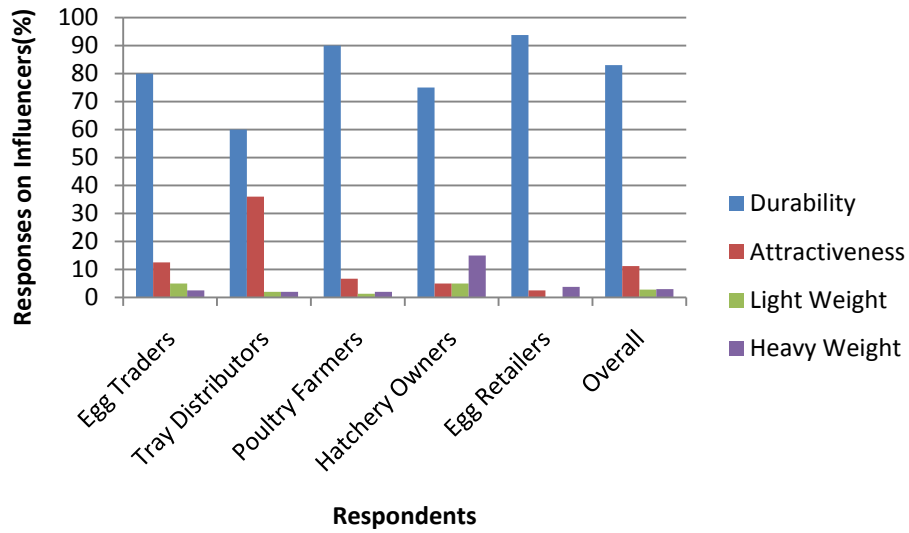


Fig 7: Factors Influencing P.E.T Selection

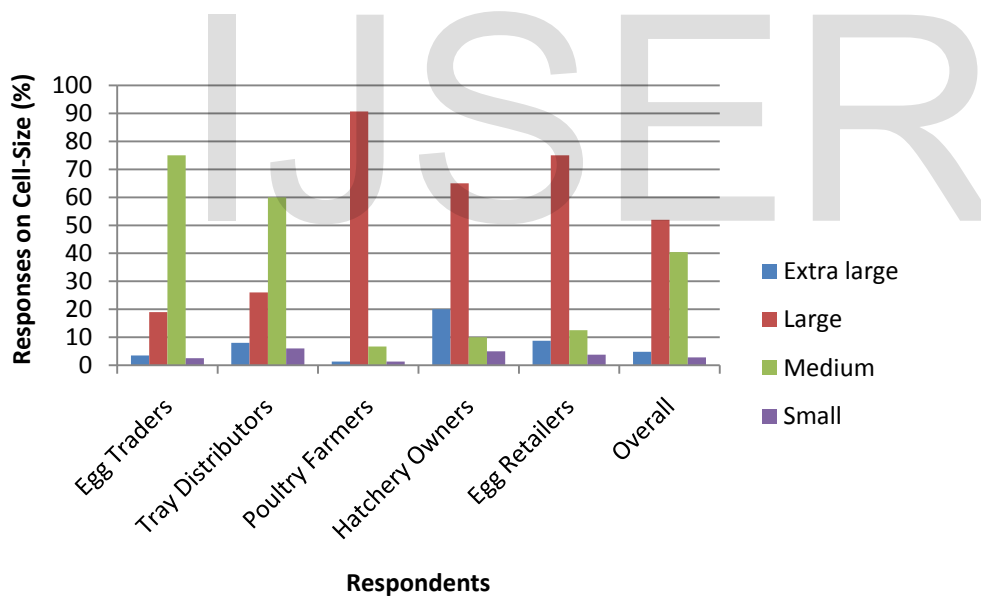


Fig 8: Preference of P.E.T Cell-Size

### *Preference of PET Colour-Types*

Fig. 9 shows the preference of P.E.T colour-types by respondents. The colours are white, brown and others. The result shows that 47% of the total population preferred white colour, 50% for brown colour, and almost 3% for other colours, respectively. This indicates that poultry farmers, hatchery owners and egg retailers preferred PET with brown colour, by virtue of their 93%, 60% and 88% of their respective responses; while egg traders and tray distributors preferred P.E.T with white colour by 88% and 74% of their respective responses. Also, few respondents preferred P.E.T with other colours like blue, yellow and purple. Meanwhile, overall responses show that both white and brown colours were majorly preferred, with brown colour taking a slight lead.

