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ASSESSMENT OF COMMERCIAL SMALLHOLDER EGG PRODUCTION SYSTEMS IN GREATER PORT HARCOURT CITY, NIGERIA

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Abstract

Commercial smallholder egg production systems in Greater Port Harcourt City were assessed for problems and opportunities to intervene. Desk study, survey of 94 farmers using semi-structured questionnaires and focus group discussion with eight farmers were carried out. Commercial smallholder farmers with maximum of 2,500 layers were purposively sampled. Subjects were selected using snowballing sampling technique. Three local government areas (Obio-Akpor, Oyigbo and Etche) of the eight in Greater Port Harcourt City were surveyed. Quantitative data was analyzed using descriptive statistics in Statistical Package for Social Sciences while matrices were used to analyze focus group discussion data. Results show low participation of youths in commercial smallholder egg production. All farmers attained some level of education. Majority (50%) had Bachelor's degrees, hence, potential for innovation adoption. Farmers were motivated by self-employment (68%) and extra income (32%) to produce eggs. Average flock size (1100) was low and inadequate to meet egg demand. Farms were mainly (91%) self-financed, thus confirming weak support for farmers by banks and government. No farm activity was automated except watering (21%). Though all farms use some form of electricity, most (70%) depended on electricity generators, which increased production costs. Majority (94%) of farmers use commercial compound feed. Most (59%) bought their feed through middlemen while others (41%) buy direct from feed manufacturing companies to gain 15% margin. Similarly, 62% bought day-old-chicks through day-old-chicks distributors while 38% procure direct from hatcheries to gain 21% margin. To improve profits, farmers should form egg producers' cooperatives to enhance bulk input purchases, and reduce costs.

Keywords: Motivation, Farming systems, Feed

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1. Introduction

Farming systems refer to a population of mostly mixed small and larger farm households, which when grouped have broadly similar livelihood and consumption patterns, constraints, and opportunities. Farm households in the same farming system also have similar agro-

ecological and market access conditions for which similar development strategies and interventions could be applied (Garrity et al., 2012). The farm household is the basic unit of a farming system, its operator and decision maker.

In a farming system, farm households allocate various qualities and quantities of land, labour, capital and management at their disposal. In carrying out the resource allocation, farmers consider their farm family's goals, preferences and available resources. These considerations are influenced by farmers' knowledge, experiences, and complex interaction of these interdependent components with the external factors i.e. socio-cultural, physical, biological, political, economic, institutional, science and technological forces (Singh et al., 2006). The complex interaction of interdependent components with external factors has made farming systems approach multidisciplinary.

Farming systems can be differentiated by natural resources (water, land, grazing areas and forest) available to the system; climate of the area where the system is in use; dominant pattern of farm activities; household livelihoods; and main technologies used. Also, farming systems are described and understood by their structure and functioning. The structure includes land use pattern and tenure, production relations, size of farm holding and their distribution, water and energy source and use, labour, marketing, transport, storage, credit institutions, finance, research and education (Dixon et al., 2001).

There is no commonly agreed farming systems classification for egg production system in Nigeria. However, basic criteria used across frameworks to classify egg production systems include aim of production, breed of birds, management system, housing, feeding, source of funding, and scale of production or number of birds reared (Adene and Oguntade, 2008). Based on these criteria, the simplest and most common egg production systems in Nigeria are commercial and traditional. These two systems have intermediate systems between them.

Commercial egg production system is a system whose size is large-scale (thousands to millions of birds), uses modern improved breeds, located around cities, and requires high use of inputs and technology (Pagani et al., 2008). Commercial egg production system is also profit-oriented. This does not, however, mean that the operator of the system cannot use outputs of the system for family consumption. If used for family consumption, they must be accounted for.

The traditional egg production system on the other hand is subsistent (mainly for family consumption but surpluses are sold), small-scale in size (few to hundreds of birds), associated with rural households, and uses non-standard breeds. Due to rapid urbanization, the traditional egg production system is now found in both urban and peri-urban localities (Adene and Oguntade, 2008).

Between commercial and traditional systems, intermediate egg production systems have evolved in response to the changing agro-economic conditions of the country. One of these intermediate systems is the commercial smallholder egg production system.

