Supply chain collaboration and its effect on SMEs' competitiveness of seaweed business sector in Takalar Regency

Armayah, Sumardi, K Damang, and M Munizu
Faculty of Economics and Business, Hasanuddin University, Perintis Kemerdekaan Street, KM.10, Tamalanrea, Makassar 90245
E-mail: armayah@fe.unhas.ac.id

Abstract. Supply chain collaboration is an important element in creating both an efficient and competitive supply chain system. This study aimed to analyze the effect of (1) information quality toward competitiveness; (2) information sharing toward competitiveness; (3) alignment of incentives toward competitiveness; and (4) joint decision-making toward SMEs's Competitiveness of seaweed business sector in Takalar Regency. The population of this study was SMEs of seaweed business sector with a total of 340 business units. The sampling technique used simple random sampling. Then, the number of samples was 110 business units. Method of analysis used in this study was descriptive analysis and structural equation modeling analysis. The results showed that information quality has a significant effect on competitiveness. Information sharing also has a significant impact on competitiveness. Incentive alignment is having a significant impact on competitiveness. Joint decision-making has a significant impact on competitiveness. Also, the variable of competitiveness was greater influenced by information sharing, compared to information quality, incentive alignment, and joint decision-making variables.

1. Introduction
Supply chain activity starts with consumer demand and ends when the customer or consumer is satisfied [1]. Development of a supply chain performance measurement system needs to consider the specific characteristics of the supply chain that measured [2]. The supply chain is an organizational system to deliver goods and services to end customers. Then, a supply chain is a network that consists of various organizations that are interconnected and have the same relationship, which is to carry out the procurement or distribution of goods and services as well as possible [3].

The supply chains involve all parts, either directly or indirectly, to meet consumer demand. A supply chain includes all activities that require time along the network to convert raw materials into finished goods and information that is forwarded to end customers, and it has added value to customers [4].

Supply chain covers all interactions among suppliers, manufacturers, distributors, and customers [5]. This interaction also relates to transportation, information, scheduling, credit transfers, and cash as well as raw material transfers among the parties involved. A supply chain is directly related to the raw material cycle from suppliers to production area, warehouses, distribution, and customers [6].
Companies can increase their competitiveness through product adjustments, high-quality product, cost reducing, and speed to reach the market with an emphasis on supply chains system.

Supply chain management is the integration of material and service procurement, then conversion it into semi-finished goods or end products, as well as shipping to customers that includes purchasing and outsourcing activities, and other important functions related to suppliers, companies and distributors activities [5]. Supply chain management regulates the flow of goods and services as well as information transmitted to meet customer needs. Each segment of the supply chain is arranged separately which focuses more on their respective objectives. Supply chain management covers all activities related to the flow of goods and services from raw materials to finished goods, then to customers [7].

The other definition of supply chain management stated that supply chain management as a management strategy for all business functions which includes several upstream or downstream flows, for some aspects of the supply chain system [8]. Moreover, the supply chain management as an approach applied to unite among suppliers, companies, warehouses, and other storage places (distributors, retailers, and retailers) efficiently [9]. It made products can be produced and distributed with the right amount, right location, and the right time to reduce costs and meet customer needs. In assessing a supply chain strategy performance, four indicators were used, namely flexibility, quality, responsiveness, and efficiency [2].

New concepts in supply chain management emphasize the importance of forming collaboration between supply chain members to provide an efficient and effective supply chain [10]. Furthermore, the study defines supply chain collaboration as a collaborative process involving two or more companies to work together and making a plan and implementing supply chain operations for mutual benefits [11]. The other study describes two types of supply chain partnerships, namely vertical and horizontal collaboration [12]. Horizontal partnership refers to partnerships among members at the same level of the supply chain, while vertical collaboration refers to partnerships among companies and partners that supply inputs (upstream collaboration) or partners who sell their products to consumers (downstream collaboration).

The benefits of supply chain collaboration, i.e.: (1) partnerships can increase profit sharing, (2) partnerships can reduce operating costs, and (3) long-term partnership is the best solution for developing business processes, lowering costs and adding value among partners [13]. Some supply chain members can provide more services to customers because partnerships allow supply chain members respond customer expectations quickly, provide good product innovation as well as anticipate customer needs [10].

