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# Improving Collaboration of Bali Cattle Supply Chain and Its Impact on Cattle Farmer Income in South Sulawesi, Indonesia

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## Abstract

This study aims to identify collaboration problems cause of low income of cattle farmers in Bali cattle supply and to determine a root of the problems that vital to be improved. As many as 126 main actors of Bali cattle supply chain, consists of 96 cattle farmers and 26 traders (the dyadic relationship) in South Sulawesi Province used as the sample of respondents .Data collected using interview techniques with instrument questionnaires and focus group discussions (FGD). The data collected was analyzed with a relatively important index (RII) and cause-and-effect (fish bone diagram). Results of RII analysis show that the first important rank of collaboration problem cause low income farmers according to perception of cattle farmers was incentive alignment, while according to the traders was decision synchronization. From the focus group discussion, results of cause-and-effect analysis show that a root of the collaboration problem was decision synchronizing with incentives alignment. This a root of collaboration problem has agreed by the FGD participants that vital for improving and they recommended action plans such are developing trust and communication to reduce costs and increase revenue, and incentives alignment can be improved by applying a system based prices quality. The results of this study have important implications for the way in which to give contribution to the development of a collaboration theory in the local beef cattle industry and become a reference for the supply chain actors and local governments to improve Bali cattle supply chain management.

**Keywords:** Collaboration; Root of problems; Bali cattle; Supply chain; Low income; Folus group discussion; Cattle farmer; Traders

## Introduction

Indonesia has quite high potential on beef cattle. Data from Agricultural Census 2011 stated that beef cattle population reached 14.8 million head and the majority of the local breed is Bali cattle (*Bos sondaicus*) which amount reached 4.8 million heads (32.31%). Bali cattle has good genetic potential and beneficial for consumer preference because they have high percentage of carcass and have meat quality as fit as the market needs [1]. Population of Bali cattle spreads across the provinces in Eastern Indonesia, where the greatest number was in South Sulawesi Province, namely 1.082.173 heads [2]. In South Sulawesi Province, more than 90% of the Bali cattle managed by smallholders (cattle farmers). Despite the Bali cattle are one of the most important assets owned or managed by smallholders/cattle farmers in rural areas of the South Sulawesi Province. However, there are challenges in relation to the low cash income of cattle farmer from Bali cattle supply chain collaboration, because of the high price of Bali beef on the consumer level was no significant improvement to the income of the cattle farmers. This evident has been figured that the cattle farmers are not well integrated to the existing Bali cattle supply chain systems. In the present scenario, the major benefits of Bali cattle supply chain system are drawn by traders [3].

Collaboration has been recognized as a process that significantly improved the supply chain system [4]. The benefits of collaboration not only improve the income of the actors of the supply chain system, but also the actors can share risk and resources [5]. According to Ahmed and Ullah [6] the practice of collaboration in the supply chain has a lot of get the attention of the researchers. For beef cattle industry, many studies have discussed the concept, type, and characteristics of beef cattle supply chain collaboration [7-11]. Nevertheless, there is still very little research being done to identify the problems faced by the actors in collaboration and its impact on income of cattle farmers [4]. Therefore, the aims of this study to find collaboration problems of the Bali cattle supply chain which because of lower income of the cattle farmers, and to decide and get consensus from the actors (cattle farmers and trader) towards a roots of collaboration problem that vital for improving.

## Literature Review

Since the mid-1990s, a new concept in SCM, stressed the importance of forming a collaboration between supply chain actors to provide the supply chain efficiently and effectively [12,13]. Cao and Zhang [14] defined supply chain collaboration as a process of a partnership in which two or more companies self-organizing cooperation to planning and executing the operation of a supply chain toward a goal together and benefitting each other. Further, Barratt [15] categorizes two types of supply chain collaboration are vertical and horizontal collaboration. Horizontal collaboration refers to collaboration between actors in the same level of the supply chain, while vertical collaboration refers to the collaboration between the company and the partners who supply input (upstream collaboration) or partners who sell its products (downstream collaboration).

Matthew and Cheung [16] mentioned the benefits of supply chain collaboration, namely, first, the collaboration increases the profit sharing. Second, collaboration increasing capable from lowering the cost of company. Third, collaboration in the long run is the best solution to develop business processes, as well as lower the cost of adding the following value of the partners. According to Menter et al. [17], collaboration can help to reduce risk, access complementary resources,

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reduce transaction costs and increase productivity. According to Tsai [12], collaboration between supply chain actors can provide more services to the customers, because of supply chain collaboration allows participants to respond quickly, product innovation, customer expectations and anticipate customer needs. A Relationship of collaboration between actors in need of trust and commitment to share the risk, knowledge and resources.

