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Supply chain collaboration for the staple food product competitiveness

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Food supply chain collaboration (FSCC) is a prevalent business strategy in developed countries. Despite the widespread adoption, there is still limited literature on FSCC in developing countries, including Indonesia. Therefore, the study aimed to analyze the factors of information sharing, relationship quality, and corporate shared value on supply chain collaboration and their effect on improving the competitiveness of rice main food products in Indonesia. The conceptual framework was developed from the Relational View theory as the basis for supply chain collaboration, which could prove beneficial in increasing the competitiveness of food products. The data were collected from three rice supply chain actors, namely farmers, rice milling units, and retailers, which were analyzed using partial least squares Structural Equation Modeling. The results showed that information sharing was the variable with the greatest effect on supply chain collaboration, followed by corporate shared value and relationship quality. Information sharing carried out by supply chain actors was due to dependence, trust, and commitment to relationships. Collaboration and information sharing among actors showed the potential to positively improve the competitiveness of rice main food products. These results provided valuable insights for food supply chain actors, emphasizing the importance of collaboration by considering economic, social, and environmental aspects.

1. Introduction

The performance of the food sector is essential for the production of high-value products (Yang & yan, 2020), focusing on quantity, quality, continuity, and safety across nutritional content, health, and hygiene (Septiani et al., 2016). However, food supply chains are usually faced with various problems due to their integration with various economic sectors and rapid changes in consumer preferences in the market (Beske et al., 2014; Palazzo & Vollero, 2021). The complexity of the food supply chain poses a significant challenge to achieving sustainable development across several economic, environmental, and social aspects (Dania et al., 2018). This is attributed to including numerous networks capable of hindering effectiveness and efficiency. Therefore, the principles of quality and sustainability are required for smooth distribution from production centers to consumers (Stone & Rahimifard, 2018) through effective and efficient collaboration (Cao & Zhang, 2011). Mutual coordination, joint, and integrated processes between suppliers, consumers, and other partners (Niemsakul et al., 2018), are also required to reduce risk and achieve competitive advantage (Fera et al., 2017). Moreover, the competitive advantage owned by food companies is the basis for designing business strategies for growth and sustainability (Potjanajaruwit, 2018). Business success in developed countries is attributed to the ability of companies to integrate network relationships through collaboration, thereby developing comparative advantage and competitiveness (Sopa & Saenchaiyathon, 2020). Despite the potential benefits, collaboration strategies have not been widely applied across all sectors. This is due to the limited literature

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examining the relationship between food supply chain management, competitiveness, and sustainability in developing, mostly agrarian countries, including Indonesia (Palazzo & Vollero, 2021). Indonesia is one country that contributes 1.40% of global rice production of 519.1 million tons (FAO, 2015). As a staple food product, 50% of rice is consumed by the world population, particularly in Asia, where more than 90% of consumption occurs, with Southeast Asia accounting for 22% (Dawe et al., 2014). Rice has a more complex supply chain structure due to the engagement of several companies and risk factors (Wang et al., 2022; Muthayya et al., 2014; Jifroudi et al., 2020; Computational Intelligence and Neuroscience, 2023). Additionally, the structure includes the process of planting (Wang et al., 2022), availability of agricultural land (Phan et al., 2021), processing (Huang et al., 2020), and packaging. (Wang et al., 2022).

In some cases, various countries such as India face problems with procurement, distribution, inter-agency collaboration, and logistics systems (Sharma et al., 2013). Thailand is challenged with a complex rice supply chain from production, processing, and marketing, which hinders competitive ability (Cavite & Suwanmaneepong, 2022). Similarly, Indonesia faces low production and marketing performance, resulting in low competitiveness of rice products (FAO, 2015). The other problems include unplanned production, improper post-harvest handling, limited technology, food logistics infrastructure such as rice storage warehouses and transportation, capital, the absence of logistics services in rural areas, and limited knowledge of farmers (Adriant et al., 2021). Numerous food companies in developed countries have practically applied supply chain collaboration. For example, Australia and New Zealand have mature food supply chain management for food industry partner consolidation and supply chain integration (Zhong et al., 2017), while India applies a centralized food supply chain model (Zhong et al., 2017). China builds logistics infrastructure (Lam et al., 2013), while Japan and South Korea build a global integration system (Narasimhan & Kim, 2002). Additionally, North America has designed food supply chain management by building innovative food warehouses (Neto et al., 2010). Collaboration is a business process where two companies work together to plan, implement, and create an effective as well as efficient supply chain (Cao & Zhang, 2011). The key elements of building supply chain collaboration are mutual performance systems, information sharing, synchronization of decisions, arrangement of incentives, and innovative supply chain processes (Simatupang & Sridharan, 2008). Recently, the development of collaboration has gained significant attention to exploring the competitive advantage of sustainability methods, using environmental information across supply chains (Soler et al., 2010) and arranging resources with marketing and branding strategies (Cox et al., 2007).