Preference for P.E.T with white colour by egg traders and tray distributors may be connected with the aesthetic value of the loaded egg trays. White colour is believed to be beautiful when combined with light brown colour (colour of eggs) (Fig.4). It is also believed that white trays are comparatively cheaper, lighter and more available than the others. Meanwhile, respondents in favour of brown trays did so due to their (brown trays) perceived satisfactory strength and durability.

### *Major Attributes of P.E.T*

Fig 10 shows the responses on major attributes of P.E.T. The attributes are strength, cell design, cost, colour and dimensions of P.E.T respectively. The result shows that 38% of the total sampled population considered strength as major attribute of P.E.T, 36% for cell design, 12% for cost, 5% for colour, and 9% for dimensions respectively. This shows that egg traders and egg retailers were influenced by P.E.T strength, by virtue of their 55% and 44% respective responses;



poultry farmers and hatchery owners were influenced by P.E.T cell design due to the 61% and 50% of their respective responses; and tray distributors were influenced by cost of PET by virtue of the 40% of their responses. However, general response shows that strength and cell design were the major attributes of P.ET considered by the respondents.

### *Effects of Seasons on P.E.T Demand*

Figure 11 shows the responses on the effects of seasons on P.E.T demand. The seasons are raining, dry and harmattan seasons of the year. The result shows that 44% of the total respondents chose rainy season, 13% chose dry season, and 43% chose harmattan season respectively. This shows that P.E.T were more demanded during both rainy and harmattan periods of the year. Those in favour of rainy season (tray distributors 60% and poultry farmers 47% of their respective responses) did so because P.E.T tend to get wet and spoilt more during the season, so they need replacement. Also, more households tend to eat more eggs during this period; hence, there is increase in the demand for P.E.T which is used for their packaging. Rainy season starts around March and ends in mid-October in the southern part of Nigeria, while it starts in June and ends around September in the Northern part of the country (*en.m.wikipedia.org*).

However, there is high demand for chicken eggs and paper egg trays by northerners during harmattan period (as shown by egg traders, poultry farmers and hatchery owners with 50%, 40% and 40% of their respective responses) due to the extremely cold weather condition in the region Harmattan, a part of dry season starts in late November and ends in mid-March of every year (*Encyclopedia Britannica*). Northerners consume majority of chicken eggs produced in the country. Northerners comprises northern Nigeria, Niger, Chad, and other North African countries which receive chicken eggs imported from Nigeria. Lastly, dry season records low demand for egg and PET due to its adverse effects on chicken egg production and distribution.

### *Factors Motivating Purchase of Local P.E.T*

Figure 12 shows the factors motivating the purchase of local P.E.T. The result shows that 27% of the total population was motivated by price, 49% by value, 7% by availability, 10% by brand name, and 8% by recommendation. This shows that all categories of respondents except tray distributors agreed that 'value' of P.E.T motivates them to buy a particular P.E.T. Tray distributor however, considered price (cheap) as the motivating factor for the purchase of P.E.T. The 'value' in this regards means the benefits and satisfaction derivable from purchase and use of a particular P.E.T.

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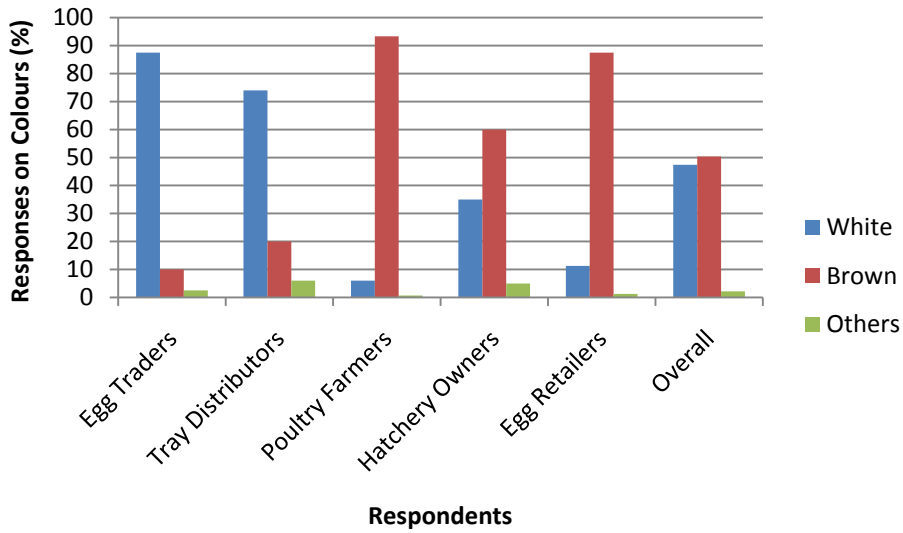