The commercial smallholder egg production system in Nigeria is small-scale in size. The number of birds kept varies, ranging from hundreds to a few thousands. This system is practiced in both rural, peri-urban and urban areas. It uses improved breeds and commercial compound diets. The system is profit-oriented. Because the number of birds in this system varies from farm to farm, and region to region, the number of birds is usually defined in each context for the sake of clarity (Adene and Oguntade, 2008; Pagani et al., 2008).

The interest of farming systems analysis and indeed egg production systems analysis is the socio-economic rationality of farmers, technology development and adoption, as well as formulation of strategies and priorities for investments (Dixon et al., 2001). Also, the analysis aims at increasing income and employment opportunities for small-holder egg production, used for research and development to reduce poverty, improve food security, enhance competitiveness, sustainability, natural and human resource management in developing countries especially for small and marginal farmers (Behera and Sharma, 2007). Egg production systems analysis also helps to identify constraints and opportunities in the production chain to enable interventions that would improve performance for the benefit of the chain stakeholders (Singh et al., 2006).

The diversity of egg production systems call for in-depth analysis of these systems to enhance evidence-based policy formulation and decision making (Garrity et al., 2012). Also, profiling of these systems provides a framework for evaluating egg production development strategies and interventions.

The commercial smallholder egg production system, a subsystem of commercial poultry production systems has been paid cursory attention in literature from Nigeria, especially Greater Port Harcourt City. To reduce the information gap caused by such poor attention, the research was aimed at assessing aspects of smallholder commercial egg production systems in Greater Port Harcourt City. This would generate data that could be used for interventions to improve the performance of commercial smallholder egg production system for the benefit of system stakeholders.

The specific objectives of this research were to:

- Assess socioeconomic characteristics and motivation of commercial smallholder egg producers in GPHC.
- Evaluate source of inputs (day-old-chicks, feed, and electricity) for commercial smallholder egg production in GPHC.
- Assess the scale of production (number of birds) and level of automation of commercial smallholder egg production in GPHC.

2. Materials and Methods

2.1. Description of Study Area

Greater Port Harcourt City (GPHC), shown in Figure 1 is comprised of eight of the twenty-three Local Government Areas (LGAs) in Rivers State. The eight LGAs include Port Harcourt City, Obio/Akpor, Ikwerre, Etche, Oyigbo, Eleme, Okrika and Ogu/Bolo. Port Harcourt is the fourth largest city in Nigeria, covering an area of about 1900 km2 with an estimated population of over 2 million people at a growth rate of 2.84% by 2020 (Ede et al., 2011). The city has a railway terminal, an international airport and the second largest sea port in Nigeria. GPHC is an international hub for oil and gas business and other investments, which attract people and businesses, hence, causing spatial and demographic expansion of the city with a potential for economic growth and expansion.

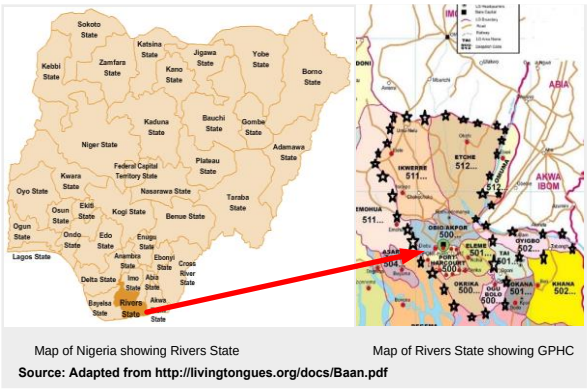

Figure 1. Maps of Nigeria and Rivers State showing Greater Port Harcourt city.

2.2. Operationalization of Variables

i. Commercial smallholder egg production systems refers to egg producing farms or egg producers that have a maximum of 2, 500 layers and the eggs so produced are mainly for sale.
ii. Farmers' motivation for starting their farms in this research is taken to mean the incentive that made the farmers to start producing eggs for sale.
iii. Source of funding refers to place from which the farmer obtains money to establish or run their farms
iv. Flock size refers to the maximum number of layer birds that a farm owns
v. Feed refers to the balance compound diet fed to birds. This can be made on-farm or bought from commercial producers of feeds, directly or through input sellers.
vi. Source of day-old-chicks refers the channel from which farmers obtain their chicks which are one day-old and will grow to become layers. It could be from day-old chick distributors or directly from the hatchery.
vii. Level of automation refers to the extent to which farm operations or activities are carried out without human assistance or labour.
viii. Source of electricity in this research refers to where the farm obtains the energy to power the farm. Possible sources include use of electric generators, solar panels and public power supply.

