

## ECONOMIC ANALYSIS OF ARTISANAL FISHERIES VALUE CHAIN IN EPE LAGOON, LAGOS STATE, NIGERIA

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### ABSTRACT

*This study analysed the artisanal fisheries value chain in Epe lagoon, Lagos State, Nigeria. The study profiled the socioeconomic characteristics, analyzed the profitability and constraints of the value chain actors. A stratified sampling technique was adopted in selecting 120 respondents for three value chain strata: fisher folks, fish marketers and fish processors. Each value chain comprised of 40 respondents. Data analysis revealed gender bias in the value chain activities as only males were fisher folks, only females were fish processors while most females were fish marketers. Only 5% of the young adults were involved in the value chains. The BCRs were 1.13, 1.70 and 1.60 respectively for fisher folks, fish marketers and fish processors. The net margin analysis showed that the average fisher folk, relative to other actors lived, on lowest daily margin. This can be attributed to the high start-up capital compared with the other two value chains. The most severe constraints faced were lack of credit for expansion and inadequate storage facilities. The purchase prices offered for their products and their non-membership in cooperative societies were considered as the least severe constraints faced by the value chain actors. It is recommended that improved access to rural credit, storage facilities and infrastructure and subsidized costs of fishing equipment should be a priority while value chain actors should be educated on the need and how to organise themselves into cooperative societies. Youths should be encouraged to explore the potentials in the artisanal fisheries value chain in order to reduce the level of unemployment.*

**Keywords:** Artisanal Fisheries, Value Chain Actors, Value Chain Development

### INTRODUCTION

Artisanal fishing is a small-scale fishing for subsistence or local markets, generally using traditional fishing techniques and small boats (Jacquet and Pauly, 2008). It covers the operations of small-scale canoes fisheries operating in the coastal areas, creeks, lagoons, inshore water and the inland rivers. The artisanal fishery is characterized by low capital outlay, low operational costs, low technology application and is labour intensive (Adedokun *et al.*, 2006; Bolarinwa, 2014). Quite a sizeable proportion of the Nigerian population depends on this fishery sub-sector as a source of income through fish processing and marketing, as well as fisheries research

(Bolarinwa, 2012; Soyinka and Kusemiju, 2007; Williams, 2006). Ogundiwin (2014) observed that the artisanal fisheries sector still showed a deficit in the supply of fish to Nigerians. Despite this deficit, a lot of the fish resources are being discarded on a daily basis due post-harvest loss resulting from unorganized or uncoordinated value chain development (Aihonsu and Shittu, 2008). It becomes necessary that to reduce the post-harvest losses occasioned by fish being a highly perishable produce, with physiological and microbial deterioration setting in immediately it dies, the catch need to be processed and or transported to the consumer or final user in time.

Fisheries value chain is the process of bringing fish from harvesting through different phases of processing and delivery to the consumer. This process involves various economic utilities such as form, place, time and possession, which have attracted various actors and stakeholders such as governments, international agencies and credit institutions as a strategy of mobilizing economic resources to promote small scale traders and improve livelihood. Although men and women participate in various enterprises within the fisheries value chains; women have been restricted to the less competitive form utility aspect that has impacted on their level of access and control over fisheries resources (Olaoye *et al.*, 2012). Alhaji *et al.* (2015) observed a form of gender division in the value chain of the artisanal fishing enterprise. He observed that while some females participate in fishing, a fraction of the female folks were into fish processing and marketing, but virtually all the males were involved in fishing either on part time or full-time basis (Alhaji *et al.*, 2015). This has been influenced by socio-cultural and economic factors such as gender, culture, values, attitudes and norms (Williams, 2002). Odebiyi *et al.* (2013) attributed poor storage facilities, poor transportation network, lack of export opportunity, low level of education in the coastal communities of Ogun State, as very severe factors constraining the development of the fish value chain. Other researchers however attributed the observed retardation in the growth of artisanal fisheries to lack of credit facilities, low liquidity ratio and the poverty level of the practitioners (Akanni and Akinwunmi, 2007; Akanni, 2008; Baruwa *et al.*, 2012; Okeowo *et al.*, 2015; Olaoye and Adebisi, 2011). Analysis of artisanal fisheries value chain is in line with the policy objectives of the Nigeria government

Agriculture Promotion Policy geared towards enterprise development across successive stages of the commodity value chains for the development of crop, livestock and fisheries sub-sectors, namely input supply, production, storage, processing/utilization, marketing and consumption. Analysing fisheries value chain will provide an insight into various employment opportunities that exist in the fisheries sector because Nigeria has a great potential of fish resources whose distribution and value chain needs to be strengthened and developed to bridge the gap between demand and supply of fish in Nigeria (Amao *et al.*, 2006; Kaplinsky and Morris, 2000).

