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MARKET MARGIN ANALYSIS AND CONSTRAINTS IN FRESH EGG VALUE CHAIN IN THE ASHANTI REGION, GHANA

Stephen Opoku-Mensah
Department of Agropreneurship, Kumasi Technical University, P.O. Box 854, Kumasi, Ghana
https://orcid.org/ 0000-0002-2950-104X

Benjamin Sarfo
Department of Agricultural Economics and Extension Education,
Akenten Appiah-Menka University of Skills Training and
Entrepreneurship Development, Mampong, Ghana
bsarfo@aamusted.edu.gh
https://orcid.org/0000-0002-0297-8411

Siegfried Affedzie-Obresi
CSIR-Animal Research Institute, P.O. Box AH 20, Achimota, Accra, Ghana

Isaac Baidoo
Biotechnology and Nuclear Agriculture Research Institute (BNARI)
Ghana Atomic Energy Commission (GAEC), P.O. Box LG 80, Kwabenya, Accra, Ghana
https://orcid.org/0000-0002-4929-9125

Abstract

The study investigated the efficiency of the fresh egg value chain in the Ashanti Region of Ghana utilizing the market margin analysis (MMA) and identifying and ranking the various constraints faced by value chain actors. A sample of 160 value chain actors was involved in the study comprising forty (40) egg producers, sixty (60) egg wholesalers, and sixty (60) egg retailers who were randomly selected. The results of the market margin analysis (MMA) revealed that egg production was male-dominated (92.5%) while its trading along the chain was

female dominated most especially wholesaling (86.7%) and retailing (95%). The egg producers sold most of their eggs through wholesalers while the wholesalers sold most of their eggs to retailers. The results showed that the egg producers obtained about 50% of the total profits generated in the fresh egg value chain while wholesalers received the least (15%) share. The greatest challenge was the high cost of inputs: feed ingredients for egg producers and the high-cost price of eggs for wholesalers and retailers. It was recommended that egg producers may sacrifice some of their profits by reducing their selling price. (It was recommended that egg producers employ efficient and cost-efficient practices that will lessen the production cost of their enterprise which will have a ripple effect along the fresh egg value chain in terms of pricing). The government can also support the egg industry by reducing tariffs on imported inputs to bring down high production costs.

Keywords: *Egg marketing, Market margin, Market efficiency, Egg wholesale, Egg retail*

INTRODUCTION

Poultry production constitutes an important component of Ghana's agricultural sector. The commercial poultry industry is the most vibrant among the livestock sector of the agricultural economy. There are well-structured commercial poultry farms (particularly layers and broilers) operated as small-scale (50-5,000 birds), medium-scale (5,000-10,000 birds), and large-scale (10,000 birds) agribusiness enterprises (Mensa-Bonsu et al., 2010). Poultry production is significant to Ghana's socio-economic development as it offers employment for thousands of actors in the egg value chain, provides income for chain actors, supports poverty reduction, and contributes to 6.2% of agricultural GDP (MoFA, 2019).

Like most emerging economies, Ghana's increasing population, rapid urbanization, and improvement in living standards are driving consumption patterns resulting in an increasing preference for poultry products especially chicken and eggs (USDA-GAIN, 2012; Kwadzo *et al*, 2013; Opoku-Mensah, Kyire, and Opoku-Mensah*.,* 2014). Eggs in particular are an excellent source of highly nutritious and inexpensive source of protein for humans. Consumption of eggs has increased from 12 eggs per capita in 1995 to 128 in 2018 (www.soygrowers.com, 18/07/22: 12:01GMT}) culminating in increased egg production from 30,000Mt in 2006 to 46,750Mt in 2020 (FAO code 1062). Several street corner food preparations in urban areas serve chicken and eggs as a source of protein.

Despite the overwhelming demand for poultry products from consumers, commercial poultry production in Ghana is under threat and struggling for survival due to the high cost of production, inefficient management practices, poor quality hatchery, and stiff competition

