

# Analysis of Beef Supply Chain in Kupang Town East Nusa Tenggara Province

Fransiskus Yulius Dhewa Kadju<sup>1\*</sup>, Budi Hartono<sup>2</sup>, Bambang Ali Nugroho<sup>2</sup>

<sup>1</sup>Magister Program, Faculty of Animal Husbandry, University of Brawijaya, Malang, Indonesia-65151

<sup>2</sup>Social-Economics of Animal Department, Faculty of Animal Husbandry, University of Brawijaya, Malang, Indonesia-65151

\*Correspondent Author: fransiskuskadju[AT]gmail[DOT]com

**Abstract**— Beef is one of the main food commodities in East Nusa Tenggara Province. Research objectives are to: 1) analyze products flow, financial flow, and information flow of beef supply chain in Kupang Town; 2) analyze level of marketing efficiency and transaction cost of the beef supply chain in Kupang Town; and 3) analyze value added of the beef supply chain in Kupang Town. The research is conducted in November 2018-February 2019 in Kupang Town. Method applied is a survey method. Method of sample collection used is a purposive sampling technique and snowball sampling. Respondents as samples cover 21 farmers, 7 cattle sellers, 7 cattle butchers and sellers, and 36 beef retailers. Data are analyzed based on descriptive, marketing efficiency, and value added using Hayami Method. Regarding supply chain mapping, there are two channels of beef marketing in Kupang Town. The channel with the highest value of marketing efficiency is Channel II reached 3.10%. The value added of the beef marketing institutions are IDR 230,453.89/kg for the farmers, IDR 9,649.54/kg for the cattle sellers, IDR 1,455.28/kg for the cattle butchers and sellers, and IDR 2,468.00/kg for the beef retailers.

**Keywords**— Marketing efficiency, transaction cost, value added.

## I. INTRODUCTION

Animal sub-sector development is an integrated part of agricultural development and economic development in Indonesia. The important role of agricultural development due to its role in forming country devisa and Product of Domestic Regional Bruto (PDRB) and covers more employment. Besides, the agriculture sector can provide main needs for people consumption and raw materials for industrial needs. Data Center and Agriculture Information System shows that meat consumption equals to fresh beef of Indonesian people in 2017 assumed reaches to 2.40 kg/capita/year; increases to 3.85% since the year of 2016. In 2017, cattle population also increased to 16.60 million heads; or it increases to 3.72% comparing with the population in 2016 [1].

Kupang Town is a town in Timor Island and it is the Capital of East Nusa Tenggara Province (NTT). Number of cattle slaughtered in Kupang Town Abattoir in 2017 reaches 12,739 heads, while at the same year Kupang Town contributes only 6,202 heads [2]. This fact indicates that most of cattle slaughtered in Kupang Town Abattoir is come from other areas. Cattle supply to Kupang Town mainly distributed from the three (3) regency in Timor Island namely The Regency of Kupang, Timor Tengah Selatan, and Timor Tengah Utara.

Supply chain is a group of activities participates in transformation process and product distribution started from

processing of raw materials until final product reaches the final customer [3]. Supply chain roles is to increase a product value through processing when a product is transported from one location to the others [4]. This management is important to do since there are many chains participate in beef supply chain and its price is higher than that of the other animal products.

Beef as one of the main food commodity is an interesting topic of research. There are many research's done focused on beef, such as optimization of management and distribution of fresh beef applying Supply Chain approachment [5, 6], include performance of supply chain on beef cattle agribusiness [7, 8]. Those research's show that the false in choosing distribution channel makes an effort of product distribution from producer to customer flows slowly.

Meat is an animal advantage commodity which source is an abattoir. The abattoir of Kupang Town is a public service unit which has functions of technically, economically, and social, in doing animal cutting process. The research objectives are: (1) to analyze flow of product, flow of finance, and flow of information of beef supply chain in Kupang Town; (2) to analyze level of marketing efficiency on beef supply chain in Kupang Town; and (3) to analyze value added of beef supply chain in Kupang Town.

## II. MATERIALS AND METHOD

### A. Location and Time

The research was conducted in Kupang Town Province of East Nusa Tenggara (NTT) in November 2018 - February 2019. The research location started from the abattoir located in Kupang Town, then searched the farmers and cattle sellers who supply their life cattle to the abattoir. Moreover, the searching continued to the beef supply chain from the abattoir to the traditional markets in Kupang Town.