A comprehensive study of the development of supply chain collaboration practices in agricultural products, especially in developing countries, concluded that lack of coordination among supply chain members causes problems in production flows, financial flows, and information flows in supply chains system. Partnership relationships require both trust and commitment to cooperate with the objective to share risks, knowledge, and resources [14].

Business competitiveness relates to the extent to which an organization can create the best position and maintaining it over its competitors. Best positions allowed organizations to get more benefit than competitors [15]. Supply chain collaboration is a potential source of competitiveness because collaboration can produce the effect of business function synergy among companies along the supply chain so that, effective supply chain collaboration can produce higher competitiveness [15-19].

The most effective supply chain flow is from farmers collected at collectors, then brought it to the wholesale market, traditional markets that eventually reach the consumers [20]. The most effective supply chain pattern can be seen from the total margin which has decreased so that farmers getting the bigger margin. The marketing planning variables involving all members of the supply chain that providing the greatest influence on the company’s supply chain management strategy [21]. Customer satisfaction variables have the greatest influence on company performance.

In addition, the study found that the supply chain performance component consists of quality, flexibility, and responsiveness has a significant influence on the competitiveness of producers; (2)
supply chain performance which consists of quality, and responsiveness has a significant influence on
the competitiveness of processors; and (3) the components of supply chain performance that consists
of quality, flexibility, responsiveness, and efficiency have a significant influence on the
competitiveness of wholesalers / retailers; (4) Employees who are less experienced and lack of skills
are key issues that affect the overall performance of the supply chain in the meat industry in Australia
[22].

The development of SMEs in the seaweed business sector is a priority program every year in
Takalar Regency. Seaweed business as one of the region's leading commodities was increasingly
improved both regarding volume and quality. However, people who seek these commodities have not
yet received optimal benefits. Therefore, the development of SMEs in the seaweed business sector
needs to be carried out with a different approach, namely through an active and collaborative supply
chain to improve competitiveness. The purpose of this study was to analyze the influence of supply
chain collaboration that consists of information quality, information sharing, incentive alignment, and
joint decision making on the competitiveness of SMEs in the seaweed business sector in Takalar
Regency.

2. Methods and Material
This study conducted in South Sulawesi Province, precisely in Takalar Regency. The population of
this study was SMEs of seaweed business sector in Takalar Regency with a total of 340 business units.
Determination of the number of samples that taken to represent the population processed by using the
Slovin formula. So, the number of the example in the study was 110 business units. Data were
collected by questionnaire, interview, and observation techniques.

The research instrument used in this study was a questionnaire as a data collection tool. So, the
type of validity used was internal validity. Validity testing conducted through item analysis by using the
Pearson Product Moment Correlation method. Validity test with this method was done by
correlating the answer scores obtained in each item with a total score of all items. An indicator/item
said to be valid if it has a value of \( r > 0.30 \) [23]. Furthermore, the reliability test showed the extent to
which measurements can give results that are not different if measures were taken back to the same
subject. Reliability testing carried out by using Alpha Cronbach (\( \alpha \) value. An instrument can be said
reliable if the value of Alpha Cronbach was more significant than 0.60 [24, 25]. Then, the methods of
analysis used in this study are (1) Descriptive Analysis and (2) SEM Analysis (structural equation
model). Research data processed by using SPSS and AMOS software.

3. Results and Discussion
Structural equation model (SEM) analysis was carried out through 2 (two) stages, i.e.: (1) testing the
suitability of the model, and (2) analyzing the relationship between variables. Test of suitability level
of the structural equation model conducted based on reference values (cut-off values). Briefly, the results
of the suitability level test on the structural model of causality relationship in this study were
presented in the following table.

| Table 1. The result of Goodness of fit indices Overall Model |
|-------------------------------------------------------------|
| The goodness of fit index | Cut of value | Model result | Result |
|---------------------------|--------------|--------------|--------|
| Chi-Square                | expected small | 95.622       | Fit    |
| CMIN/DF                   | \( \leq 2.00 \) | 1.272        | Fit    |
| GFI                       | \( \geq 0.90 \) | 0.944        | Fit    |
| RMSEA                     | \( \leq 0.08 \) | 0.020        | Fit    |
| CFI                       | \( \geq 0.95 \) | 0.960        | Fit    |
| TLI                       | \( \geq 0.95 \) | 0.955        | Fit    |
The test results on some suitability criteria of the structural model listed on the table above indicate that all requirements have met the good model requirements. Therefore, this research model can be used to estimate and analyze further research. Briefly, the results of the structural model about the influence of supply chain collaboration variables on the competitiveness of SMEs in the seaweed sector in this study were presented in the following figure.