In the context of beef industry, Huang and Sheu [18] point out that compared to supply chain systems in other industries, there are some unique challenges presented in beef supply chains that has made the design of an efficient beef supply chain difficult. First, the industry consists of a large number of unorganized parties and coordination between them has been lacking. A large number of cattle farmers are dispersed across wide geographic areas, which makes coordination extremely difficult. In addition, the relationships of between segments have traditionally been adversarial in part a result of intensive negotiation over cattle prices and volatile margins over time. Second, product flow was not synchronized with market demand, cattle farmers did not receive clear economic signals to help them develop production plans based on market demand. The mismatching of supply and demand often forced cattle farmers to carry too much inventory, which resulted in significant lengthy production cycles over time and created facility utilization inefficiency. Third, unique problem in beef industry is related to information flow. Specifically, cattle farmers rarely receive information about carcass quality or consumer preferences. This is especially true when fed cattle are sold on a live-or dressed-weight basis. Without necessary information cattle farmers cannot improve feeding operations to increase cattle quality, and they cannot select appropriate genetic breeds to meet market demand. The last, challenge to the beef supply chain comes from financial flow or pricing of beef, cattle farmers negotiated selling price for finished cattle with traders face to face when cattle were sold. These transactions for individuals pens of cattle were made at an average price, often termed as pricing on the-average and there were no economic incentives for producers and feeders to raise high quality cattle.

Fearne [9] stated that generally, there is five benefits that can be obtained from collaboration with the beef cattle supply chain, namely, improved market access, improved communications, higher profit margins, and greater discipline. Collaboration can also provide benefits of farmers on the side of cost and value. On the cost side, guaranteed access to a high volume market not only reduces market risk but also provides opportunities for economies of scale in the production process. Improved communications should result in shorter lead times, lower stock levels and reduced waste, further potential cost savings. On the value side, better knowledge of what consumers want and how they make purchasing decisions is invaluable when seeking to identify ways of differentiating meat products. Patrick et al. [19], studied roles of actors in local beef cattle supply chains in Eastern Indonesia, found that cattle farmers as a main involvement with the cattle supply chain occurs through brokers, collectors and traders These participants play an important role in buying and selling decisions, providing price information , and transport and linkage with buyers and sellers. The role of traders cannot be neglected in the cattle supply chain. In general, traders have a similar role, buying cattle either directly from farmers or through collectors (at the farm gate or the market), and transporting these cattle live to other regencies and provinces or islands. Helena and Hadi [20] reviewed in the macro marketing policy of Bali cattle in eastern Indonesia , noted that the Bali cattle supply chain is long with many actors involved and the benefits of supply chain more dominated by traders, suppliers, collectors and butcher. Long chain supply strongly influenced ranges and marketing spatial. The cattle was sold outer islands have a longer supply chain from being sold in the local market. If the cattle were sold only in the local market, traders generally buy cattle from collectors and then sold it to the butcher at abattoir. The cattle had been cut at the abattoir, mostly sold to retailers in the traditional market, and a small portion sold in modern markets, catering, restaurant and hotel. If the cattle were sold out of province/ other islands, before the cattle arrived in the market destination, it needs to pass the collector, traders among district, traders among regency, and trader between provinces or island.

## Method

This study-adopted a case study approach designed to understand the Bali cattle supply chain collaboration problem of the low income of cattle farmers in Bali cattle supply chains at Bone and Bulukumba Districts as the center region of Bali cattle production in South Sulawesi Province. The population of the study consisted of cattle farmers and traders, which describe the dyadic relationship of Bali cattle supply chain. Hence, a snowball sampling technique used, where cattle farmer respondents as many as 96 people determined based on Slovin formula and then, the cattle farmers respondent asked to whom traders they sold their cattle, and finally we found respondent of traders as much as 26 people. Therefore, the total respondent of the study was 126 people. Questionnaire survey method was used to collect primary data, which contains a list of questions prepared for the form of multiple choice questions and the respondent is given a statement to respond with answers using 3 point Likert scale, namely important, less important, and not important. Primary data collected was perception of the respondents on the collaboration problem because of low income of cattle farmers in Bali cattle supply chains. Then, focus group discussions (FGD) implemented by inviting as many as 30 people who were representatives of cattle farmers and trader respondents in order to validate the case study findings as well as to decide and get a consensus towards the root of collaboration problem that vital will improve. The FGD is often used as an exploratory technique [21] and appears to be an important determinant of actor's motivation and consensus to word improves beef cattle supply chain collaboration [19]. The problem of supply chain collaboration with this study associated with collaboration dimensions of Cao and Zhang [14], namely, information sharing, goal congruence, decision synchronization, incentive alignment, risk sharing, sharing resources, joint activity, joint communication, and joint knowledge creation. Finally, the cattle farmers' income indicator in this study is the average cash incomes received by cattle farmers from selling their cattle for the last two years.