This study is developed from collaboration and relational view (RV) theory, which explains how to increase the competitiveness of companies along with the relational network and other resources (Sopa & Saenchaiyathon, 2020). Some components of supply chain collaboration are information sharing, building shared knowledge, internal communication between supply chain members, coordinated goal setting, planning, and decision-making (Sopa & Saenchaiyathon, 2020). Moreover, information sharing occurs due to dependence on trust factors (Fu et al., 2017), and relationship commitment (Chen et al., 2017), serving as a key aspect that can improve collaboration and performance of all supply chain networks (Zhang & Gong, 2021).

Relationship quality is another factor in collaboration (Lees et al., 2020), as the quality relationship between suppliers and consumers facilitates the ease of addressing delivery issues (Kannan, 2002). Furthermore, the inclusion of supplier partners in business requires aspects of quality relationships to build collaboration (Aggarwal & Srivastava, 2016). In this study, collaboration development integrates social, environmental, and economic goals (Seuring & Muller, 2008; Ahi & Searcy, 2013; Khan et al., 2021; Palazzo & Vollero, 2021), as a commitment of all supply chain networks for shared value creation. The benefits of shared value become evident when sustainable supply chain management is considered a rational capability that grows over time, resulting in a competitive advantage for companies (Meulensteen et al., 2016).

Based on Collaboration and Relational View theory, the study contributes to the development of literature and references for supply chain actors to produce competitive main food products. Therefore, this study aimed to describe supply chain collaboration by examining the factors of information sharing, relationship quality, and corporate shared value regarding competitiveness of rice as main food products in Indonesia. The results show that information sharing among supply chain actors is facilitated by dependency, trust, and relationship commitment.

Other sections of this study include Section 2, which describes the literature review and hypotheses. Section 3 explains the materials and method, while. Section 4 presents the results by describing the effect of information sharing, relationship quality, and corporate shared value on supply chain collaboration and their effect on competitiveness of rice main food products. Furthermore, Section 5 presents the discussion, and Section 6 shows the conclusion.

2. Literature Review and Hypothesis

2.1. Food Supply Chain

Food products have complex supply chains, interconnecting various economic sectors, such as agriculture, processing industry, and distribution, in a market dominated by rapid changes in consumer preferences (Beske et al., 2014; Palazzo & Vollero, 2021). Generally, the type of food available is often affected by the natural environment, production systems,

transportation distance from producers to consumers, waste management, and conditions of workers (Palazzo & Vollero, 2021). In the food supply chain, coordination starts from production to consumers, ensuring food safety and quality (Zhong et al., 2017). This shows the need to address the complexity of the food supply chain and predict future structure through various strategies such as integrated global architects, sustainability, and physical internet (Zhong et al., 2017). Food supply chain consists of food production, storage, delivery, and retail sales to the final consumers (Haessner & Mcmurtrey, 2023). The production stage starts from the agricultural sector, followed by sales to first-line traders who store, process, and deliver to wholesalers and processors (Haessner & Mcmurtrey, 2023). Subsequently, food products flow from wholesalers and manufacturers to retail stores and the service sector to be purchased by consumers (Haessner & Mcmurtrey, 2023).

2.2. Supply Chain Collaboration

Supply chain collaboration is conceptualized as the synergy between two or more actors working collectively to create competitive advantage through information, cooperative decisions, and sharing the benefits resulting from greater profitability and satisfying consumer needs (Azevedo et al., 2018). It also refers to the collective efforts of organizations and companies to achieve certain goals, thereby contributing to the sustainability of supply chains and building long-term relationships. Consequently, actors generally conduct working relationships, share information, plan, and modify business practices to improve joint performance (Azevedo et al., 2018).

In this study, supply chain collaboration of main food products, particularly rice, is analyzed. The analysis focuses on the importance of sustainability and fulfilling hygiene and health aspects, which are reflected in product competitiveness. Sustainability and collaboration are important concepts in supporting complex systems in food supply chain management (Dania et al., 2016). Collaboration among actors aims to share awareness of a common understanding based on common interest in progress and welfare (Simatupang & Sridharan, 2008). Therefore, these actors are responsible for solving mutual challenges and playing an active role in designing effective strategies to generate mutual benefits (Simatupang & Sridharan, 2008).