2.3. Population

The target population for the research was commercial egg producers in GPHC. Number of birds was used to differentiate the commercial egg production systems based on scale of production (number of birds). The different commercial egg production systems identified using number of birds include large-scale (≥10,000 layers), medium-scale (2,500-10,000 layers), and smallholder or small-scale (<2,500 layers). The target sample was drawn from commercial smallholder egg production systems. The research focused on commercial smallholder egg producers.

2.4. Data Collection and Analysis

Desk study was first carried out to gather information on background of study area, study concepts, and present state of knowledge in the research area.

Desk study was followed by a survey using semi-structured questionnaire. Three local government areas (LGAs) of the eight in GPHC were purposively selected for the survey because from observation and enquiries they probably have the largest concentration of poultry farmers. These LGAs included Obio-Akpor, Oyigbo and Etche. One Ninety-four commercial smallholder egg producers rearing not more than 2,500 birds were identified and used for the survey. Of this number, 34 were from Obio-Akpor and 30 each from others. Obio-Akpor had 34 because it has the largest population of egg producers based on enquiries from Poultry Association of Nigeria, Rivers State chapter. The snowballing sampling technique was used to sample the farmers. This was because no register of farmers (hence, no sampling frame) could be obtained from government or other agencies, hence, subjects were difficult to come by. The farmers were administered questionnaires and personally guided to fill-in the answers. After an interview, the interviewee was asked for leads to other farmers having 2, 500 birds and below. Input sellers were also helpful in recruiting subjects. All forty-seven questionnaires (100% response rate) were filled and returned.

Following the survey, focus group discussion (FGD) was used to collect data that gave deeper insight on issues that arose from the survey and that needed further probing. Open-ended questions from a checklist were used for FGD. Eight egg farmers (4 females and 4 males) were purposively selected, considering gender inclusion and spread across the LGAs.

Quantitative data was analyzed using descriptive statistics (mean, median and mode) and simple percentage in Statistical Package for Social Sciences (SPSS) version 24. Data from the FGD were analyzed using matrices and thematic analysis and simple percentage. Results were presented in tables and graphs.

2.5. Limitations of the Study

There was no population database of commercial egg producers in the study area from which the sample could have been drawn, hence, no sampling frame. This could limit the application of the findings to wider population of commercial smallholder egg producer in Rivers State and Nigeria.

3. Results

3.1. Socio-economics of Commercial Smallholder Egg Producers

3.1.1. Age

Figure 2 shows the age ranges of smallholder commercial egg producers in Greater Port Harcourt City. The farmers were between 36-50 (62%), 19-35 (24%) and 51-65 (15%) years old. None was younger than 19 or older than 65 years.

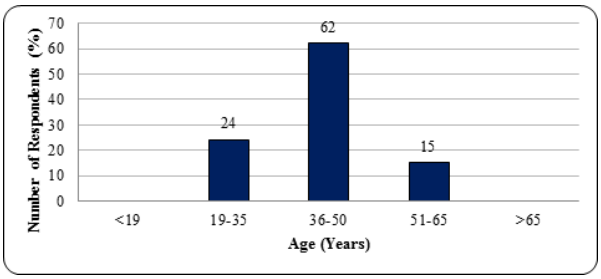

Figure 2. Age of commercial smallholder egg producers.

3.1.2. Educational qualification

Educational qualifications of commercial smallholder egg producers in Greater Port Harcourt City are presented in Figure 3. About 50% had Bachelor's degrees followed by Ordinary National Diploma (OND) and Senior School Certificate (SSC) (15%), M.Sc. (12%), First School Leaving Certificate (FSLC) (6%) and Ph.D. (3%).