It is against this background that this study conducted an economic analysis of artisanal fisheries value chain in Epe lagoon, Lagos State, Nigeria. Specifically, the study addressed the objectives: (i) describe the socioeconomic characteristics of the value chain actors; (ii) estimate the costs and returns from artisanal fishery value chain; and (iii) identify the constraints limiting the development of artisanal fishery value chain.

## **METHODOLOGY**

### **Study area**

Epe lagoon is located in Lagos State, South-West, Nigeria. The lagoon is situated between two other lagoons, the Lagos lagoon (brackish water) to the west and Lekki lagoon (freshwater) to the east (Soyinka and Ebigbo, 2012). The uniqueness of the lagoon is being the only lagoon in south-western Nigeria that is sandwiched between two lagoons (Lagos and Lekki lagoons). Epe Lagoon is connected to the Atlantic Ocean through the Lagos lagoon. The lagoon opens into the Gulf of Guinea (the sea) via the Lagos harbour. Epe lagoon has 460 km<sup>2</sup> brackish water areas (FAO, 1986). Soyinka and Ebigbo (2012) observed its salinity to be 0.24±0.19, pH 7.56±0.05 and temperature 30.35±0.17. This

confirmed that the lagoon is relatively fresh and stable from season to season. This freshness could be due to the closer connection of two fresh water bodies: Lekki lagoon and River Oshun, which over-ride the effect of further distant brackish water of Lagos lagoon. Epe lagoon has more fish species compared to Badagry and Ologe lagoons. Soyinka and Ebigbo (2012) attributed the higher number of fish families in Epe lagoon to migration of species from Lagos and Lekki lagoons; to River Oshun emptying into Epe lagoon, and also to the resident species of aquatic life in the lagoon. Interestingly, there is relatively little or no seasonal variation in species composition in Epe lagoon as compared with lagoons with Badagry and Ologe lagoons, also in Lagos State (Soyinka and Ebigbo, 2012). Epe lagoon supports major fishery activities in Lagos State, and it is also used as transportation route for people, goods and timber from Epe to other places in south-western Nigeria.

### Sampling procedure

A stratified sampling technique was used for this study. The first stage was the identification of the participants in the artisanal fisheries value chain in Epe lagoon. The second stage was the stratification of respondents into three strata of value chain actors. These strata were fisher folks, fish processors and fish marketers. The fish processors included those that eviscerated and those that dried and smoked the catch. Data was collected from the respondents using interview administered questionnaires. A total of 120 respondents comprising of 40 respondents for each stratum were selected. The interview instrument was divided into 3 sections based on the objectives of the study, information on the socioeconomic characteristics of the respondents; the costs

and returns along the value chain and the constraints hindering the value chain development in the study area.

### Data analysis techniques

Descriptive statistics including percentages, means, standard-errors were used to describe the socioeconomic characteristics of the selected respondents.

The viability of the value chain strata was determined using the following ratios:

$$NM = GM - TFC \text{ ----- (i)}$$

$$\text{Where } GM = \sum TR - \sum TVC \text{ ----- (ii)}$$

$$NROI = NM/TC \text{ ----- (iii)}$$

$$NPM = NM/TR \text{ ----- (iv)}$$

$$ESR = TFC/TC \text{ ----- (v)}$$

$$BCR = TR/TC \text{ ----- (vi)}$$

Where, NM is the Net Margin

GM is the gross margin income (total revenue) in Naira

TVC is the total variable cost in Naira, and

TFC is total fixed cost in Naira

NROI is Net Return on Investment

TR is Total Revenue in Naira

NPM is Net Profit Margin in Naira

ESR is Expense Structure Ratio

BCR is Benefit Cost Ratio

In conformation with the works of Odebiyi *et al.* (2013) and Anyanwu *et al.* (2009), the depreciated values of the fixed assets were calculated using the straight-line method assuming zero salvage value. The formula is specified as:

$$Ds = (OC - SV)/L \text{ ----- (vii)}$$

Where:

Ds = Annual depreciation in Naira per annum

OC = Original cost in Naira

SV = Salvage value in Naira

L = Expected or useful life (year).