2.3. Relevance of Supply Chain Collaboration Theory for Main Food Products Competitiveness

This study focuses on three main actors in the main food supply chain. These include farmers as producers of agricultural products, rice milling units engaged in processing, and retailers who sell main food products to consumers. Theoretically, food supply chain collaboration (FSCC) has three dimensions: economic, environmental, and social. The economic dimension is an important driver in food business processes that implement sustainability (Dania et al., 2016). Implementing sustainability can incur additional costs while adjusting internal and external facilities to create an advantage for all business partners (Li et al., 2019). The environmental dimension leads to procurement, internal operations, product development, and management. Meanwhile, the social dimension is associated with procuring raw materials from local farmers, vitamin addition, and income generation by providing healthy and affordable products (Gold et al., 2013). The social dimension supports community development, employment opportunities, and welfare (Leat et al., 2011).

2.3.1. Supply Chain Collaboration Theory

A model for supply chain collaboration for food is created to ensure the sustainability of products. This shows the need to integrate the chain from upstream to downstream, including cultivation and distribution processes with good logistics performance (Simatupang & Sridharan, 2002). The key elements crucial for building supply chain collaboration of food products are information sharing, decision synchronization, and synchronization of incentives (Simatupang & Sridharan, 2008). In food products, collaboration practices should have a different strategy because of their perishable character and seasonality, including various networks and routes that start from producer farmers. Therefore, a sustainable collaboration model is required to create a competitive advantage and realize products competitiveness (Handayati et al., 2015). Product quality is also determined by the production process, with significant requirements for raw materials from suppliers (Fu et al., 2017). This phenomenon shows the need for information sharing between companies and suppliers (Huo et al., 2021) in building collaboration. The effectiveness of this process can also reduce information dissymmetry, bullwhip effect, and distortion, thereby positively affecting supply chain performance (Fu et al., 2017).

2.3.2. Relational View Theory

The relational View explains that the competitiveness of companies increases along with their relational network and identifying other resources (Sopa & Saenchaiyathon, 2020). This relational network is realized through collaboration with many parties to ensure companies' sustainability of business processes. The theory implies that establishing relationships and cooperation with various networks becomes a sustainable business strategy to realize each business unit's comparative and competitive advantage. Based on the Relational View theory, this study investigates the variables of supply chain collaboration for increasing competitiveness of the staple food products of rice.

2.4. Hypothesis of FSCC for Main Food Products Competitiveness

The key elements in building supply chain collaboration of food products are information sharing, decision, and incentive synchronization (Simatupang & Sridharan, 2008). This study considers information sharing as main variable determinant of supply chain collaboration. The optimal performance of information-sharing activities is facilitated by factors such as dependency, trust, and relationship commitment, which are essential for the mutual benefits of all parties in the supply chain (Fu et al., 2017). Similarly, previous studies stated that the trust built between supply chain actors and the commitment to conducting relationships could facilitate information sharing to enhance business sustainability (Le et al., 2021). Therefore, the study examines several factors that affect information sharing by proposing several hypotheses.

H_1: *Dependence has a positive effect on information sharing.*

H_2: *Trust has a positive effect on information sharing*.

In addition to the two factors affecting information sharing, this study hypothesizes the significant effect of relationship commitment.

H_3: *Relationship commitment has a positive and significant effect on information sharing*.

Information sharing is conceptually the willingness to make strategic and tactical data such as inventory levels, forecasts, sales promotions, and marketing strategies available to companies that create supply chain nodes (Zhang & Huo, 2013). Previous studies have shown that information sharing can lead to improvements in supply chain network collaboration and performance, causing a significant reduction in the operational costs of business units (Zhang & Gong, 2021). However, the synchronised flow of information significantly affects the development of collaboration due to the integration of an effective supply chain network capable of generating added value (Fawcett et al., 2007). This shows the need for supply chain collaboration to extend from one side of the channel to the other, with information serving as a key determinant (Shahbaz et al., 2019).

H_4: *Information sharing has a positive effect on supply chain collaboration.*

The supply chain of agricultural products is coordinated predominantly by farmers and processors (Handayati et al., 2015). In this study, collaboration is built for all actors, both vertically and horizontally, concerning seven aspects of supply chain management-coordination system. These include coordinating special content strategies, information, trust, cultural, business, form, and distribution (Zhang & Gong, 2021). Moreover, the Relational View theory is used in food products supply-chain actor relationships (Lees et al., 2020). To produce competitive main food products with indicators of product quality and competitive prices, there is a need to include producer farmers in network collaboration to facilitate product sales with good quality. In this context, communication, trust, and commitment between the participating parties are important attributes of the relationship quality factor. Therefore, relationship quality is needed to build supplier collaboration with buyer companies (Aggarwal & Srivastava, 2016).