![Figure 1. The result of Empirical Model](image)

Figure 1 above reveals the relationship between supply chain collaboration with SMEs competitiveness. Based on the results of the structural model above, then the results of the research hypothesis in this study can be presented as seen in the table below.

| Description | Estimate | Critical Ratio (CR) | Prob. | Result |
|-------------|----------|---------------------|-------|--------|
| information quality ---→ competitiveness | 0.213 | 3.629 | 0.024*) | Significant (H1, accepted) |
| information sharing ---→ competitiveness | 0.586 | 5.288 | 0.000*) | Significant (H2, accepted) |
| alignment of incentives ---→ competitiveness | 0.205 | 3.105 | 0.035*) | Significant (H3, accepted) |
| joint decision-making ---→ competitiveness | 0.366 | 4.365 | 0.010*) | Significant (H4, accepted) |

*) significant at: $\alpha \leq 0.05$

The table above shows that information quality has a significant effect on competitiveness. This can be seen from the critical ratio (CR) value which is greater than the t-table (3.629 > 1.960). Therefore, quality information in the supply chain system can improve SMEs competitiveness. Then, information sharing has a significant effect on competitiveness. This can be seen from the critical ratio (CR) value which is greater than t-table (5.288 > 1.960). Therefore, better information sharing in the supply chain system can improve SMEs competitiveness. Furthermore, the variable of incentives alignment has a significant effect on SMEs competitiveness. This can be seen from the critical ratio (CR) value which is greater than the t-table (3.105 > 1.960). Incentives that are increasingly aligned with all members of the supply chain can increase SMEs competitiveness. Finally, the variable of joint decision-making has a significant effect on SMEs competitiveness. This can be seen from the value of the critical ratio (CR) which is greater than the t-table (4.365 > 1.960). Therefore, the hypotheses 1, 2,
3, and 4 proposed in this study was accepted or in other words, the hypothesis which proposed in this study supported by empirical facts.

Supply chain collaboration is a potential source of competitiveness [16-18]. Collaboration produces the effect of business function synergies between companies in the supply chain system [19]. The more effective supply chain collaboration can produce a higher competitiveness in an organization [10]. The results of this study are in line with finding that quality, flexibility, and responsiveness have a significant influence on firm competitiveness [22]. The findings of this study are also consistent with the results that competitiveness will increase along the supply chain through creative and innovative efforts in the firm [26].

The results of this study relate to the statement of that the lack of collaboration reduces competitiveness because it can cause inefficiencies in the production of raw materials, manufacturing of processed products and functions of the supply chain as a whole [27]. Collaboration creates togetherness and sharing between partners, namely sharing experiences, sharing market information, sharing plans and sharing knowledge.

These findings supported, which carried out a comprehensive study of the development of supply chain collaboration practices in agricultural products in developing countries [14]. The study concluded that the lack of coordination and vertical relationships could be caused problems in product flows, financial flows, and information flows in the supply chain system. Partnership relationships require both trust and commitment to cooperate with spirit to share risks, knowledge, and resources among supply chain members [10].

4. Conclusions

The results of this study showed that better supply chain collaboration could improve SMEs competitiveness of the seaweed business sector in Takalar Regency. Then, this study also found that information quality variable has a significant effect on SMEs competitiveness. Information sharing also has a significant impact on SMEs competitiveness. Moreover, alignment of incentives can increase SMEs competitiveness. Also, the variable of joint decision-making having a significant impact on SMEs competitiveness.

Therefore, the results of this study provide sufficient data and information for SME managers in the seaweed business sector to develop effective collaboration with their supply chain partners. The better partnership can improve business competitiveness. Also, this study gives some implication to the managers for making some improvements in the organization policies, especially on every indicator of incentive alignment variables for creating a better supply chain system.