### B. Research Methods

The research is conducted by applying a survey method. Singarimbun and Effendi explained that information through a survey gained from the respondents based on questionnaires as a tool to collect primary data [9]. The Kupang Town abattoir is selected purposively since the town has the highest level of beef demand comparing with the other regency in the Province of East Nusa Tenggara. Further, snowball sampling is applied in order to select participating chain samples in the beef supply chain in Kupang Town. Method applied in collecting data is a survey method by direct observation and interview

based on questionnaires to the respondents. The respondents comprise 21 farmers, 7 cattle sellers, 7 cattle butchers and sellers, and 36 beef retailers. The research is conducted to have a description focused on distribution channel of beef supply chain from abattoir to customer in Kupang Town.

Data used are primary and secondary data. The primary data offer from direct interview to the respondents, while the secondary data offer from Institution of Agriculture and Animal of Kupang Town, Institution of Industry and Trading of Kupang Town, Statistic Center Institution of Kupang Town, and publication of relevant institutions.

C. Data Analysis

Descriptive analysis is applied to describe about the flows of product, finance, and information, therefore the data can be understood easier and more informative for the readers. A method of descriptive is a method applied to describe or to analyze a research result but it is not used to make a wide conclusion [10]. Further, analysis of marketing efficiency is applied to evaluate the most efficient of supply chain.

Marketing Efficiency (ME) formulated as  $TC/TVP \times 100\%$ . Soekartawi explained that concept of marketing efficiency is a ratio between total cost (TC) and Total Value Product (TVP) marketed [11]. Supply chain with the highest marketing efficiency value is the supply chain with the lowest value of marketing efficiency.

TABLE 1. Procedure of Value Added Analysis Based on Hayami Method

No.	Variable	Value
<b>Output, Input, and Price</b>		
1	Output (kg)	(a)
2	Input of Raw Materials (kg)	(b)
3	Input of Labor (Daily Human Work)	(c)
4	Factor of Conversion	(d) = (a) / (b)
5	Coefficient of Field Labors (Daily Human Work/kg)	(e) = (c) / (b)
6	Price of Output (IDR/kg)	(f)
7	Average of Wage (IDR/Daily Human Work)	(g)
<b>Revenue and Profit (IDR/kg of Raw Materials)</b>		
8	Price of Input (IDR/kg)	(h)
9	Contribution of Other Input (Transaction Cost)	
	Cost of Abattoir (IDR/kg)	
	Cost of Market Retribution (IDR/kg)	
	Cost of Electricity (IDR/kg)	
	Kiosk Rent/day (IDR/kg)	
	Others Cost (IDR/kg)	
	Total Cost of Transaction (IDR/kg)	(i)
10	Value of Output (IDR/kg)	(j) = (d) x (f)
11	Value Added (IDR/kg)	(k) = (j)-(i)-(h)
	Ratio of Value Added	(l) = (k) / (j)
12	Income of Employment	(m) = (e) x (g)
	Wage of Labor	(n) = (m) / (k)
13	Profit	(o) = (k) – (m)
	Level of Profit	(p) = (o) / (j)
<b>Cost of Production Factors (IDR/kg of Raw Materials)</b>		
14	Margin (IDR/kg)	(q) = (j) – (h)
	Income of Field Labors (%)	(r) = (m) / (q)
	Contribution of the others Input (%)	(s) = (i) / (q)
	Profit of Company (%)	(t) = (o) / (q)

Source: Hayami in Emhar et al., 2014 [14]

Analysis of value added is done by applying Hayami Method. The test is needed to evaluate the value of value

added as a cause of slaughtering process of life cattle. Value added is an added value occurs on a commodity since the commodity is processed in a production process [12]. The increasing value of product produced will increase a competitive advantage of a company [13]. Value added is gained from the value of output minus the price of raw materials and other inputs, so it can be formulated as follows:

$$\text{Value Added (VA)} = \text{Output Value} - \text{Input Value}$$

Analysis procedure of value added based on Hayami Method can be seen on Table 1.