H_5: *Relationship quality has a positive effect on supply chain collaboration.*

The production process activities carried out by many companies affect the environment and community. To overcome these effects, companies are responsible for implementing sustainable supply chain management that can be used during production (39). This includes the specification of technical standards that should be adhered to by suppliers as well as the management and coordination of the actors (54). Specifically, collaboration in the chain should lead to a win-win situation, with shared value being an essential component (Meulensteen et al., 2016). Creating shared value includes individuals, social groups, organizations, and the environment, constituting a unified process interrelated with various stakeholders such as companies, value chain, and communities (Fearne et al., 2012). Therefore, the third variable used in the study is corporate shared value.

Shared value undertaken by companies is an activity carried out to realize one of the three objectives, namely production, value chain, and cluster creation as well as a positive effect on social and organizational benefits (Beschorner, 2013). The three strategies included in the creation of social value are reconceptualizing production and markets, redefining productivity, and building industries that support clusters at the company's location (Yang & Yan, 2020). The creation process should also include individuals, social groups, organizations, and the environment, serving as a unified process interrelated with various stakeholders, including companies, value chains, and communities (Fearne et al., 2012). Corporate shared value is also implemented as a new business model combining economic and social benefits to gain profits through social innovation and collaboration with stakeholders to address social problems (Yang & Yan, 2020).

H_6: *Corporate Shared Value has a positive effect on supply chain collaboration*.

Efforts to improve rice products' competitiveness in Indonesia include designing supply chain networks to enhance the performance from upstream to downstream. This method positively affects supply chain performance with low costs and increased responsiveness (Acimovic, 2006). In this context, collaboration plays an essential role, integrating all major networks to generate product competitiveness according to consumer expectations (Gupta et al., 2021). It also serves as a business process where two companies collaborate to plan, implement, and create an effective as well as efficient supply chain to achieve common goals and mutual benefits. The strategy includes coordinated, joint, and integrated processes between suppliers, consumers, and other partners to achieve competitive advantage, and reduce risk, inventory levels, costs, as well as consumer rotation (Cao & Zhang, 2011; Niemsakul et al., 2018; Fera et al., 2017; Georgiadis et al., 2005).

H7: *Information sharing positively affects main food products' competitiveness.*

H8: *Supply chain collaboration positively affects rice main food products' competitiveness.*

3. Materials and Methods

This section describes the conceptual framework, data collection, and data analysis.

3.1. Conceptual Framework

The conceptual framework is built on collaboration and Relational View theory. Moreover, this study added the corporate shared value factor, as an important component for supply chain collaboration and main food products' competitiveness.

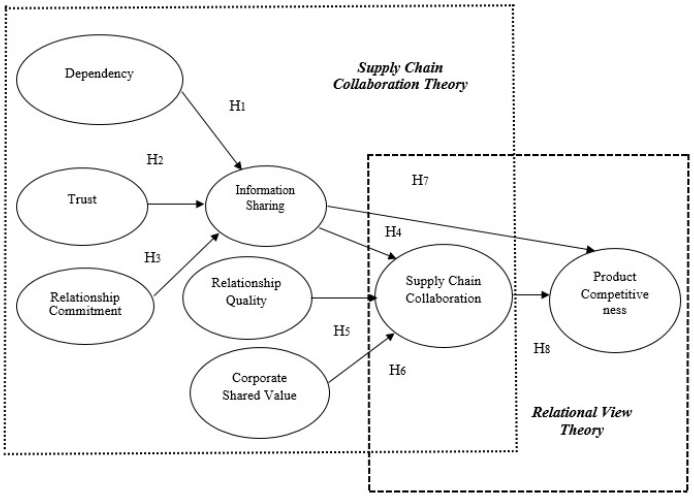

Fig. 1. Conceptual Framework

The constructs are measured using the following variables and indicators. These include Dependence (Holm et al., 1999; Cai & Yang, 2008), Trust (Ganesan, 1994; Coulter & Coulter, 2002; Fu et al., 2017), Relationship Commitment (Ganesan, 1994; Coulter & Coulter, 2002; Fu et al., 2017), Information Sharing (Li et al., 2006; Li & Lin, 2006; Fu et al., 2017), Relationship Quality (Molnar et al., 2010; Chang et al., 2012; Odongo et al., 2016; Chen et al., 2017; Johnson, 1999), Corporate Shared Value (Yang & Yan, 2020; Porter & Kramer, 2011; Brown & Knudsen, 2012; Shrivastava & Kennelly, 2013; Maltz et al., 2011; Pirson, 2012), Supply Chain Collaboration (Li et al., 2006; Li & Lin, 2006; Fu et al., 2017; Chen et al., 2017; Johnson, 1999; Yang & Yan, 2020), and Products Competitiveness (Porter, 1990).