Fig 9: Preference of P.E.T Colour-Types

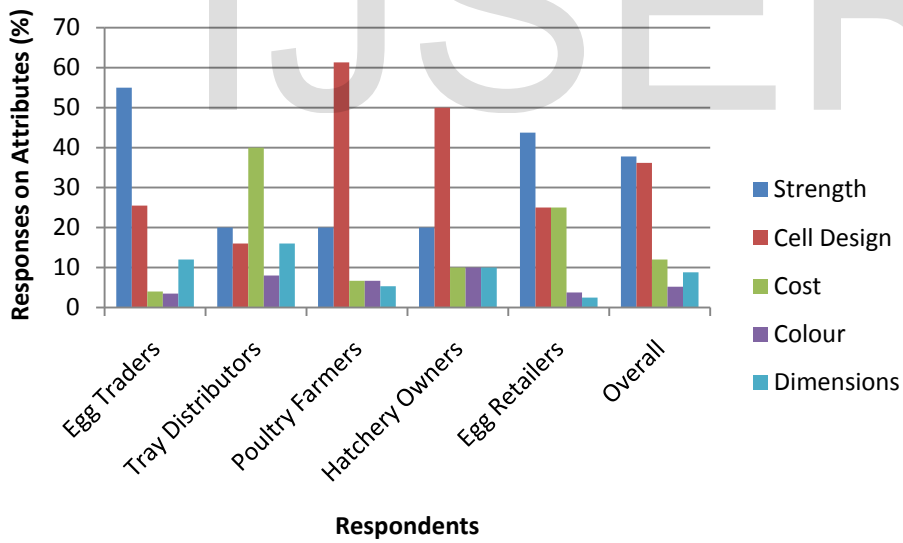


Fig 10: Major Attributes of P.E.T

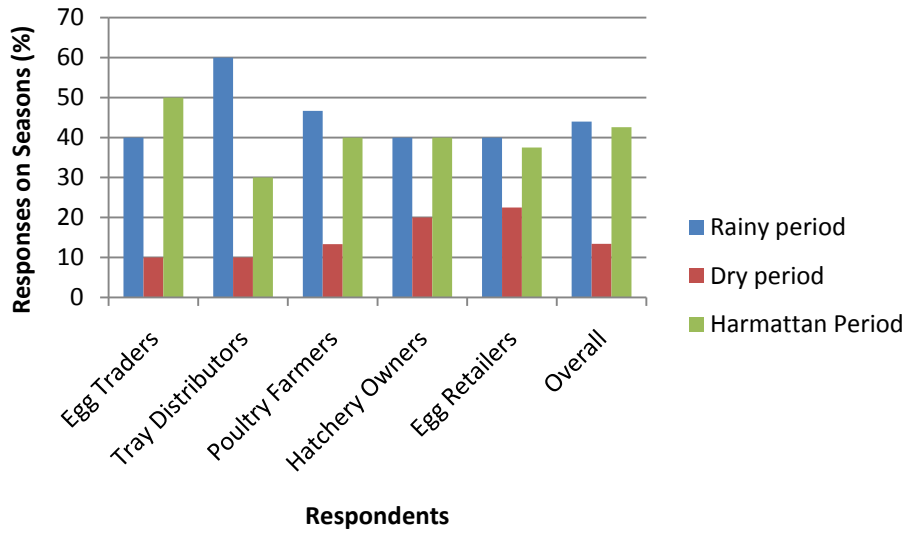


Fig 11: Effects of Seasons on P.E.T Demand

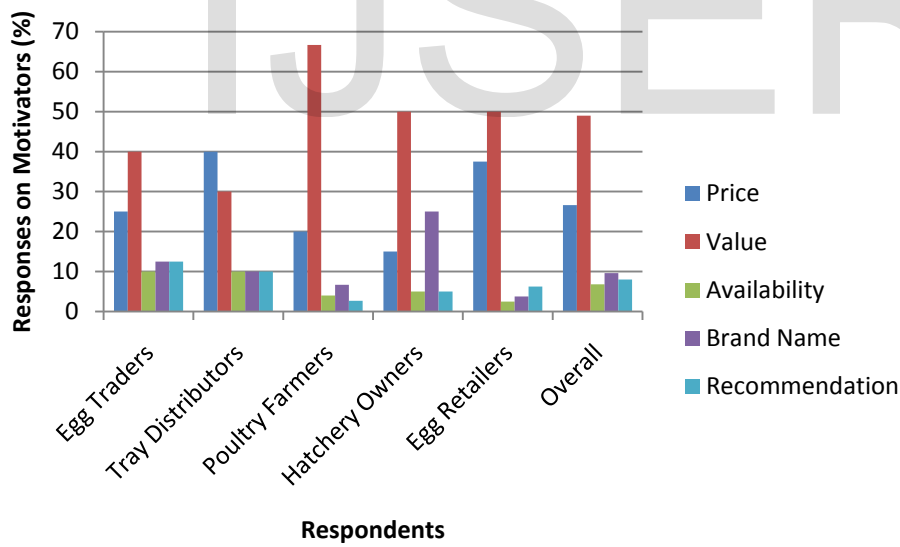


Fig 12: Factors Motivating Purchase of Local P.E.T

## **Conclusions**

Based on the data obtained during the survey, the usage pattern and preferences by P.E.T users in South Western Nigeria have been established. Profile of P.E.T users and their opinions on both local and imported paper egg trays (P.E.T) have also been revealed. It is discovered that egg traders (merchants) are the leading users of P.E.T in the region, in terms of frequency and volume of purchase. The level of confidence and acceptance of locally-produced P.E.T in the region are shown to be stable.

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## References

- Abubakar M.D, 2015: 'In L&Z Halal Farm, Eggs Have Expiry Date'. Daily Trust Newspapers. [www.dailytrust.com.ng](http://www.dailytrust.com.ng). Retrieved on August 20, 2016
- Ahmed Mohammed, 2015: "Nigeria Has 180 million Birds, Needs No Poultry Importation". Online Interview. [www.vanguardngr.com](http://www.vanguardngr.com). Retrieved on 07/08/2016.( Dr Ahmed Mohammed is the Executive Director of National Veterinary Research Institute (NVRI))
- AOAV and NWGAV, 2013: The Violent Road: Nigeria's South West
- Daniel Arkkelin, 2014: Using SPSS to Understand Research and Data Analysis. *Psychology Curricular Materials. Book 1.*
- Gay L.R. 1981. Educational Research: Competencies for Analysis & Application.
- Geography of Nigeria: [en.m.Wikipedia/wiki/Geography of Nigeria](http://en.m.wikipedia/wiki/Geography_of_Nigeria). Retrieved on 29/07/16
- Harmattan in Nigeria: Encyclopedia Britannica. Retrieved on 22 July 2016.
- IDRG Consultancy Services, 2011: Project on Green Industries (Part II). Detailed Feasibility Analysis of Recycling of Paper Waste – Pulp Molded Products