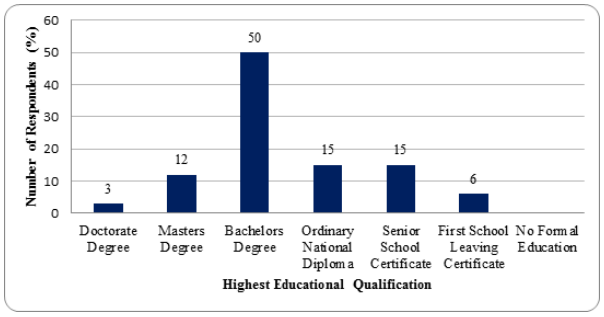

Figure 3. Highest educational qualification of commercial smallholder egg producers.

3.1.3. Motivation for starting egg production

Survey results (Figure 4) show that farmers were motivated by self-employment (68%) and desire to make extra money (32%) to start egg production. No farmer produced eggs as a hobby.

3.1.4. Flock size

Table 1 indicates that farm flock sizes range from 1050-4700 layers. The mean, median and modal flock sizes were 1282, 1050 and 1100 layers, respectively.

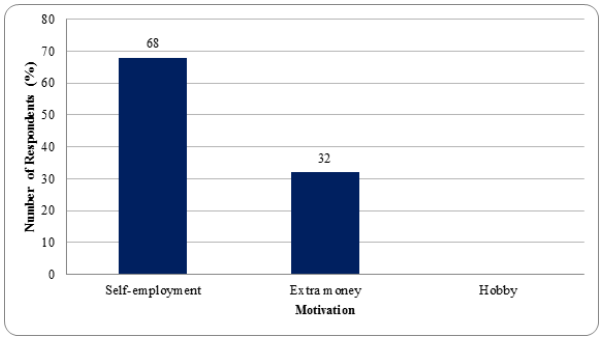

Figure 4. Farmer's motivation for starting egg production business.

Table 1. Flock sizes of smallholder egg producing farms

Statistic	Number of layers
Mean	1282
Median	4450
Mode	1100
Standard deviation	1136
Range	1050-4700

3.1.5. Source of funding

Figure 5 shows the source of funding for smallholder commercial egg farms in GPHC. Majority (91%) of the farms were funded by producers' own money followed by family (6%) and bank loans (3%). None of the farms were funded by government or friends' loans.

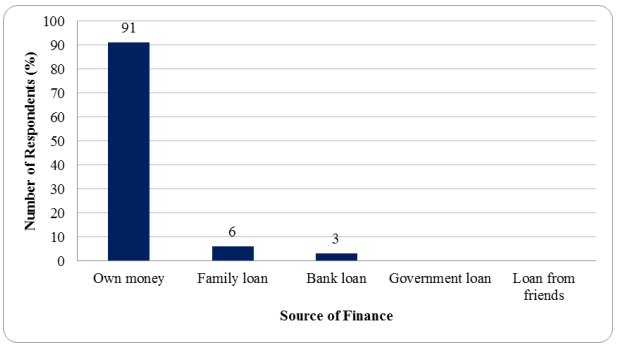

Figure 5. Source of funding for commercial smallholder egg farms.

3.1.6. Level of automation

Level of automation in egg producing farms in Greater Port Harcourt City is shown (Figure 6). There was no automation in egg picking, grading and crating as well as feed milling and feeding in most (79%) of the farms. However, 21% of the farms practice automatic watering of the birds.

3.1.7. Source of electricity

Table 2 shows the sources of electricity for smallholder egg farms in GPHC. About 70% depend on electric generators while 30% use public power supply. Solar panels were not in use.

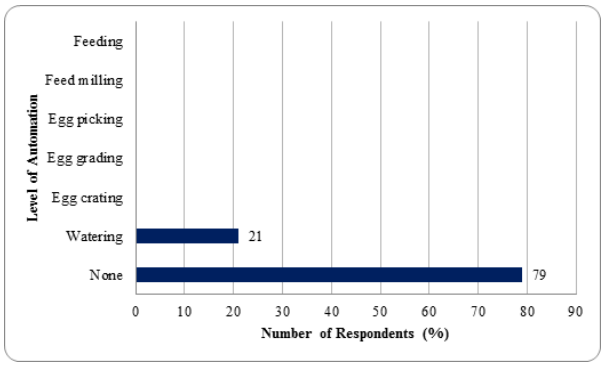

Figure 6. Level automation in commercial smallholder egg farms.