Indicators are measured using a Likert Scale, with points ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This scale increases the response rate and the fiber response quality by reducing respondents' difficulty in answering the questionnaire (Buttle, 1996). The 5-point Likert scale is also used to compare the reliability coefficient with other studies that apply a similar method (Ryan, 1991). Subsequently, the constructs and indicators are described as follows.

- Dependency (DEP) is measured using the indicators: "It is relatively difficult to find a similar partnership when the relationship with companies is terminated (DEP1)", "There are not many partners who can provide similar resources to farmers (DEP2)", "Finding a new suitable partner takes time and effort (DEP3)", "It is important to continue working with the company for sales growth (DEP4)", and "Loyalty is required to maintain the partnership (DEP5)".

- Trust (TR) is measured using the indicators: "Partners believe that companies will follow agreements and commitments based on previous experience (TR1)", "The companies show potential of offering the best help to partners when there is a change in the situation (TR2), "Partners believe that companies will be frank and honest in transactions (TR3)", "Companies will put the interests of partners first (TR4), "Company will consider decisions because of the effects for partners (TR5)".
- Relationship Commitment (RC) is measured using the indicators: "Partners feel that companies view farmers and consumers as an important business network (RC1), "Partners feel proud to tell others as producers for companies (RC2), "Partners can identify the processing methods used by companies (RC3)", "Partners will renew their cooperation with companies (RC4)", "Partners are not easy to interrupt cooperation with companies (RC5)".
- Information Sharing (IS) is measured using the indicators: "The accuracy of information shared facilitates collaboration (IS1), "The continuity of information sharing can affect collaboration (IS2)", "Information shared is appropriate to existing availability (IS3)", "Information shared is useful for the collaborating parties (IS4)", "Information shared can be understood by all parties (IS5)".
- Relationship Quality (RQ) is measured using indicators: "Cooperative relationships with partners get benefits (RQ1)", "Relationship intensity can improve cooperation in supply chain collaboration (RQ2), "Relationship enthusiasm can improve collaboration (RQ3), "The importance of honesty in cooperation to build supply chain collaboration (RQ4)", "A strong spirit of justice can improve relationship quality (RQ5)".
- Corporate Shared Values (CSV) are measured using indicators: "The products produced by companies care about the interests of consumers (CSV1)", "Companies strive for all parties to benefit equally (CSV2), "Companies have a social responsibility towards the surrounding community (CSV3)", "Companies show concern for environmental sustainability (CSV4)", "Companies produce various social innovations for the mutual benefit of community (CSV5)".
- Supply Chain Collaboration (SCC) is measured using the indicators: "Quality information can facilitate collaboration of all parties (SCC1), "The existence of information sharing activities can build supply chain collaboration (SCC2)", "The existence of synchronization of incentives can facilitate collaboration of various parties (SCC3)", "Collaborating parties make decisions together (SCC4)", "Collaborating parties do plan together (SCC5)".
- Product competitiveness (COMPET) is measured using the indicators: "The products produced are different from other similar products (COMPET1)", "Quality products are produced because many parties are included in generating raw materials and production processes (COMPET2)", "Products competitiveness results from products with prices that can be reached by consumers (COMPET3)", "Products competitiveness is observed from availability in the required quantities (COMPET4)", "Products competitiveness is created due to supply sustainability for a long time (COMPET5)".

3.2. Sampling and Data Collection

The study was conducted in Indonesia, the fourth-largest rice-producing country globally after China, India, and Bangladesh Asia. The location was selected to be West Java Province, the third largest rice production center after Central and East Java. Specifically, the study was carried out at Indramayu Regency, recognized as the largest rice-producing center in the country.

The analysis included three actors in the rice main food products supply chain: farmers, rice milling units, and retailers. Farmers who were used as respondents owned rice fields and conducted farming activities. Respondents of rice milling businesses were individuals with businesses engaged in processing agricultural products. Meanwhile, retailers conduct rice trading businesses to consumers in Indramayu Regency and traders in areas such as Cirebon City, Karawang Main Market, Bandung, and Cipinang Main Market Jakarta.