### RESULTS AND DISCUSSIONS

Respondents' gender distribution presented in Table 1 shows that all the fisher folks were male and all of the fish processors were

female while 80% of the fish marketers were female. This shows that the artisanal fisheries value chain in Epe lagoon is gender sensitive. This result is in agreement with the position of earlier studies that found that men were predominantly the harvesting of wild fish species (Olubanjo *et al.*, 2007; Williams and Awoyomi, 1996). This finding also conforms with that of Odebiyi *et al.* (2013) in Ogun Waterside Local Government Area of Ogun State. It is also in agreement with the findings of Akanni (2008); Lawal *et al.* (2016), Okeowo *et al.* (2015) and Olaoye *et al.* (2012) that artisanal fisher folks in Lagos State are predominantly male, while the females engaged mainly in preservation and processing activities.

It is empirically evident that 85% of the fisher folks were within the age range of 31 – 50 years, while it is 92.5% only for processors and 75% for fish marketers. The mean age of the fisher folks was approximately  $43 \pm 6.82$  years, processors ( $38 \pm 5.81$ ) years and marketers, approximately  $39 \pm 8.48$  years. The age distribution shows that most respondents fall within a highly productive and active age however only few young adults 21-30 years were participants in the value chain.

Most, of the fisher folks (77.5%) were married while 5% were divorced. Among the fish processors, it is 85% of married and 2.5% widowed; and 87.5% of the fish marketers were married against 2.5% widowed. This result aligned with the findings of Alfred and Fagbenro (2006) and Odulate *et al.* (2011) who reported higher percentage of married women in coastal communities of Ondo and Ogun States.

In terms of household size 65% of the fisher folks had between 1 – 5 members; 30.0% had 6 – 10 household members while only 5.0% had 11 – 15 members. It is also evident that

57.5% of fish processors had 1 – 5 household members, while the remaining 42.5% had 6 – 10 household members. It was also reported that 75% of the fish marketers had 1 – 5 household members while only 20% of the fish marketers had 6 – 10 household members. The mean fisher folks' household membership size was approximately  $5 \pm 2.92$ , the fish processors was  $5.15 \pm 2.47$ , while that of the fish marketers was  $4.5 \pm 2.78$ . Majority of the respondents had household members ranging between 1 and 5 persons. This relatively low household membership size may increase the number of hired labour needed at different nodes along the artisanal fish value chain, and will result in an increase in explicit cost of production (Olaoye *et al.*, 2012).

The years of education showed that 55% of the fisher folks had no formal education, 40% had primary education, while only 5% had secondary education, and none of the fisher folks had tertiary education. The result also showed that 50% of the fish processors had no formal education, 45% had primary education while only 5% had secondary education with no fish processor having tertiary education. Also, 47.5% of the fish marketers had no formal education, 40% had primary education while 12.5% had secondary education with no fish marketer having tertiary education. This confirms the findings of Olubanjo *et al.* (2007) and Alfred *et al.* (2008) that most fisher folks were illiterate or semi-literate, most of whom have dropped out of formal school system.

It is empirically evident that a larger percentage (62.5%) of the fisher folks had more than ten-year experience in fishing while only 37.5% of the fisher folks had 1 – 10 years in fishing. About 32.5% of the fish marketers had 1 – 10-year experience in fish marketing while the remaining 67.5% had more than ten-year experience.