The relative importance index (RII) method used to find cattle farmers and traders perceptions on collaboration problem cause of the lower income of cattle farmers. The RII was computed as [22]:

$$\text{Relative importance/difficulty index} = \frac{\sum w}{AN} \quad (1)$$

Where w is the weight given to each factor of the respondents, ranged from 1 to 5, A is the highest weight (i.e. 5 in the study) and N is the total number of samples. Based on equation (1), the relative importance index (RII) can be calculated ranging from 0 to1s. Furthermore, the finding from the case study (result of RII and their rank) are validated by FGD participants with applying cause-and-effect analysis (fish bone diagram). The analysis is also used to decide a root of collaboration problems. The process of deciding the root of collaboration problems with fish bone diagrams using '5 Why' methods.

## Results and Discussion

Table 1 shows result of the relative importance index and rank of each collaboration problem.

Table 1 illustrate that among all collaboration problem, the third rank is most important problems according to the perception of cattle farmers are,

a. Incentive alignment with RII=0.84. Incentives alignment is considered important by cattle farmers, because they perceived that the traders were not willing to share the profits and did not provide price incentives or material rewards if farmers produced high quality beefs

b. Information sharing with RII=0.79. Information sharing is considered important by the cattle farmers; because they perceived that the traders did not want to share useful information and also, provided them accurate and complete information about market and changes. Then, the traders tend to close the markets information on the cattle farmers. Without the information, cattle farmers could not efficiently manage their cattle and could not produce finish cattle in accordance with market demand, both from the aspect of quantity and quality

c. Decision synchronization with RII=0.75. Decision synchronization is considered important by the cattle farmers; because they perceived that the traders never involved them in making decisions about how to save on the supply chain cost and to predict market demand

In connection with the findings above, Mussell and Gooch [23] stated that improving information sharing and incentive alignment are very important factor to initiate collaboration between actors in the supply chain of agricultural commodities. The finding are also supported by previous studies, Leat and Giha [4] examines the challenges of building collaboration among actors of beef cattle supply chain in Scotland, found that a low level of trust of farmers and other chain actors, especially anything to do with the incentive alignment. Palmer [11] examined the beef cattle supply chain collaboration with the UK found that to encourage cattle farmers to develop relationships to other supply chain actors. They can assess and provide the right products, consistent beef quality. It is believed that cattle farmers should form the structure of the group and then integrated it with the traders to develop a supply chain management, build commitment and communication continuously as a key factor to develop effective collaboration.

On the other hand, the third rank of most important collaboration problems of the perception of traders is,

a. Decision synchronization with RII=0.96. Decision synchronization is considered important by the traders, because they perceived that the cattle farmer was difficult to work together with the traders in developing expected market demand, the cattle farmers did not interest to develop their number cattle owned even though market demand for beef cattle was promising

| Collaboration Problems | Cattle Farmers | | Traders | |
|---|---|---|---|---|
| | RII | Rank | RII | Rank |
| Information sharing | 0.79 | 2 | 0.48 | 8 |
| Goal congruence | 0.6 | 6 | 0.85 | 3 |
| Decision synchronization | 0.75 | 3 | 0.96 | 1 |
| Incentive alignment | 0.84 | 1 | 0.68 | 4 |
| Risk sharing | 0.65 | 4 | 0.56 | 6 |
| Joint activity | 0.55 | 8 | 0.49 | 7 |
| Joint communication | 0.63 | 5 | 0.86 | 2 |
| Joint knowledge creation | 0.58 | 7 | 0.57 | 5 |

**Table 1:** Relative importance index and rank for collaboration problem cause of low income of cattle farmer.

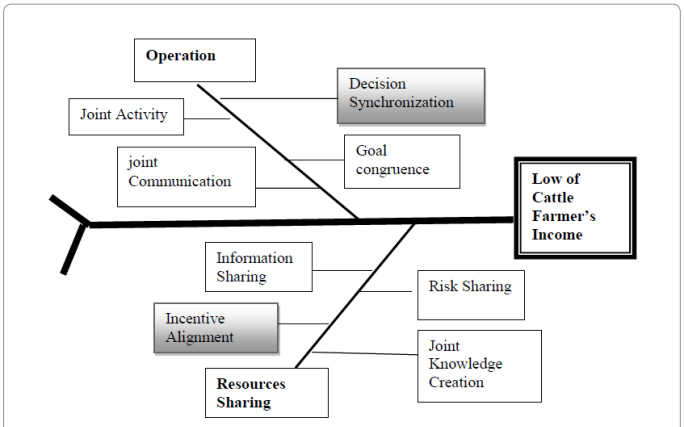


**Figure 1:** Fish bone diagram for a root of collaboration problems in increasing cattle farmers income.

b. Joint communication with RII=0.86. Joint communication is considered important by the traders, because they perceived that the cattle farmer had less such initiatives to communicate with the traders and communication with cattle farmers was very difficult to open up