The study focused on supply chain collaboration, which positively increases the competitiveness of rice main food products. The analysis was carried out using quantitative methods through verification to test the truth of the hypothesis from the data obtained at the location. The samples were obtained using a purposive proportional random sampling method and data were collected through the distribution of questionnaires and in-depth interviews with 200 respondents. In SEM-PLS analysis, the number of samples used was at least five times the indicator variables (Sekaran, 2003). Moreover, with eight variables, each consisting of five indicators, the total sample size was 200. Sampling was carried out using the Maximum Likelihood estimation (ML) method, with an effective sample size ranging from 150 to 400 (Hair et al., 2017).

3.3. Data Analysis Methods

The study describes the results of the three-path analysis, examining several factors affecting information sharing, collaboration, and competitiveness. Before further description, the instrument was tested to ensure accuracy by constructing a measurement model. Structural Equation Modeling (SEM) analysis was used to test the model with a dependent variable structure. SEM is a statistical method for testing and estimating causal relationships by integrating factor and path analysis. Specifically, the SEM modeling process consists of two basic stages: measurement model validation and structural model testing. The implementation process commences with hypothesis development, model representation, variable operationalization using measurement instruments and model testing (Cooper & Schindler, 1999).

The measurement model is used to evaluate the construct validity and reliability of the instrument. A validity test is conducted to determine the ability of instruments to measure the required item (Cooper & Schindler, 1999). Meanwhile, construct validity shows the correlation of the results obtained from a measurement with the theories (Cooper & Schindler, 1999). An established method of testing construct validity is determining the strong correlation between the construct and question items and a weak relationship with other variables. In Partial Least Squares (PLS), construct validity is assessed based on factor loading, which shows the correlation between the question item and the construct scores. A higher factor loading value shows the greater importance of the question item in explaining the construct. The critical value for factor loading is 0.70, suggesting that a question item is declared valid with a value > 0.70.

After the instrument is declared valid and reliable, a structural model is constructed to prove the hypothesis and assess the significance level of the independent variable on the dependent variable. The Path Coefficient or inner model value is related to the significance level in hypothesis testing, which is performed using the T-test for two-tailed testing with a real level of 0.05 or 5%, and the critical limit of the T value = 1.96. The null hypothesis (H0) is rejected when the T-statistic value in PLS analysis is greater than 1.96 or the P-value is less than 0.05.

The R^2 (R-Square) value shows the level of variation between the independent and dependent variables. Specifically, a higher R^2 value signifies a better prediction model of the proposed study model.

4. Results

4.1. Evaluation of the Measurement Model

Based on the validity test, each variable item has a factor loading value above 0.70, showing that all instrument questions are valid. The quality of the study instrument is assessed through validity and reliability tests to determine the evaluation level (Fu et al., 2017). The reliability analysis is carried out based on Cronbach's alpha value using the SPSS tool. The instrument is considered reliable when its Cronbach's alpha is equal to or greater than 0.60. Meanwhile, validity uses confirmatory factor analysis (CVA), where all factors' values are above 0.50 and significant at the 0.01 level (Fu et al., 2017). The measurement has acceptable quality in multiple regression models at a threshold above 0.70 (Hair et al., 2017). The results of testing the instrument's validity are presented in **Appendix 1.**

The results of instrument testing show that all question items from each variable are declared reliable. This is attributed to Cronbach's Alpha and Composite Reliability values above 0.80, greater than the standard value of 0.70, as presented in **Appendix 2.**

4.2. Structural Model Evaluation

The results of the structural model evaluation show that the measurements meet the required criteria. Moreover, SEM-PLS analysis results using Bootstrapping are shown in Fig. 2 below.