Table 2. Source of electricity for smallholder egg farms

Source of electricity	Frequency	
	N	%
Public power supply	28	30
Electric generator	66	70
Solar panels	-	Nil
I do not use electricity	-	Nil
Total	94	100

3.1.8. Type of feed

Results of survey (Figure 7) show that 6% of farmers make their own feed while 94% use commercial feed.

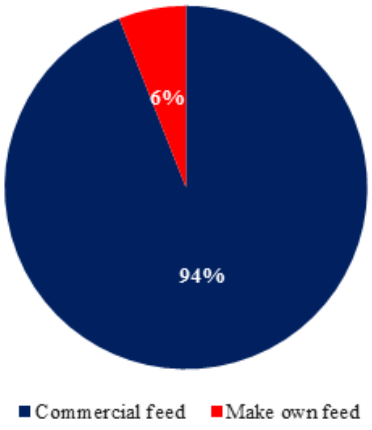

Figure 7. Type of feed used by smallholder egg producers.

3.1.9. Source of purchased feed

The survey further indicates that among farmers using commercial feed (Figure 8), 59% buy their feed from feed sellers while 41% buy direct from feed producing companies.

3.1.10. Source of day-old-chicks

The farmers also source their day-old-chicks (Figure 9) from DOC distributors (62%) and direct from the hatchery (38%).

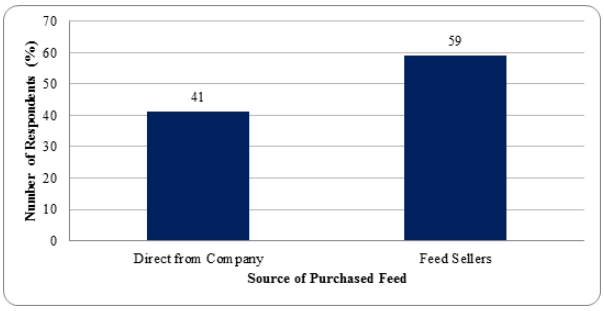

Figure 8. Source of feed purchased by smallholder farms.

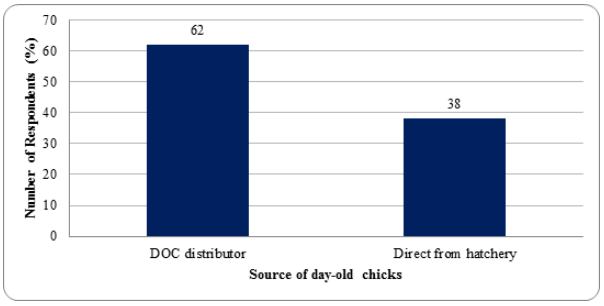

Figure 9. Source of day-old chicks for commercial smallholder egg producers.

4. Discussion

Figure 2 indicates that the age of farmers ranges from 19-65 years (average of 42). Majority (62%) were between 36-50 (average of 43) years old followed by 19-35 (24%) and 51-65 (15%) years old. The Nigerian youth policy defines youth as between 18-40 years (average of 29) (NBS and FMYD, 2012). The mean age of all the farmers (42 years) and that of the highest-ranking age group (43 years) were higher than average age of youths in Nigeria. Hence, it could be deduced that youths' participation in smallholder egg production in GPHC was low. This is a big threat to future of smallholder egg production in the study area but not surprising as nationally and globally, youth interest in agriculture was low (Ibitoye, 2011; Basnet, 2015).

Educational qualifications of smallholder egg producers in GPHC (Figure 3) indicate that all the farmers attained some level of education. Majority (50%) had Bachelor's degrees. This shows that speed of adoption of innovations to improve egg production in GPHC could be enhanced by the educational attainment of the farmers in GPHC. This is because years of educational positively influenced agricultural innovation adoption (Iheke and Nwaru, 2013).

Figure 4 indicates that farmers were most motivated (68%) by desire for self-employment to start egg production business followed by the need to make extra money (32%). No farmer produced eggs as a hobby. This shows that livelihood is at the heart of egg farmers' motivation, therefore, to sustain farmers' motivation to expand production and create much development impact, chain improvement intervention strategies must seek to raise financial benefit farmers get from the business.