from cheap chicken products imported from the Netherlands, Poland, USA and Brazil (NEA, 2020). Ghana now imports 90% of all broiler meat consumed annually (USDA-GAIN, 2018). Several decades of constrained poultry sector have culminated in the near extinction of the broiler subsector (USDA-GAIN, 2017; GNPFA, 2018). Consequently, many farmers have shifted to focus on layer bird production (FAO, 2014; Ouma et al., 2019; MoFA, 2019; NEA, 2019). Ghana's commercial poultry industry is now almost entirely layer-bird dominated (NEA, 2019) as a result of a highly uncompetitive broiler industry (USDA-GAIN, 2018). Marketing of poultry products, especially broilers, is extremely difficult as most Ghanaian consumers are price-sensitive. Ashitey (2017) reports that imported chicken parts are estimated to be 30-40% cheaper than domestically produced chicken. Again, studies by Kwadzo et al., (2013) and Egyir, Adu-Nyarko, and Okafor (2012) indicated that consumers preferred imported broiler meat to Ghana-grown chicken based on the product price. Fresh eggs, which are the main product from layer birds are comparatively cheaper and therefore easily affordable by consumers than chicken meat. However, there are fears that the layer-bird subsector can also suffer a similar fate as broilers due to generally inefficient production (NEA, 2019). There is, therefore, the need for researchers and policymakers to pay attention to this likely occurrence.

ASSESSMENT OF EGG MARKETING

Production inefficiencies can translate into the high production cost and high cost of poultry products including fresh eggs. The main agents of egg marketing are producers, traders (wholesalers and retailers), and consumers. Egg traders, mainly wholesalers, and retailers, play an important role in linking producers to consumers to meet customer satisfaction. Specifically, egg traders provide consumers with fresh eggs with some value-added, in terms of form utility (processed and packaged), time utility (storage and preservation), and place utility (households, shops, street corners, supermarkets).

The role of traders in the egg marketing chain cannot therefore be overemphasized. Despite the significant role played by these wholesalers and retailers in the egg value chain, not much empirical study has been done within this segment of the value chain, especially about performance and the constraints encountered by these actors. For example, it has been reported that egg marketing has challenges including poor handling techniques, lack of storage and preservation infrastructure, low level of value addition, and inadequate marketing techniques (Anning, 2006; NEA, 2019).

There is an extant body of literature on the poultry industry across the developing world. Much of the empirical studies in the poultry industry have focused on production efficiency

(Dziwornu and Sarpong, 2012; Tuffour and Oppong 2014; Nanii, Murshed and Isalam, 2019; Etuah *et al*., 2019), consumer preference and choice of chicken (Pouta *et al.,* 2010; Martínez, Anders, and Wismer, 2011; Kwadzo, Dadzie, Osei-Asare, and Kuwornu, 2013), profitability of poultry production (Bamiro, Otunaiya and Adejumo, 2013; Annan, Yeboah and Agbolosu, 2013), and economics of egg production (Tijjani et al., 2012; Anang, Yeboah and Agbolosu, 2013; Osti, 2016). These studies have shown both prospects available to and constraints encountered by actors in the poultry value chain. What appears to be a lacuna in the literature is the performance of the main actors in the marketing of eggs in the chain, especially in Ghana.

Marketing of fresh eggs in Ghana is to a large extent less formal and constrained by several challenges such as high losses due to damages, poor transport systems, price fluctuations, poor storage systems, and inadequate financing among others. Reports on the egg value chain capture farm gate, wholesale, and retail prices. For instance, it is reported that in 2021 farm-gate egg prices ranged between GHS15.00–GHS21.00 per crate, and the wholesale prices ranged between GHS22- GHS23. It is difficult to estimate the margins due to the dispersed nature of the actors and to perform a critical analysis of the performance of the egg market in Ghana due to its informal operations. The performance of the egg market can be assessed using the distribution of the marketing margins among the actors in the trade. Marketing margin is the difference between the price received by producers and the prices paid by final consumers for a given quantity and quality of a product (Acharya and Agarwal 1999). Wallen and Turner (2010) defined marketing margins as all margins or rewards made by actors in the course of product marketing from the time of harvesting until it reaches the consumer. Marketing margin describes the price differences at various points in the marketing chain (Scarborough and Kydd, 1992). The size of the margins is expected to be dependent upon the quality of the eggs, the number of actors along the supply chain, the intensity of value addition, and the efficiency of the marketing operations. There is a perception of inequity in the distribution of rewards among actors in the egg value chains in Ghana. According to Masuki, (2009), farmers receive relatively small margins compared to their non-agricultural counterparts. How true is this statement in the Ghanaian context? The main objective of this study is to evaluate the performance of the fresh egg marketing system in the Ashanti Region of Ghana, through the use of market margin analysis (MMA). The analysis first deals with the determination of the gross margins, profits, and market margins earned by the main actors participating in the fresh egg marketing chain. Secondly, the efficiency of the entire marketing system is measured as a means to determine the vibrancy of the market chain. Evaluation and measurement of the performance of the egg marketing chain are critical for a challenged subsector like the

poultry industry in Ghana. Findings from this study can inform policymakers and stakeholders to work collaboratively to re-invigorate the poultry industry and make it a more profitable sector and a contributor to economic growth and poverty reduction. Finally, this study will reveal deficiencies in the marketing system for actors and recommend policy actions to address them.