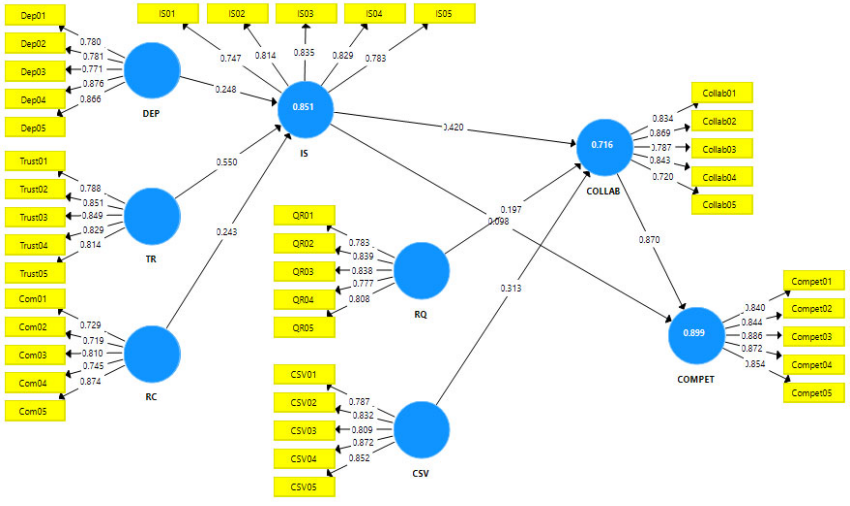

Fig. 2. Data Analysis Results (Smart PLS Report)

Note: In Fig. 2, DEP is Dependence, TR is Trust, RC is Relationship Commitment, IS is Information Sharing, RQ is Relationship Quality, CSV is Corporate Shared Value, COLLAB is Collaboration, and COMPET is Competitiveness.

The study makes eight hypotheses that require testing to explain their acceptance and rejection. The two criteria used in testing are statistical value and path coefficient. When the statistical value exceeds t-table, the hypothesis is accepted with a prediction error of 5%, which is 1.96. A positive path coefficient shows that a variable affects others, while a negative coefficient shows the opposite impact on other variables.

The results of hypothesis testing are described in **Appendix 3.** The first hypothesis, H1, suggesting that dependence has a real and significant effect on information sharing, is accepted in this study with a path coefficient value = 0.248, T-statistic = 6.627> 1.96, and p-value = 0.000 <0.05. The second hypothesis, H2, trust with a path coefficient value = 0.550, T-statistic = 12.720> 1.96, and p-value = 0.000 <0.05. The third hypothesis H3, namely relationship commitment, has a real and significant effect on information sharing with a path coefficient value = 0.243, T-statistic = 4.694, and p-value = 0.000 < 0.05. These results are consistent with the theory of Resource Dependence, suggesting the optimal performance of information-sharing activities. Therefore, the factors of dependence, trust, and relationship commitment are essential, offering significant benefits for the parties in supply chain (Fu et al., 2017). The trust built between supply chain actors and the commitment to the relationship facilitate information sharing for the benefit of business sustainability (Le et al., 2021).

The fourth hypothesis, H4, states that the information sharing variable with a real and significant effect on collaboration can be accepted with the path coefficient value = 0.420, T-statistic = 4.906, and -value = 0.000 < 0.05. Previous studies stated that increasing performance in supply chain collaboration could be determined by information sharing based on the quality to benefit the networks included at the upstream and downstream levels. Moreover, information sharing is valuable for supply chain partners, when information is reliable to make better decisions and improve performance (Deghedi, 2014).

The fifth hypothesis H5, states that relationship quality variable with a real and significant effect on collaboration is accepted with a path coefficient value = 0.197, T-statistic = 2.565, and p-value = 0.011 <0.05. This aligns with other studies, where the inclusion of partners requires aspects of relationship quality to build collaboration between suppliers and buyer companies (Aggarwal & Srivastava, 2016).

The sixth hypothesis H6, states that the variable of corporate shared value with a real and significant effect on collaboration is accepted with a path coefficient value = 0.313, T-statistic = 4.547, and p-value = 0.000 <0.05. Previous studies stated that innovation by companies in network relationships formed a spillover effect of knowledge due to knowledge diffusion and social network support creating collaboration and improving positive corporate social performance (Yang & Yan, 2020).

The seventh hypothesis, H7, states that information sharing has a real and significant effect on competitiveness, with a path coefficient value = 0.098, T-statistic = 2.663, and p-value = 0.008 <0.05. Regarding the eighth hypothesis, H8, collaboration variable has a real effect on competitiveness, with a path coefficient value = 0.870, T-statistic = 25.604, and p-value = 0.000 <0.05. Similarly, other studies stated that the companies's competitive advantage was directly affected by technological capability factors and inter-organizational collaboration (Potjanajaruwit, 2018).