- Keith G. D, 2002: A Step-by-Step Guide to Developing Effective Questionnaires and Survey Procedures for Program Evaluation & Research.
- Map of Nigeria: [www.researchgate.net/figure/265910035\\_fig1\\_Map-of-Nigeria-showing-the-sampling-locations-in-southwest-Nigeria](http://www.researchgate.net/figure/265910035_fig1_Map-of-Nigeria-showing-the-sampling-locations-in-southwest-Nigeria). Retrieved on 28/07/2016
- Map of South Western Nigeria: [www.aoav.org.uk/wp-content](http://www.aoav.org.uk/wp-content). Screen-Shot-2013-12-12-at-02.39.18-1024x1007. Retrieved on 02/08/2016
- Omodele T. and Okere I.A, 2014: GIS Application in Poultry Production: Identification of Layers as the Major Commercial Product of the Poultry Sector in Nigeria.
- Onallo Akpa, 2013: Online Article. [www.m.poultrysite.com](http://www.m.poultrysite.com). Retrieved on 07/08/2016. (Onallo Akpa; General of Poultry Association of Nigeria PAN)
- Priscilla A. G, 2005: Fundamentals of Survey Research Methodology
- Sahel Capital, 2015: An Assessment of the Nigerian Poultry Sector. Sahel Newsletter (Volume 11)
- Sample Size Determination: Online software. [www.surveysystem.com](http://www.surveysystem.com). Retrieved on 10/04/ 2016

Surai P.T and Spark NHC,2001: Designer Eggs: From Improvement of Egg Composition to Functional Food. Trends Food Sci. Tech., 127-16.

Thomas F.B, 2001: A General Introduction to the Design of Questionnaires for Survey Research.

Thompson B.K., and Hamilton, 1986. Relationship Between Laboratory Measures Of Eggshell Strength and Breakage of Eggs Collected at a Commercial Grading Station. Poultry Sci. 65:1877–1885.

Winnie Mugara, 2013: Non-probabilistic Sampling Techniques. Research Method

*http://www.gamji.com*: Nigerian Economy. Online Article 6000. Retrieved on 02/08/2016

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