III. RESULT AND DISCUSSION

A. Flow of Product, Finance, and Information

Based on the research result as shown on Figure 1, there are three types of flows describe beef supply chain in Kupang Town. The first flow is flow of product that flows from upstream to downstream. The second flow is flow of finance that flows from downstream to upstream. Thirdly, flow of information that flows from upstream to downstream and vice versa. Structure of supply chain covers members of the supply chain participation, each member of the supply chain do marketing functions. The members of supply chain are all participants who are joining and have roles in beef supply chain.

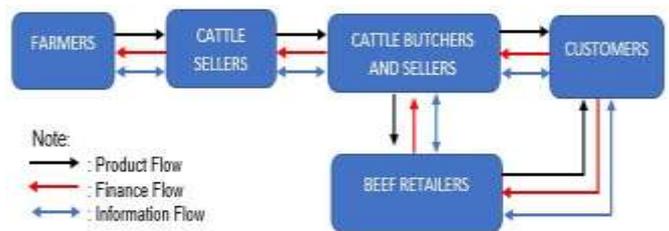


Fig. 1. Marketing Channel of Beef in Kupang Town

Flow of Product

Concerning the result, there are two patterns of product flow. The patterns formed are: (1) farmers - cattle sellers – cattle butcher and sellers – retailers – customers; (2) farmers - cattle seller – cattle butcher and sellers – customers.

The flow of product is commodity flow started from upstream in form of life cattle to downstream in form of beef. Most of the life cattle supplied by the cattle sellers come from regencies in Timor Island. The farmers do not sell directly their cattle to the cattle butchers and sellers, but through the cattle sellers. The cattle marketing done by the farmers is not based on life weight. The cattle price determination is done by the cattle sellers based on the cattle performance. Then, the cattle which has bought by the cattle butchers and sellers are transported to the Kupang Town abattoir to be slaughtered.

Regarding interview to the cattle sellers who slaughter the cattle in the abattoir, there are never stamp given and diagnose female cattle in order to evaluate whether the female cattle is productive or not. According to the research of Priyanti et al., the slaughtering of female cattle in Kupang Town reaches 91% every day [15]. There are some reasons found. Firstly, most of this case is affected by the unsatisfactory supply of available male cattle (since the best performance of

male cattle are sold to the other provinces). Secondly, the price of female cattle is cheaper than that of the male cattle. Thirdly, the weakness of law application deal with the prohibition of male cattle slaughtering.

Number of cattle slaughtered by every butcher is 5 - 7 heads, based on the market demand assumption. Average cattle slaughtered every day is 39 heads with body life weight range is 170 - 180 kg. Then, the slaughtered cattle is cut into carcass and distributed by the butchers and sellers to the beef. The retailers sell the beef about 25 kg - 100 kg/day. Most of the retailers supply the beef only to the household customers. The final customer can buy the beef at the abattoir based on the agreement of the butchers and sellers. In addition, most of the beef from the abattoir (80%) is marketed to the traditional markets in Kupang Town, to the beef processing UMKM (small scale industries) and meat shop (15%), and to the restaurant in Kupang Town (5%).

*Flow of Finance*

Flow of finance is a movement of money from downstream to upstream. The flow of finance on each marketing institution is important, so it is not inhibit development of the marketing institutions [16]. The flow of finance flows from customer until the beef cattle farmers. The flow patterns in beef distribution channels started from the cattle seller to the farmers. Payment system is in cash based on agreement and satisfaction of product and price ask by the farmers. The payment of beef cattle is done directly at the farmers' house or wherever the cattle is offered.

Further, the flow of finance occurs at the time of cattle marketed at animal market. On this phase, the flow of finance move from the cattle market to the government employers who work at the animal market. The retribution of cattle which transported to the market is IDR 21,000.00/head. The highest flow of finance at the animal market occurs when the butchers and sellers do a buying transaction with the cattle sellers, where the flow of finance move from the butchers and sellers to the cattle sellers.

Flow of finance also flows from the butchers and sellers to the abattoir in relation to slaughtering retribution cost. The flow of finance does not relation to the product since the abattoir institution only has a role in services and controlling the beef cattle slaughtering, and to make sure that the slaughtered cattle has a good criteria both health and relevant regulation. The flow of finance covers the payment of retribution at IDR 30,000.00 per cattle. Further, the retailers flow the money to the butchers and sellers through the buying process of fresh beef produced by the cattle. Further, the retailers flow the money to the cattle butchers and sellers through a process of buying fresh beef produced buy the cattle butchers and sellers.