**TABLE 1: SOCIOECONOMIC CHARACTERISTICS OF RESPONDENTS**

Variables of Interest	Fisher folks		Fish processors		Fish marketers	
	n=40	Percent	n=40	Percent	n=40	Percent
<b>Sex</b>						
Male	40	100.0	0	0.0	08	20.0
Female	0	0.0	40	100.0	32	80.0
<b>Age distribution (years)</b>						
21 – 30	02	5.0	02	5.0	04	10
31 – 40	12	30.0	27	67.5	25	62.5
41 – 50	22	55.0	10	25.0	05	12.5
51 – Above	04	10.0	01	2.5	06	15
Mean	42.50±6.82		38±5.81		38.75±8.48	
<b>Marital Status</b>						
Single	03	7.5	01	2.5	02	5.0
Married						
Divorced	02	5.0	04	10.0	02	5.0
Widowed	04	10.0	01	2.5	01	2.5
Single	03	7.5	01	2.5	02	5.0
<b>Household size (members)</b>						
1 – 5	26	65.0	23	57.5	30	75.0
6 – 10	12	30.0	17	42.5	08	20.0
11 – 15	02	5.0	0	0.0	02	5.0
Mean	5.00±2.92		5.13±2.47		4.5±2.78	
<b>Highest formal educational level</b>						
None	22	55.0	20	50.0	19	47.5
Primary	16	40.0	18	45.0	16	40.0
Secondary	02	5.0	02	5.0	05	12.5
Tertiary	0	0.0	0	0.0	0	0.0
None	22	55.0	20	50.0	19	47.5
<b>Years of experience in the value chain</b>						
1 – 10	15	37.5	10	25.0	13	32.5
11 – 20	20	50.0	24	60.0	22	55.0
21 – 30	04	10.0	03	7.5	03	7.5
31 – above	01	2.5	03	7.5	02	5.0
Mean	13.25±7.24		15.25±7.90		14.0±7.60	

Source: Field survey data, 2018

### Profitability Analysis by value chain actor

The cost and return of the value chain are shown in Table 2. The value actors incurred several costs in form of fixed and variable costs. The average investment of an artisanal fisher folk in the study area was 88.92% of the total cost of production while that of the fish processors and fish marketers were 49.59% and 42.35% respectively. Net margin analysis used to assess the profitability of value added activities showed that an average fisher folk obtained a margin of about N16,695.25 weekly which was on the average approximately N2,385.04 (\$7.79) daily, while an average fish processor obtained an average weekly margin of N29,548.90, which was approximately N4,221.27 daily (\$13.79) and an average fish marketer earned an average weekly margin of N33,773.00 implying a daily earning of N4,824.71 (\$15.76) daily. The dollar exchange values were in line with the Central Bank of Nigeria (CBN) central rate of \$1 to N306.10 as at 30 October 2018. These imply that all artisanal fisheries value chain actors lived well above the World Bank International poverty line of \$1.90 per day as at 2015 (The World Bank, 2015). The budgetary analysis for the value chain actors shows the lowest marketing margins at the

fisher folk's level compared to the other value chain actors. The Net Rate of Return on Investment (NROI) of 0.13 for the fisher folk, 0.70 for the fish processor and 0.58 for the fish marketer, implied that for every Naira invested in the artisanal fish value chain enterprise b, a return of N13.00, N70.00 and N58.00 respectively were obtained by fisher folk, fish processor and fish marketer respectively. The variations in NROI for the chain can be attributed to varying high investment start-up costs for the different actors. This result is consistent with the findings of Ashaolu *et al.* (2006), Adewuyi *et al.* (2010), Odebiyi *et al.* (2013) and Olaoye *et al.*, (2011). The Benefit Cost Ratios (BCR) of 1.13:1 (fisher folk), 1.70:1 (fish processor) and 1.60:1 (fish marketer) show that artisanal fisheries value chain is profitable irrespective of the constraints militating against its development. The expense structure ratio of 88.94% (fisher folk), 49.08% (fish processor) and 42.35% (fish marketer) implies that unlike the other value chains, the average fisher folk allocated 88.94% of the total cost of production to fixed costs and also further explains the reason for lowest BCR of the average fisher folk.