Table 1 shows a wide range in flock size. A modal flock size of 1100 is small compared to flock size of 6500 elsewhere in Nigeria (Bose, et al., 2015). Small scale of production is a serious threat to sustainable egg supply to a populous city like GPHC (Clapp, 2015) with high demand and purchasing power (Ezedinma and Chukuezi, 1999).

In Figure 5, majority (91%) of the farms were funded by producers' own money. Loans from families (6%) and banks (3%) played little role in farm financing while government and friends played no role at all in egg farm financing. This agrees with several reports and amplifies the challenges of lack of capital faced by smallholder farmers, governments' indifference to their plight and at best token effort to resolve the problem in Nigeria. This forces farmers to look inwards for solution to their financial challenges (Aromolaran et al., 2013).

Figure 6 shows there was no automation in 79% of the farms (egg picking, grading and crating, feed milling and feeding of the birds) while 21% of the farms automated watering of birds. This shows inability of the farmers to acquire automated farm machines and equipment which are expensive. It could also be attributed to their small farm sizes which may be uneconomical to automate because scale of production positively associates with farm automation (Emokaro and Erhabor, 2014).

From Table 2, all farms use some form of electricity. Majority (70%) of the farms were powered by electric generators while the rest (30%) depend on the national grid. No farm uses solar panels to generate electricity. The high dependence on electric generators increases the cost of production and reduce the profit of small-scale businesses in Port Harcourt as public electricity is unreliable (Agwu and Emeti, 2014).

Figure 7 indicates that majority (94%) of the farmers depend on commercial compounded feed while the rest (6%) make their own feed. For those that depend on commercial feed (Figure 8), most (59%) procure theirs from feed sellers (middlemen) while others (41%) buy direct from feed manufacturing companies. During the FGD, those that buy feed direct from the feed companies explained that the landing cost for each bag of feed is 12% less than the cost of buying from middlemen. They added that aside the 12% savings per bag, they get bonuses every month if they can meet certain target in orders. This, they said adds up to 15% reduction for a bag of feed compared to those who buy from middlemen. However, they added that they are required to order at least 600 bags (i.e. 15 metric tonnes each time) to be eligible for buying direct from the company. It is interesting that those who need large feed quantities buy direct from the feed companies which reduces feed cost by 15% per bag. Since feed constitutes about 70% of the cost of producing eggs in Nigeria (Oladukun and Johnson, 2012), it would mean an opportunity for significant cost savings to smallholder farmers. However, the requirement for 600 bags to be ordered each time implies that smallholders with small flock size and feed requirement, may need to form cooperatives to enable them purchase feed in bulk, hence, benefit from collective action, one of the benefits of agricultural cooperatives to smallholders (KIT et al., 2010).

Source of day-old-chicks (Figure 9) showed most (62%) of the farmers buy their day-old-chicks (DOCs) from DOC distributors while the rest (38%) procure theirs direct from the hatcheries. During the FGD, farmers that buy direct from the hatcheries said they prefer doing so because DOC distributors add 25% to the cost price of the chicks. After removing the 4% transport cost per chick, the DOC distributors would pocket a 21% margin per chick. They indicated their interest in the 21% margin, which to them, is unfair for the distributors to enjoy alone. To keep the cost of transportation at 4%, it will be necessary for smallholders to form cooperatives and benefit from economies of scale enjoyed for those purchasing in bulk. When cost savings from DOC purchases are added to the 15% from feed, the opportunities for input cost reduction available to farmers that form cooperatives is enormous (KIT et al., 2010).

5. Conclusion

The study evaluated commercial smallholder egg production systems in GPHC seeking problems and opportunities to improve. In the egg production system, there was low youth participation, small flock size with low supply capacity, high potential for innovation adoption, high self-financing and poor automation of farm activities except watering. Buying feed and DOCs direct from feed companies and hatcheries reduced input cost by 36%. Intervention strategies should focus on increasing farmers' profits by encouraging formation of Egg Producers' Cooperatives to enhance bulk purchase of inputs at reduced cost.

Conflict of interest

The author declared that there is no conflict of interest.

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