The flow of money from customer flows to the retailers and to the cattle butchers and sellers. The customer who buys the beef from the retailers always buy in a small amount of beef and the customer is categorized as loyal customer of the retailers. Customer who buys the beef in a big amount always buy from the cattle butchers and sellers. Transaction occurs in

cash and directly done at the market or at the abattoir.

*Flow of Information*

The flow of information is a flow of two ways, either from upstream to downstream or from downstream to upstream. The information flow relates to life cattle supply, amount of demand, price of life cattle, price of beef, include policy and regulation deal with beef marketing. The flow of information flows both vertically and horizontally. On vertical flow, there are a coordination on different chains, namely among farmers, cattle sellers, cattle butcher and sellers, retailers, and customers. On horizontal flow, coordination occurs among the chain members. For instance, a horizontal coordination is a coordination among the cattle sellers in relation to the number of supply cattle on farmers level. Communication relationship occurs deal with availability, quality, and product price.

*B. Marketing Efficiency on Beef Supply Chain*

Based on the result analysis of beef marketing efficiency, it can be seen that all beef marketing in Kupang Town has been efficient, since all marketing efficiency value gain is less than 50% (Table 2). The marketing efficiency can be increased by decreasing marketing transaction cost and increasing selling volum if commodity price or product price is constant, therefore an equal management between risk and profit can be done by a company [17]. The channel with the highest efficient value is Channel II reaches 3.10% followed by the Channel I at 3.51%. The pattern of buying beef both by the retailers and customer in Kupang Town has a limited alternative channel because the beef price is controlled by the cattle butchers and sellers.

TABLE 2. Analysis of Marketing Efficiency on Beef Marketing Institution

Marketing Institution	Buying Price (IDR/kg)	Selling Price (IDR/kg) (a)	Transaction Cost (IDR/kg) (b)	Marketing Efficiency (%) (c = b/a)
<b>Channel I</b>				
Farmers	1,111.12	20,000.00	57.14	0.29
Cattle Sellers	20,000.00	29,795.92	633.55	2.13
Cattle Butchers and Sellers	29,795.92	82,500.00	574.36	0.70
Beef Retailers	82,500.00	85,000.00	329.18	0.39
Total	133,407.04	217,295.92	1,594.23	3.51
<b>Channel II</b>				
Farmers	1,111.12	20,000.00	57.14	0.29
Cattle Sellers	20,000.00	29,795.92	633.55	2.13
Cattle Butchers and Sellers	29,795.92	85,000.00	574.36	0.68
Total	50,907.04	134,795.92	1,265.05	3.10

Source: Analyzed based on Primary Data, 2019

Transaction cost is a cost of utilizing the market (market transaction cost) and cost of using obligation to instruction in a company (managerial transaction cost) occurs as a cause of the existence of transfer cost, offer, and to maintain position obligation [18]. The transaction cost is a cost spend by a

company to maintain the efficient supply chain [19]. Channel with the highest cost transaction is Channel I (IDR 1,594.23) followed by Channel II (IDR 1,265.05). The Channel I has the highest transaction cost since it has a longer marketing chain. The longer the marketing channel, the highest the transaction cost spend by the marketing institution.

C. Analysis of Value Added in Beef Supply Chain

Value added is given by activities of slaughtering the life

cattle therefore product will be changed into carcass. The value added on every supply change is different depends on inputs and treatments of each member of the supply chain [20]. Analysis of value added applying Hayami Method comprises some components, namely production cost and profit gained by every chain. Analysis of value added on the levels of the farmers, cattle sellers, cattle butchers and sellers, and retailers is shown on Table 3.