**TABLE 2: COST AND RETURN ANALYSIS OF AN AVERAGE VALUE CHAIN ACTOR PER WEEK**

Variable of Interest / Items	Fisher folk		Fish Processor		Fish Marketer	
	Amount (N)	% of TC	Amount (N)	% of TC	Amount (N)	% of TC
<b>'A' – Fixed Cost</b>						
Dep. Smoking Kiln	-	-	11,100.00	26.17	16,900.00	29.02
Dep. Fishing Gear	10,211.40	7.70	-	-	-	-
Dep. Fishing Craft	31,125.80	23.70	-	-	-	-
Dep. Wire Gauze	-	-	2,980.50	7.03	-	-
Dep. Outboard Engine (OBE)	73,500.00	55.90	-	-	-	-
Shop/Stall	-	-	4,920.10	11.60	6,840.60	11.75
Knife	-	-	360.00	0.85	-	-
Lamp/Torch	950.00	0.70	880.00	2.80	920.00	1.58
Dep. Paddle and Pole	740.45	0.60	-	-	-	-
Bowl	450.00	0.30	480.00	1.14	-	-
<b>TFC</b>	<b>116,977.65</b>	<b>88.90</b>	<b>20,720.60</b>	<b>49.59</b>	<b>24,660.60</b>	<b>42.35</b>
<b>'B' – Variable Cost</b>						
Styrofoam	2,890.50	2.20	-	-	-	-
Fuel	5,550.00	4.20	-	-	-	-
Kerosene	1,550.00	1.20	840.00	1.99	510.00	0.88
Packaging	-	-	-	-	315.50	0.54
Firewood	-	-	5,520.00	13.07	3,520.00	6.04
Labour	3,250.00	2.50	740.50	1.75	4,125.00	7.08
Transportation	-	-	1,100.00	2.61	5,600.00	9.62
Basket	-	-	650.50	1.54	822.50	1.41
Tax	-	-	100.00	0.24	280.00	0.48
Fish	-	-	12,547.00	29.20	18,389.00	31.58
Miscellaneous	1,300.00	1.00	-	-	-	-
<b>TVC</b>	<b>14,540.50</b>	<b>11.10</b>	<b>21,498.00</b>	<b>50.41</b>	<b>33,571.00</b>	<b>57.65</b>
<b>TC (C) = A + B</b>	<b>131,518.15</b>	<b>100.00</b>	<b>42,218.60</b>	<b>100.00</b>	<b>58,231.60</b>	<b>100.00</b>
<b>Total Revenue (D)</b>	<b>148,213.40</b>	-	<b>71,767.50</b>	-	<b>92,004.60</b>	-
<b>Gross Margin Income (E) =D-B</b>	<b>133,672.90</b>	-	<b>50,269.50</b>	-	<b>58,433.6</b>	-
<b>Net Margin (F) = E-A</b>	<b>16,695.25</b>	-	<b>29,548.90</b>	-	<b>33,773.00</b>	-
<b>Net Returns on Investment (G)=F/C</b>	<b>0.13</b>	-	<b>0.70</b>	-	<b>0.58</b>	-
<b>Net Profit Margin (H) = F/D</b>	<b>0.11</b>	-	<b>0.41</b>	-	<b>0.37</b>	-
<b>Expense Structure Ratio (I)= A/C</b>	<b>88.94%</b>	-	<b>49.08%</b>	-	<b>42.35%</b>	-
<b>Benefit-Cost Ratio= D/C</b>	<b>1.13</b>	-	<b>1.70</b>	-	<b>1.60</b>	-

Source: Field survey data, 2018

**Constraints faced by the artisanal fishery value chain actors**

The results in Table 3 showed that most and more severe constraints felt by the more than half of the respondents were lack of improved technology for their business activity, lack of

storage facilities; lack of social amenities in their communities; inadequate extension service and the lack of credit facility for expansion of activity. However, about 48.3% of them did not see the non-membership of cooperative society as a severe constraint.