References

[1] Chopra S and Meindl P 2009 Supply Chain Management: Strategy, Planning, and Operation (United States of America: Pearson Prentice Hall)
[2] Aramyan LH, Ondersteijn CLM, Kooten O V, Lansink AOJM 2006 Performance indicators in agrifood production chains: Quantifying the agrifood supply chain Wageningen UR Front. Ser. 15 47 - 64
[3] Indrajit R E and Djokopranoto R 2006 Supply Chain Management Concept: A New Way to Look at the Supply Chain of Goods (Jakarta: Grasindo)
[4] Ballou R H 2004 Business Logistic: Supply Chain Management Strategy, Planning, and Operation (New Jersey: Prentice Hall)
[5] Heizer J and Render B 2010 Operations Management (Jakarta: Salemba Empat)
[6] Siagian YM 2005 Supply Chain Management application in the Business World (Jakarta: Grasindo Press)
[7] Russell RS and Taylor B W 2003 Operations Management (New Jersey: Person Education Inc)
[8] Nahmias S 2005 Production and Operations Analysis (New York: McGraw-Hill/Irwin Inc)
[9] Simchi-levi, Kaminsky D Pand Simchi-Levi E 2000 Designing and Managing The Supply Chain: Concepts, Strategies and Case Studies (New York: McGraw-Hill Inc)
[10] Tsai YL 2006 Collaborative Supply Chain Practices: Taiwanese Companies in China (Skotlandia: University of Stirling)
[11] Cao M and Zhang Q 2011 Supply chain collaboration: Impact on collaborative advantage and firm performance. Oper. Manag. 29 163-180
[12] Barratt M 2004 Understanding the meaning of collaboration in the supply chain Supply Chain Manag. An Int. J. 9 30-42
[13] Matthew B M and Cheung M S 2008 Sharing global supply chain Knowledge Sloan Manage. Rev. 49 67-73
[14] Huang BW and C Sheu 2005 The 10th Annual Conf. of Asia-Pacific Decision Sciences Institute (Taipei: Yuan Ze University)
[15] Barney J 1991 Firms Resources and Sustained Competitive Advantage J. Manage. 17 791-400
[16] Grant MR 2002 Contemporary Strategy Analysis: Concepts, Techniques, and Application (Massachusetts: Blackwell Publisher Inc)
[17] Gunasekaran A, Patel C and Mc Gaughey RE 2004 A framework for supply chain performance measurement. Int. J. Prod. Econ. 87 333-347
[18] Hassini E, Surti C and Searcy C 2012 A literature review and a case study of sustainable supply chains with a focus on metrics. Int. J. Prod. Econ. 140 69-82
[19] Manuj I and Mentzer J T 2008 Global supply chain risk management J. Bus. Logist. 29 133–155
[20] Ritonga OS 2005 Potato Commodity Marketing Analysis with Supply Chain Management (SCM) Approach in Semarang City, Central Java Province (Bogor: Bogor Agricultural Institute: Bogor)
[21] Irmawati 2007 Effect of Supply Chain Management on Performance in PTPN VIII Gunung Mas Bogor (Bogor: Bogor Agricultural University)
[22] Jie, Ferry, Kevin A, Parton R J and Rodney C 2008 Supply chain performance indicators for Australian beef industry: An empirical analysis Int. J. Prod. Econ. 81 133-147
[23] Hair Jr, Yoseph F, Rolph EA, Ronald L, Papham and William B 2011 Multivariate Data Analysis (New Jersey: Prentice-Hall Inc)
[24] Sekaran U 2009 Research Methods For Business: A Skill-Building Approach (New York: John Wiley & Sons)
[25] Sugiyono 2012 Statistics for Research (Bandung: Alfabeta Press)
[26] Munizu, Musran and Hamid N 2018 Mediation effect of innovation on the relationship between creativity with business performance at furniture industry in Indonesia Qual. Access to Success J 19 165 98-102
[27] Fearne A 1998 The evolution of partnerships in the meat supply chain: insights from the British beef industry Supply Chain Manag. Int. J. 3 214-231
[28] Fu Y and Piplani R 2004 Supply-side collaboration and its value in supply chains Eur. J. Oper. Res. 152 281-288