MATERIALS AND METHOD

The Study Area

The study was conducted in the Ashanti Region, a very prominent region in poultry production regions in Ghana. Ashanti Region is the second largest region in Ghana in terms of land size and has a very favourable climate to support agriculture. The region is highly populated (19.1%) in Ghana of which 46.6% live in rural areas (MoFA, 2020). Four administrative areas, Kumasi Metropolis, Atwima-Kwanwoma District, Ejisu-Juabeng Municipality, and Atwima-Nwabiagya District, were selected based on the high number of layer/egg production poultry farms.

Sampling technique

The study employed multi-stage sampling techniques in arriving at the sample size. Firstly, the aforementioned administrative areas were purposefully selected based on the high intensity of poultry value chain activities in the region. In the second stage, ten (10) egg producers (farmers) were randomly selected from each of the four districts using data from the Directorate of Agriculture. In the third stage, sixty wholesalers were selected using the snowball sampling technique where the poultry farmers assisted in identifying fifteen (15) egg wholesalers per district. This was done due to the absence of data on wholesalers in the selected districts. Finally, sixty (60) egg retailers (15 per district) were also randomly selected from prominent markets in the districts.

Data Collection Methods

Structured questionnaires were used to gather information on the socio-economic characteristics of egg producers, egg wholesalers, and egg retailers. Mostly quantitative data that reflected the marketing activities, cost, returns, and margins of each category of actors were also taken. The various actors were also asked to list and rank their constraints on a scale of 1 (highest) to 6 (least). Data obtained were analyzed using SPSS version 20 and MS Excel software.

Data Analysis Methods

Measurement of Market Performance

Descriptive statistics were used to analyze actors' socio-economic characteristics and the marketing channels for fresh eggs. The performance of egg marketing was done by estimating the gross margin analysis, market margins, net returns, and efficiency. Estimates of gross marketing margins were used to determine the performance of the egg market. The gross margin (GM) was analyzed using the budgetary technique, as the total revenue (TR) less the total variable cost (TVC). A higher gross margin is an indicator of better performance and returns and vice-versa.

Marketing margin can be explained as the difference between the price paid by the consumer and the price received by the producer. The marketing margin (MM) was computed as the difference between the selling price (SP) and the sum of the cost of production (PC) and the marketing cost (MC) (Demissie, Komicha, and Kedir (2015). Marketing cost refers to the cost incurred after production until the eggs reach the consumer. This includes the cost of activities such as packaging, transportation, storage, marketing fees, loading, and off-loading. The marketing cost at various stages of the marketing chain was computed by summing up these costs of the actors at the various stages in the marketing chain (Choudhary et al, 2017). The market margin is computed as shown in equation (1). This is expressed mathematically as:

$$MM = SP - (PP + MC)100 \quad (1)$$

The gross marketing margin at a given stage 'i' ($\underline{GMMi}$) of the marketing intermediary or node was computed as:

$$GMMi = \frac{SPi - PPi}{TGMM} \times 100 \quad (2)$$

Where, SPi is the selling price of the i^{th} actor and PPi is the purchase price of the i^{th} actor.

Total Gross Marketing Margin (TGMM) was computed as the ratio of the difference between the price paid by the end buyer (Consumer price) and the farmer's price to the consumer price and is expressed as a percentage (Mendoza, 1995).

$$TMMi = \frac{Consumer\ price - Farmers\ price}{Consumer\ price} \times 100 \quad (3)$$

A similar concept of profit margin that deducts operating expense or the marketing cost from the marketing margin was done by Dawit (2011) and Marshall (2011) as stated in the equation 4.

$$GPMi = \frac{GMMi - OEi}{TGPM} \times 100 \quad (4)$$

Where, $GPMi$ is the Gross Profit Margin of the i^{th} actor, GMM_i is the Gross marketing margin of the i^{th} actor, $\underline{OEi}$ is the Operating expense or the marketing cost of the i^{th} actor and TGPM refers to the Total Gross Profit Margin

Marketing Efficiency of Egg Marketing

The profitability and sustainability of any value chain are the efficiency of operation. Marketing efficiency (ME) provides a fair indication of the performance of the marketing system. A commonly employed indicator of marketing efficiency is the Producers' Share (PS) concept which measures the share of actors in the value or margins created in the value chain.