**TABLE 3: CONSTRAINTS LIMITING THE DEVELOPMENT OF ARTISANAL FISHERY VALUE CHAIN**

Constraints	Most Severe	More Severe	Undecided	Less Severe	Non-Severe
Lack of credit facility for expansion of activity	<i>n</i> = 60 (50.0%)	<i>n</i> = 42 (35.0%)	<i>n</i> = 02 (1.7%)	<i>n</i> = 7 (5.8%)	<i>n</i> = 9 (7.5%)
Non-membership of cooperative society	<i>n</i> = 48 (40.5%)	<i>n</i> = 14 (11.7%)	<i>n</i> = 0 (0%)	<i>n</i> = 29 (24.2%)	<i>n</i> = 29 (48.3%)
Poor storage facilities	<i>n</i> = 61 (50.8%)	<i>n</i> = 39 (32.5%)	<i>n</i> = 02 (1.7%)	<i>n</i> = 10 (8.3%)	<i>n</i> = 8 (6.7%)
Lack of improved technology for activity	<i>n</i> = 48 (40.0%)	<i>n</i> = 60 (50.0%)	<i>n</i> = 0 (0%)	<i>n</i> = 4 (3.3%)	<i>n</i> = 8 (6.7%)
Inadequate or low prices offered by consumers	<i>n</i> = 16 (13.4%)	<i>n</i> = 8 (6.7%)	<i>n</i> = 10 (8.3%)	<i>n</i> = 40 (37.5%)	<i>n</i> = 46 (38.3%)
Seasonality of fish	<i>n</i> = 33 (27.5%)	<i>n</i> = 25 (20.8%)	<i>n</i> = 08 (6.7%)	<i>n</i> = 24 (20.0%)	<i>n</i> = 30 (25.0%)
Poor transport network for products	<i>n</i> = 48 (40.0%)	<i>n</i> = 31 (25.8%)	<i>n</i> = 06 (5.0%)	<i>n</i> = 20 (17.0%)	<i>n</i> = 15 (12.5%)
High cost of implements and equipment	<i>n</i> = 49 (40.8%)	<i>n</i> = 39 (32.5%)	<i>n</i> = 0 (0%)	<i>n</i> = 23 (19.1%)	<i>n</i> = 9 (7.6%)
Lack of government intervention	<i>n</i> = 23 (19.2%)	<i>n</i> = 12 (10.0%)	<i>n</i> = 09 (7.5%)	<i>n</i> = 37 (30.8%)	<i>n</i> = 39 (32.5%)
Inadequate extension service	<i>n</i> = 58 (48.3%)	<i>n</i> = 22 (18.3)	<i>n</i> = 0 (0%)	<i>n</i> = 23 (19.1%)	<i>n</i> = 17 (14.1%)
Lack of social amenities	<i>n</i> = 53 (44.2%)	<i>n</i> = 36 (30.0%)	<i>n</i> = 0 (0%)	<i>n</i> = 12 (10.0%)	<i>n</i> = 19 (15.8%)
Harassment by local government officials	<i>n</i> = 27 (22.5%)	<i>n</i> = 21 (17.5%)	<i>n</i> = 12 (10.0%)	<i>n</i> = 21 (17.5%)	<i>n</i> = 29 (32.5%)

Source: Authors’ computation, 2018

**CONCLUSION**

The study revealed that value chain activities were gender specific, actors also had low level of education. Very few young adults from 21-30 years participated in the value chain. The

net margin analysis showed that all the value chain actors lived above the World Bank International poverty line of \$1.90 per day. The fisher folks’ earnings which is a little above the poverty line can be attributed to the

high Expense Structure Ratio of the enterprise. Although the net margin analysis showed that the fish marketers were the most profitable actors in the value chain. The results showed that the fish processors had a higher benefit cost ratio (BCR). Since all the value chain activities gave BCRs that were greater than 1.0, it shows that each activity delivered high returns to the actors.

The most severe constraints faced by the value chain actors were lack of credit facility to expand their business and poor storage facility, while some of them did not see their non-membership in cooperative society as a constraint.

### RECOMMENDATIONS

Based on the findings, the following recommendations are made: (i) Artisanal fisheries value chain is profitable and youth should be encouraged to participate in the value chain in view of their low level of presence in the activities of the value chain. This would also reduce the current level of high unemployment among the youth; (ii) although the fishing, fish processing and fish marketing are profitable, and the actors live above the current World Bank International poverty line of \$1.90, the actors can improve on their poverty line in the face of the widening inflation gap by expanding their business and adopting modern storage facilities and other equipment. These will require credit facilities. The Government and other formal credit institutions should therefore assist the value chain actors by facilitating their access to soft loans; (iii) the fisher folk chain is the least profitable with the actors living slightly above the World Bank International poverty line. This was greatly attributed to their high startup cost, especially the cost of outboard engines and motorized crafts. Government and support groups can

ameliorate the burden of the costs. This can be achieved by, but not limited to, granting them subsidies and soft loans, subsidizing the costs or offering hire purchase prices on costly equipment; (iv) the artisanal fishery value chain actors should be given cooperative education and them in forming cooperative societies to address mutual problems. ; (v) Cold storage facilities should be provided to reduce post-harvest losses while rural transportation infrastructure should be made available by government to ensure quick movement of produce to consumers.

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