TABLE 3. Analysis of Value Added of Beef Products in Kupang Town by Applying Hayami Method

Variables	Value			
	Farmers	Cattle Sellers	Cattle Butchers and Sellers	Retailers
<b>Output, Input, and Price</b>				
Output (kg) = (a)	6,850.00	6,850.00	2,629.00	2,225.00
Input of Raw Materials (kg) = (b)	588.90	6,850.00	6,850.00	2,225.00
Input of Labors (Day Human Work) = (c)	-	15.75	11.50	-
Factor of Conversion = (d) = (a) / (b)	11.63	1.00	0.38	1.00
Coefficient of Field Labors (DHW/kg) = (e) = (c) / (b)	-	0.002	0.0017	-
Price of Output (IDR/kg) = (f)	19,927.01	29,687.17	82,500.00	85,000.00
Average of Labors Wage (IDR/DHW) = (g)	-	50,000.00	50,000.00	-
<b>Revenue and Profit (IDR/kg of Raw Materials)</b>				
Price of Input (IDR/kg) = (h)	1,107.06	19,927.01	29,687.17	82,500.00
Contribution of Other Inputs (Transaction Cost)				
Retribution of Abbatoir (IDR/kg)	-	-	63.57	-
Transportation (IDR/kg)	-	38.58	67.91	8.80
Retribution of Traditional Market (IDR/kg)	-	-	-	1.35
Retribution of Animal Market (IDR/kg)	-	17.08	-	-
Packaging (IDR/kg)	-	-	-	5.18
Puls of Mobile Phone (IDR/kg)	-	7.30	19.02	8.18
Feed (IDR/kg)	167.88	14.60	38.03	-
Health Care (IDR/kg)	12.76	11.68	19.02	-
Rope (IDR/kg)	6.36	12.20	-	-
Cattleshed (IDR/kg)	3.18	9.18	-	-
Others (IDR/kg)	-	-	-	8.99
Total Cost of Transaction (IDR/kg) = (i)	190.18	110.62	207.55	32.50
Value of Output (IDR/kg) = (j) = (d) x (f)	231,751.13	29,687.17	31,350.00	85,000.00
Value Added (IDR/kg) = (k) = (j) - (i) - (h)	230,453.89	9,649.54	1,455.28	2,468.00
Ratio of Value Added (%) = (l) = (k) / (j)	99.44%	32.50%	4.64%	2.90%
Income of Labors (IDR/kg) = (m) = (e) x (g)	-	100.00	85.00	-
Labors Wage (%) = (n) = (m) / (k)	-	1.04%	5.84%	-
Profit (IDR/kg) = (o) = (k) - (m)	230,453.89	9,549.54	1,370.28	2,468.00
Level of Profit (%) = (p) = (o) / (j)	99.44%	32.17%	4.37%	2.90%
<b>Cost of Production Factors (IDR/kg of Raw Materials)</b>				
Margin (IDR/kg) = (q) = (j) - (h)	230,644.07	9,760.16	1,662.83	2,500.00
Income of Field Labors (%) = (r) = (m) / (q)	-	1.03%	5.11%	-
Contribution of Other Inputs (%) = (s) = (i) / (q)	0.08%	1.13%	12.48%	1.30%
Profit of Company (%) = (t) = (o) / (q)	99.92%	97.84%	82.41%	98.72%

Source: Analyzed based on Primary Data, 2019

The result analysis shows that the value added gained by the farmers is IDR 230,453.89/kg (99.44%). Then, the value added gained by the cattle sellers is IDR 9,649.54/kg (32.50%), the cattle butchers and sellers is IDR 1,455.28/kg (4.64%), and the retailers is IDR 2,468.00/kg (2.90%). The highest value added is gained by the farmers. Regarding level of profit and comparing with the others suppliers, the farmers still be the supplier with the highest profit. The profit gains by the farmers reaches 99.44% of total value of output. Amount of value added and percentage of profit on the farmers level are more than that other marketing institutions. The reason is the income gains by the labor for each kilogram of output does not counted since the labor source is household members.

IV. CONCLUSION

Based on the result of beef supply chain net mapping in Kupang Town, there are three (3) pattern of beef marketing channels comprise: a) Channel I: Farmers – Cattle Sellers – Cattle Butcher and Sellers – Beef Retailers – Costumer, and b) Channel II: Farmers – Cattle Sellers – Cattle Butcher and Sellers – Costumer. The channel with the highest value of marketing efficiency is Channel II reaches 3.10%, followed by the Channel I with the value is 3.51%. Value added gains by the beef marketing institution for one kilogram output is IDR 230,453.89/kg for the farmers, IDR 9,649.54/kg for the cattle sellers, IDR 1,455.28/kg for the cattle butchers and sellers, and IDR 2,468.00/kg for the beef retailers.