The producer's share was determined as the ratio of producer price to consumer's price (Denish and Sharma, 2019), mathematically expressed as:

$$PS = \frac{Farm\ gate\ price}{Retail\ price} \times 100 \quad (5)$$

Another indicator of marketing efficiency is the ratio of the value of market output to the value of the inputs. Market efficiency analysis was conducted following the description by Mendoza (1995), Dawit (2011), and Marshall (2011) using MS-Excel Software. We also measured the egg marketing efficiency by employing the Shepherd's model, quoted by Imlibena and Sharma (2019);

$$Marketing\ Efficiency(ME) = \frac{Consumer\ price}{Total\ Marketing\ cost} \times 100 \quad (6)$$

Constraints of the egg marketing

Actors in the agricultural value chains are confronted with challenges and those in the egg marketing chain are no exception. This study proceeded to measure the faced by the main actors in the marketing of fresh eggs. It was assumed that actors' constraints may vary with activity mindful of the variation in time and intensity (Khor, 2006). Thus, egg producers, wholesalers, and retailers may be confronted with different sets of challenges. Kendall's coefficient of concordance analysis was used to measure and rank the constraints encountered by actors. The constraints were ranked from the most limiting to the least limiting constraint. Following Legendre (2010), Kendall's Coefficient of Concordance (W) is stated and computed as:

$$W = \frac{12S}{n^2 - (n^3 - n) - MT} \times 100 \quad (7)$$

Where, W is Kendall's Coefficient of Concordance, m denotes the judges (producers, wholesalers, and retailers), n denotes the number of constraints, T denotes the correction

factors for tied ranks and s denotes the sum of squares statistics over the row sum of ranks. The results of the ranked constraints were analyzed using means and Kendall's coefficient of concordance to determine the degree of agreement in the ranking.

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

A summary of the results of the demographic characteristics of the actors in egg marketing is presented in Table 1 and discussed below. The main agents and actors in the egg marketing system described in this study are the poultry farmers (egg producers), wholesalers, and retailers.

Age of Respondents

People enter the poultry industry at different times in their lives. The egg producers (layer bird farmers) in the region were relatively older than wholesalers and traders (Table 1). The age of egg producers was skewed towards adulthood with 40% above 60 years. The minimum age for egg producers was 31 years while the wholesalers and retailers were about 10 years younger. About 95% of wholesalers and 90% of retailers were in the active age group of 21-50 years. The older age status of egg producers in this finding contradicts the results of Amanor-Boadu *et al* (2016) which reported a much lower average age of 44.5 years with a standard deviation of 12.2 years. The high proportion of the aged (60 years and above) among the egg producers could be attributed to the relatively high capital required to set up an egg production farm. The results suggest that the aged rather than the youth tend to have access to resources (land, and funds) to commit to egg farming. Again, poultry production is not as labor-intensive as crop farming, and thus older people including even retirees from public service can venture into the poultry business. However, the high proportion of aged in the production segment of the egg value chain raises questions about the future of the enterprise. Commercial egg trade can be used to generate income and contribute to food security even in old age.

Gender of Respondents

Egg production is a male-dominated (92.5%) enterprise in the study area. However, trading in eggs was the preserve of females, where 86.7% of wholesalers and 95% of retailers were females (Table 1). This finding aligns with that of Amanor-Boadu et al., (2016) which showed that poultry production (including layer production) in Ghana is dominated by males. Similar findings are reported by Afolabi *et al* (2013) in Nigeria and Daweli and Sharma (2018) in Ethiopia. Poor access to production resources (Quisumbing, 2013) and the capital-intensive

nature of commercial layer production in Ghana most likely constrains females from venturing into the business. It is therefore not very surprising that females rather focus on the marketing and distribution segment of the egg value chain. Agri-food marketing in Ghana is highly informal and has very few entry barriers, hence the dominance of females in the wholesaling and retailing activities.