c. Goal congruence with RII=0.85. Goal congruence is considered important by the traders, because of they perceived that the cattle farmers difficult to work together with traders towards their common goal in beef cattle supply chain, due to the traders activity ware market and profit oriented, while the cattle farmers in keeping cattle ware as a part-time activity and a way of investing or saving money.

The findings above supported by Kohli and Jensen [24] who states that the joint communication and goal congruence are believed to be the most important element for a successful collaboration in the supply chain. According to Ahmad and Ullah [6], decision synchronization and joint communication have been considered as a tool for operating collaborative supply chain management effectively and efficiently. Added by Schroeder and Kovanda [25] that an important factor in building collaboration among actors in the supply chain beef cattle is improving coordination, have the same goals, and build communication.

From the results of case studies, it seems there are differences perception among cattle farmers and traders to the problem collaboration. To overcome the difference, FGD were then conducted to validate results of the case study (RII and their ranks) as well as decide the root of the problem collaboration that vital will improve in order to increase of cattle farmers' income. Figure 1 presents cause and effect diagram (fish bone diagram) depicts the root of collaboration problems for increasing cattle farmers' income.

The results of cause and effect analysis as described the FGD participants agreed that a root collaboration problem cause of the low income of cattle farmers was decision synchronizing with incentives alignment. Group 1 and 3 pointed out that the non-transparent decision will cause difficulties the cattle farmers and the traders to share information and financial benefits. Group 2 and 5 explained that the decision synchronization and incentives alignment become an integral

part of the sharing of information. Limited information (technology and markets) access of the cattle farmers has created uncertainty for them to increase a number of cattle can be produced and their ability to maximize cattle sale price. This finding is supported by previous studies that the decision synchronization and alignment of incentives have a positive effect on the performance of the organization (such as revenue improvement, and cost reduction). Here it appears that the actors of the supply chain will be able to receive the benefits of collaboration if there is a link between joint decision (joint decision making) and incentives alignment [5]. Fearne [9] stated that the decision synchronization and incentives alignment in the beef supply chain collaboration provides benefits to farmers from the financial side. The financial benefits can be a cost-saving controller (deliver cost savings) and increase revenue or a combination of both.

For decision synchronizing with incentives alignment improvement, the FGD participants recommended several action plans which can be considered for increasing the income of cattle farmers. The first proposal (recommended by group 1 and 3) was improving synchronization decision through setting rules to provide operational guidance for cattle farmers and traders to harmonize their actions and to avoid conflict between the goals and interests of them. Joint decisions making between cattle farmers and traders will develop trust and communication between them to reduce costs and increase revenue. Furthermore, the second proposal (recommended by group 2 and 5) for improving incentives alignment was the price information is communicated throughout the supply chain by implementing a value-based pricing system, such as the provision of a premium price to encourage cattle farmers to produce high quality Bali cattle. According to Huang and Sheu [18] one of the ways to increase the income of cattle farmers in the beef supply chain collaboration is doing a strategic alliance that has been successfully applied in non-agricultural industry supply chain to reduce costs and share the benefit with traders.

## Conclusions

The relative important index (RII) results show that the first rank of the most important of collaboration problems causes the low income of cattle farmers, according to the cattle farmers perception was incentive alignment. While according to the traders perception was decision synchronization. Due to the there was a different perception between the cattle farmers and the traders, therefore FGD conducted to get consensus from them. From the FGD, result of cause and effect analysis show that a root of collaboration problems was decision synchronizing and incentives alignment. This root of collaboration problems agreed by the FGD participants to be improved with action plans, such are (a) synchronization decision improved by involving all actors in decision-making by developing trust and communication to cut costs and increase revenue; and (b) incentives alignment improved in which the price information communicated throughout the supply chain by implementing a quality based pricing system. The implications of this research for practitioners, actors of Bali cattle supply chain can use the results of this study as a reference in formulating guidelines for collaboration practice. For local government, the result of this study can be used as a policy in improving Bali cattle supply chain management. Further research can be applied statistical methods to test the relationship of the variables of supply chain collaboration and their impact on increasing cattle farmer incomes.

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