## REFERENCES

- [1] Pusat Data dan Sistem Informasi Pertanian. 2017. Outlook Daging Sapi 2017. Sekretariat Jenderal Kementerian Pertanian. Jakarta.
- [2] Badan Pusat Statistik Kota Kupang. 2018. Kota Kupang Dalam Angka 2018. Kota Kupang: BPS.
- [3] Anwar, S. N. 2011. Manajemen Rantai Pasokan (Supply Chain Management): Konsep dan Hakikat. *Jurnal Dinamika Informatika*. Vol. 3, No.2.
- [4] Janvier-James, A. M. 2012. A New Introduction to Supply Chains and Supply Chain Management: Definitions and Theories Perspective. *International Business Research*. 5(1): 194-207.:
- [5] Rachman, N. M., E. R. Cahyadi, and H. Hardjomidjojo. 2017. Biaya transaksi dan nilai tambah pada rantai pasok daging sapi di Kota Bogor. *Jurnal Manajemen dan Agribisnis*. 14(1): 22-31.
- [6] Van der Vorst, J. G. A. J., S. O. Tromp, D. J. Van der Zee. 2009. Simulation modelling for food supply chain redesign: integrated decision making on product quality, sustainability and logistics. *International Journal of Production Research*. 47: 6611-6631.
- [7] Yayat, H.F., Marimin, and Harianto. 2010. Analisis kinerja rantai pasok agribisnis sapi potong : studi kasus pada PT. Kariyana Gita Utama. *Jurnal Teknik. Industri Pertanian* 20 (3):193-205.
- [8] Ningsih, U.W., B. Hartono, and E. Nugroho. 2017. Analisis pemasaran sapi potong melalui analisis marjin, transmisi harga, struktur pemasaran, perilaku pemasaran dan kinerja pemasaran. *Jurnal Ilmu-Ilmu Peternakan*. 27(1): 1- 11.
- [9] Singarimbun, M., and S. Effendi. 2006. Metode Penelitian Survei. Jakarta: LP3ES.
- [10] Sugiyono. 2011. Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta. Bandung.
- [11] Soekartawi. 1989. Prinsip Dasar Ekonomi Pertanian: Teori dan Aplikasi. Jakarta: Rajawali.
- [12] Coltrain, D., D. Barton, and M. Boland. 2000. Value Added: Opportunities And Strategies. Arthur Capper Cooperative Center, Department of Agricultural Economics. Kansas City (UK): Kansas State University.
- [13] Felea, M., and I. Albăstroi. 2013. Defining the Concept of Supply Chain Management and its Relevance to Romanian Academics and Practitioners. *The Amfiteatru Economic Journal*. 15(33): 74-88.
- [14] Emhar, A., J. M. M. Aji, and T. Agustina. 2014. Analisis rantai pasokan (supply chain) daging sapi di Kabupaten Jember. *Berkala Ilmiah Pertanian*. 1(3): 55-61.
- [15] Priyanti, A., I. Inounu, and N. Ilham. 2017. Pencegahan Pematangan Sapi Betina Produktif Melalui Tata Kelola Lembaga Korporasi Perusahaan Daerah. *Wartazoa*. 27(2): 53-66.
- [16] Bunte, F. 2006. Pricing and Performance In Agri-Food Supply Chains. Proceedings of the Frontis workshop on quantifying the agri-food supply chain. Wageningen, The Netherlands, 22-24 October 2004. Wageningen: Wageningen University and Research Center. Page 37-45.
- [17] Preckel, P. V., A. Grey, M. Boehlje, S. Kim. 2004. Risk and value chains: participants sharing risks and rewards. *Journal on Chains and Network Science*. 4(1): 25-32.
- [18] Williamson, O.E. (1985) *The Economic Institutions of Capitalism*. New York: Free Press.
- [19] Chen, S. F. S. 2010. Transaction Cost Implication of Private Branding and Empirical Evidence. *Strategic Management Journal*. 31(4): 371-389.
- [20] Marimin and N. Maghfiroh. 2010. Aplikasi Teknik Pengambilan Keputusan Dalam Manajemen Rantai Pasok. Bogor (ID): IPB Press.