Table 1: Demographic Characteristics of Actors in the Fresh Egg Value Chain

Variable	***Egg Producers***		***Egg Wholesalers***		***Egg Retailers***	
	Frequency	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*
Age (years)						
<20	0	0	0	0	6	10
21-30	0	0	17	28.4	36	60
31-40	9	22.5	28	46.7	14	23.3
41-50	8	20	12	20	4	6.7
51-60	7	17.5	3	5	0	0
60 above	16	40	0	0	0	0
Total	**40**	**100**	**60**	**100**	**60**	**100**
Gender						
Male	37	92.5	8	13.3	3	5
Female	3	7.5	52	86.7	57	95
Total	**40**	**100**	**60**	**100**	**60**	**100**
Education Level						
Illiterate	0	0	0	0	20	33.3
Basic	10	25	20	33.3	39	65
Secondary	11	27.5	35	58.3	1	1.7
Vocational	0	0	2	3.3	0	0
Tertiary	19	47.5	3	5	0	0
Total	**40**	**100**	**60**	**100**	**60**	**100**
Business Registration						
Yes	34	85	7	11.7	3	5
No	6	15	53	88.3	57	95
Total	**40**	**100**	**60**	**100**	**60**	**100**
Main Income Source						
Yes	37	92.5	34	56.7	15	25
No	3	7.5	26	43.3	45	75
Total	**40**	**100**	**60**	**100**	**60**	**100**
Business Experience						
1-5 years	8	20	21	30	14	23.3
6-10 years	9	22.5	27	49.8	46	76.7
11-20 years	13	32.5	11	18.5	0	0
21-30 years	7	17.5	1	1.7	0	0
30 above	3	7.5	0	0	0	0
Total	**40**	**100**	**60**	**100**	**60**	**100**

Educational Level

There is a high literacy rate among the actors in fresh egg marketing. While none of the egg producers were illiterate, as many as 48% of them attained tertiary education. There was no unlettered person among the egg wholesalers but they were less educated than the producers. About 58% of egg wholesalers have attained secondary education and 65% of retailers have basic education. The retailers on the other hand were the least educated. None of them had tertiary or vocational education and about 33% were illiterate (Table 1). The results may reflect the intellectual requirements of the activity. The relatively high literacy rates reported can be attributed to the fact that the study was conducted in peri-urban and municipal areas. The high literacy rate among actors can enhance technology transfer production and marketing efficiency.

Business Registration and Formalization

Business registration is one indicator of the level of business formalization that can enhance overall business operating activity including access to some high-end markets and credit. This study showed that the majority of the egg producers (86%) had formalized their farm business and had it registered. The high level of registered poultry businesses in the study area can be attributed to the fact that the Ghana National Association of Poultry Farmers (GNAPF) from which most of the farmers were drawn for the study compel their members to register their businesses. Again, the high level of education of poultry farmers enhances the appreciation and benefits of registering their businesses. On the contrary and as expected wholesaling and retailing of food commodities in Ghana is heavily informal. Thus, about 88% and 95% of egg wholesalers and retailers respectively have not registered their businesses (Table 1).

Other Sources of Income

Business operators, particularly in the informal sector, can engage in multiple income-earning activities in order to improve living standards and minimize risk (Davis et al., 2010; Davis, Giusppe, & Zezza, 2017). People depend on combinations of business activities to generate income and create wealth for their livelihoods. There was a decreasing dependence on egg trade from producers to retailers; egg producers (92.5%), wholesalers (57%), and retailers (25%) (Table 1). Amanor-Boadu *et. al.* (2016) in describing the structure of the poultry industry in Ghana, reported that about 63.4% of poultry farm owners depended on it as their main source of income. This is anticipated because of the resource use flexibility associated with the activities. Egg production requires more specific inputs like feed while wholesalers and retailers have greater flexibility to spread their resources over several goods at a time.

Years of Business Experience

Poultry producers have relatively well-distributed years of experience. Egg producers tended to have a longer operational experience between 1 and 30 years with a mode of 32.5% having worked for 11-20 years. The wholesalers and retailers on the other hand tend to have a shorter year of experience with a mode of 6-10 years (Table 1). This result conforms to the study of Amanor-Boadu *et al* (2016) which revealed that the average business operational experience of poultry farmers was about 10 years. This is expected because egg production requires higher investment capital that demands longer years of operation to recover costs. Given the length of business experience against the high average age of farmers, it can be inferred that most farmers retire into poultry farming.

Marketing Channel of Fresh Eggs Producers, Wholesalers, and Retailers

Many marketing channels exist for fresh eggs. For instance, farmers can sell fresh eggs through wholesalers to retailers and to consumers. Fresh eggs can also be sold directly to consumers at the farm gate and alternatively, eggs can be sold by farmers to retailers.

Marketing Channel for Fresh Egg Producers

The results of the marketing channel of producers are presented in Table 2. The study showed that egg producers sold their fresh eggs to four identifiable groups of actors in the egg value chain; namely wholesalers, retailers, institutions, and individual consumers. Both institutions and individual consumers represent the final consumers who use the eggs and do not resell them.

Table 2: Marketing Channel for Egg Producers

Market Participant	1-10%		11-30%		31-50%		51-70%		71%+	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
Wholesalers	1	2.5	1	2.5	1	2.5	5	12.5	32	80
Retailers	21	52.5	9	22.5	1	2.5	1	2.5	2	5
Institutions	15	37	2	5	-	-	-	-	-	-
Consumers	13	27.5	1	2.5	-	-	-	-	-	-

The most important market outlet for egg producers was the wholesalers who buy more than 70% of weekly production from 80% of the producers. Egg producers sold less than 30 percent of their weekly production to individual consumers (Table 2). Farm-gate sales to individuals were the lowest as farmers sold less than 30 percent of their eggs to 30 percent of individual consumers. This is likely to be smallholder backyard farmers who may not meet quantity and quality standards required by wholesalers or want to sell at retail price.

Marketing Channel for Fresh Egg Wholesalers

Table 3 presents the results of the Marketing Channel for Fresh Egg Wholesalers. It was identified that egg wholesalers sell their eggs to retailers, institutions, and individual consumers. The most important marketing channel for wholesalers was through retailers as about 85% of egg wholesalers sold over 71% of their fresh eggs through retailers. The results revealed that individual consumers buy fresh eggs from wholesale shops. Sale of fresh eggs to institutions was low probably because the institutions that patronize fresh eggs regularly were few.

Table 3. Marketing Channel for Fresh Egg Wholesalers

Market Participant	1-10%		11-30%		31-50%		51-70%		71%+	
	Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
Retailers	2	3.3	-	-	-	-	8	13.4	50	85.4
Institutions	23	38.4	10	16.7	-	-	-	-	2	3.3
Consumers	53	88.4	2	3.3	-	-	-	-	-	-

Marketing Margin of Egg Producers, Wholesalers, and Retailers

Table 4 presents the results of the analysis of the market margin of egg producers, wholesalers, and retailers. Marketing margin analysis was used to determine the rewards generated by various actors in the fresh egg marketing chain. Due to the wide and inconsistent variations as well as high missing data in the use of storage facilities, storage cost was not included in the analysis. The major marketing costs associated with fresh egg marketing were the cost of egg trays (crates), sorting and packaging, on- and off-loading, transportation, market levy, communication and egg breakages (Table 4).

The total marketing cost of fresh eggs from producer to consumer was GHS8.96 per tray of 30 eggs. Retailers incurred the highest marketing cost of GHS3.95 representing 44.08% of the total marketing cost. The study revealed that egg producers incurred the least marketing cost of GHS2.43 (27.12%). The average selling price of fresh eggs by Egg producers, wholesalers and retailers were GHS21.18, GHS26.15 and GHS32.87 per tray of 30 eggs respectively (Table 4). The gross margin for egg producers, wholesalers and retailers in the fresh egg marketing chain were GHS7.10, GHS4.97 and GHS6.72 per tray respectively. Ultimately the profit margins accruing to the actors were GHS4.67 to egg producers, GHS2.39 to wholesalers and GHS2.77 to retailers (Table 4). The egg producers earned about 47.51% of the total share of the profit generated by the actors in the egg marketing chain. This is contrary to the assertion that producers receive lower returns than egg wholesalers and retailers.

Further analyses revealed that the highest marketing cost of the egg farmers was egg breakages amounting to GHS1.51 per tray of 30 eggs. The highest marketing cost items for the

wholesalers were transport, Market levy or tolls and communication costs which were GHS0.85, GHS0.68 and GHS0.15 per tray respectively. Also, the highest marketing cost item of the retailer was packaging cost which was GHS1.73 per tray of 30 eggs (Table 4).

Table 4. Market Margin of Producers, Wholesalers, and Retailers per crate of fresh Eggs

Items (Corrected)	Producers GH₵	Wholesalers GH₵	Retailers GH₵	Total GH₵
Purchase prices		21.18	26.15	
Production cost	14.08			
Marketing cost:				
Empty crates	0.50	0.50	0.50	1.50
Packaging cost	0.03	0.03	1.73	1.79
Loading/unloading cost		0.03	0.14	0.17
Transport cost	0.34	0.85	0.68	1.87
Market Levy		0.68	0.43	1.11
Telephone cost	0.05	0.15	0.08	0.28
Physical losses	1.51	0.34	0.39	2.24
Total marketing cost	2.43	2.58	3.95	8.96
Total cost	16.51	24.04	30.19	70.65
Sales prices (Consumer price)	21.18	26.15	32.87	80.20
Gross Market Margin (GMM)	7.10	4.97	6.72	18.79
Total Gross margin (%)	33.52	19.01	20.44	-
% Share of GMM	37.79	26.45	35.76	100.00
Profit (Marketing)Margin	4.67	2.39	2.77	9.83
Profit (marketing) Margin (%)	22.05	9.14	8.43	-
% Share of Profit	47.51	24.31	28.18	100.00

Most egg producers were observed to earn their living from this activity and gained the greatest share of the total profits generated in the marketing chain. Whereas the wholesalers who are the main sales outlet for egg farmers obtained the least share of the profits generated. This result conforms to the findings of Amanor-Boadu *et al* (2016) that wholesalers add a small margin and sell to retailers and other consumers. The farmers' gain could be overstated if the egg producers understate their production costs. Given this situation, egg producers could be persuaded to sacrifice some profits by reducing their farm gate prices of eggs**.**

Producer Share and Marketing Efficiency

The performance of chain actors was also assessed by estimating their market share and marketing efficiency. Marketing efficiency is essential for measuring the degree of marketing performance for fresh eggs. Actors with the highest market share and larger value of efficiency were deemed to perform better. Results from this study revealed that the producers'

share in the price received by wholesalers was 81%, while the producers' share in the retailers' selling price was 64%. This suggests that wholesalers performed better than the retailers. The marketing efficiency score indicates that wholesalers obtained the highest score of 10.14 followed by egg farmers who scored 8.72 and the lowest score of 8.32 for egg retailers (Table 5). The wholesalers were deemed to be the most efficient (10.14) followed by egg producers (8.72) and then the egg retailers (8.32).

Table 5. Producer Share and Marketing Efficiency of Fresh Egg Intermediaries

Items (Corrected)	Producers GH₵	Wholesalers GH₵	Retailers GH₵
Producer share in consumers' price (%)		80.99	64.44
Marketing efficiency	8.72	10.14	8.32

The egg wholesalers were the most efficient because they performed the least task and also obtained the least cost due to physical damages leading to the least marketing cost. They have been observed to re-grade the eggs to recover the cost of egg damages as reported by Affedzie-Obresi et al., (2019). Egg producers can increase their marketing efficiency by reducing the cost of egg damage. The seeming marketing inefficiency of egg retailers was due to value addition through processing (cooking and/or frying) and packaging which is very important in the egg value chain.

Constraints of Egg Marketing

The three categories of actors in the egg marketing chain experienced varying levels of challenges in their business operations. A summary of the constraints encountered presented in Table 6-8. The constraints of egg producers were categorized into 6 broad groups. Highest constraint for egg producers was the high cost of production (1.36) attributed to high feeding cost. Least challenge for the egg farmers was egg demand (5.28) indicating that eggs can be sold. There was a weak agreement in the ranking of the constraints (W=0.499) (Table 6).

Table 6. Marketing Constraints of Egg Producers

Ranking of items	Mean
High cost of production	1.36
High cost of marketing	2.99
Low prices offered by customers	3.41
Saturated market	3.67
Limited market access	4.30
Low demand for eggs	5.28

Test Stats: N=38; Kendall's W=0.499; df=5; Asymp. sig=.000.

The constraints of the egg wholesalers were categorized into 6 as presented in Table 7. The results show that the wholesalers' greatest challenge was the high farm gate prices of eggs (2.33). The cost of losses from spoilage, theft, and cracks was the least challenge (5.27) for the wholesalers, indicating that wholesalers paid attention to handling of products because of their delicate nature. There was however a weak agreement (W=0.296) in the ranking of constraints (Table 7).

Table 7. Marketing Constraints of Egg Wholesalers

Ranking of items	Mean
High cost of eggs	2.33
Insufficient or inadequate supplies from farmers	2.77
Inconsistent supplies from farmers or producers	3.27
Saturated market	3.55
High cost of marketing and transaction	3.82
Losses from spoilage, theft and breakages	5.27

Test Stats: N=60; Kendall's W=0.296; df=5; Asymp. sig=.000

The constraint of the retailers was similar to that of the wholesalers and this is not surprising because they perform the same function but on different scales. The high cost of eggs was the most important constraint confronting retailers with a mean rate of (2.85). The retailers also indicated that egg loss (spoilage, theft, and broken eggs) was their last challenge. Kendall's concordance (W = 0.173) indicated very weak agreement among the rankings (Table 8).

Table 8. Marketing Constraints Faced by Retailers

Ranking of items	Mean
High cost of eggs	2.85
Insufficient or inadequate supplies from farmers	3.03
Inconsistent supplies from farmers or producers	3.12
Saturated market	3.20
High cost of marketing and transaction	3.88
Losses from spoilage, theft and breakages	4.92

Test Stats: N=60; Kendall's W=0.173; df =5; Asymp. sig=.000

Among the actors in egg marketing, the prevalent constraint was the high cost of production, inputs, and market transaction cost. For the egg producer, production cost mainly from feed constitutes a major barrier to profitability whiles for wholesalers and retailers the cost

of fresh eggs from the producer was a problem. The Kendall's concordance test among the ranking of the actors was highest for egg producers and followed by wholesalers and the least was recorded for the retailers. This pattern may be explained by differences in operational strategies employed and the degree of association. Farmers' operations are more similar to that of retailers who use very dissimilar approaches to sell their wares. Wholesalers Kendall's Concordance (W=0.296) indicates a very weak or about 30 percent agreement among the ranking of the respondents.

CONCLUSION AND RECOMMENDATIONS

Egg production and marketing is an important economic activity in the rural, urban, and peri-urban areas of Ghana. The egg marketing chain in the Ashanti Region is somewhat well organized with a well-defined flow of fresh eggs from poultry farmers (producers) to wholesalers and to retailers. Whiles the production of eggs is a male-dominated activity, egg marketing was entirely female-dominated, suggesting a gendered pattern of the egg value chain.

The study also revealed that wholesaling is the major route for egg farmers to sell their produce whiles wholesalers sold mostly to retailers and consumers. Egg marketing is a lucrative business since all three marketing actors made positive gross margins and net returns showing that the egg value chain can generate positive income to justify investments. Market performance was led by wholesalers in the market chain since they secured a larger share of producer price and were more market efficient. The major constraint common to all the actors in the market chain is the high cost of business operations. Specifically, for egg producers, the major constraint was the high cost of production (especially feed) and for wholesalers and retailers, it was the high cost of fresh eggs.

Based on the outcome of the findings and conclusions drawn from the study a number of recommendations would be suggested. First, the growing demand for chicken eggs which is met largely by domestic supplies, and the lucrative nature of the egg trade business, suggest a vibrant industry with potential for employment generation especially for the youth and women. Therefore, the government must invest in the poultry value chain with technical and infrastructural facilities, especially for the layer subsector, where Ghana seems to have a comparative advantage. Secondly, egg producers should be encouraged to undertake cost-efficient technologies and practices that lessen production costs, especially in the area of feed preparation by using local raw materials to enhance the reduction of egg prices, and consequently trickle down to an efficient marketing system. The government should also consider reducing tariffs on imported raw materials in order to reduce production cost of eggs. Finally, to address the issue of inconsistent supplies of fresh eggs from farmers, wholesalers

and retailers must strengthen transaction relations with farmers to lock up supplies. Specifically, wholesalers can advance credit facility to farmers to pre-finance feed cost, which can even boost egg output and interrupted egg supplies.

Value chain actors include consumers too; therefore, any future studies must consider consumer interest to determine how their utility derived from egg consumption can be enhanced. In addition, the scope of the study should be extended to other regional cities and urban areas where egg wholesale and retail is vibrant.

CONFLICT OF INTEREST

Authors have no known competing financial or non-financial, professional, or personal conflicts that could have appeared to influence the work reported in this paper.

AUTHORS' CONTRIBUTION

S.O.M: Conceptualization; Methodology; Investigation; Resources; Writing – original draft; Formal Analysis; Funding Acquisition.

B. S.: Methodology; Investigation Resources; Writing–review & editing

S.A.O: Conceptualization; Investigation; Resources; Writing-original draft

IB: Methodology; Resources; Review and Editing

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