The model variation of each variable is measured by determining the coefficient of determination (R^2) described in **Appendix 4.** Moreover, there is a need to determine the level of variation as a basis for identifying the difference between the variables tested. Based on the results, the information-sharing variable showed potential to be explained by variations in the value of the dependence, trust, and commitment variables by 85.1%. Meanwhile, the collaboration variable was explained by the variation in the value of information sharing, quality, and corporate shared value variables by 71.6%. The competitiveness variable was explained by the variation in the value of information sharing and collaboration variables by 89.9%. Finally, the magnitude of the effect of each variable tested was presented in **Appendix 5.** The results showed that dependability, trust, and relationship commitment variables affected information sharing by 0.248 (24.8%), 0.550 (55%) and 0.243 (24.3%), respectively. Meanwhile, collaboration was influenced by information sharing at 0.420 (42%), relationship quality at 0.197 (19.7%), and corporate shared value of 0.313 (31.3%). Competitiveness was affected by information sharing at 0.463 (46.3%) and collaboration at 0.870 (87%).

5. Discussion

This study focuses on the determinants of supply chain collaboration and their positive effect on main food products' competitiveness based on the Relational View theory. Several studies have shown a direct relationship between several variables: information sharing, relationship quality, corporate shared value, and supply chain collaboration (Zhang & Gong, 2021; Simatupang & Sridharan, 2005; Biggemann, 2012; Zhong et al., 2020).

The statistical analysis in this study examines the direct relationship between information sharing, relationship quality, corporate shared value, and supply chain collaboration variables. The results show that information sharing has a significant influence on collaboration. Similarly, previous studies stated that information sharing was an important activity for all supply chain actors, enabling cooperative planning, implementation, and establishment of an efficient supply chain to achieve common goals and mutual benefits. The timeliness, accuracy, reliability, adequacy, and credibility are also determinants for measuring the quality of information sharing (Zhong et al., 2020).

This aligns with other studies, which identify dependence, trust, and relationship commitment as determinants of information-sharing activities (Fu et al., 2017). Based on the social exchange theory, the trust-commitment theory supports the idea that trust can increase relationship commitment and cooperation (Morgan & Hunt, 1994). Moreover, relationship commitment in social exchange theory represents the exchange of trust pairs, with sustainable relationships playing an essential role. Therefore, committed parties believe the relationship is worth implementing and maintaining (Morgan & Hunt, 1994). Trust generally originates from a strong belief in a trustworthy party with high integrity, consistency, and responsibility (Morgan & Hunt, 1994).

In addition to information sharing, collaboration is affected by relationship quality. This is in line with previous results, where suppliers identified relationship quality as an important factor in building confidence in quality and delivery specifications (Lees et al., 2020).

Another factor influencing collaboration is corporate shared value carried out by companies to realize production, value chain, or cluster creation, with has a positive effect on social and organizational benefits (Beschorner, 2013). The three methods of creating social value are reconceptualizing production and markets, redefining productivity in the value chain, and building industries that support clusters at companies's location (Yang & Yan, 2020).

Corporate shared value is achieved by integrating social and environmental issues into business operations [OBJ]. Furthermore, it is created by including individuals, social groups, organizations, and the environment, serving as a unified process interrelated with various stakeholders such as companies, value chains, and communities (Fearne et al., 2012). Corporate shared value is implemented as a new business model combining economic and social benefits to gain profits through social innovation and collaboration with stakeholders to address social issues (Yang & Yan, 2020).

This study shows that food products competitiveness is affected by supply chain collaboration and information sharing. The results show that product competitiveness can be generated due to information sharing and collaboration carried out by supply chain actors, significantly affecting companies' competitive strength (Banerjee & Mishra, 2017). Similarly, previous studies stated that information sharing was the key to increasing competitive advantage and superior supply chain performance (Ahmed et al., 2019).

6. Conclusion

In conclusion, this study successfully showed that several factors positively influenced supply chain collaboration, enhancing the competitiveness of the main food products of rice. The results showed that information sharing, relationship quality, and corporate shared value significantly affected supply chain collaboration. Supply chain actors shared information due to factors such as dependence, trust, and relationship commitment. The establishment of supply chain collaboration and information sharing activities positively increased the competitiveness of main rice food products in Indonesia.

The Relational View theory was used in this study for supply chain management analysis. The results showed collaboration posed a significant challenge for supply chain actors, particularly for main food products. However, it was discovered that collaboration could be built through information sharing, relationship quality, and corporate shared value.

In this study, information sharing was the factor with the greatest effect on supply chain collaboration. Similarly, previous results identified the significance of information sharing due to dependence, trust, and relationship commitment. Several dimensions, such as information accuracy, sustainability, availability, usefulness, and level of understanding, were also identified as essential components to facilitate collaboration among actors.

Relationship quality was the required variable in building business collaboration due to cooperation for profit, honesty, and fairness. Additionally, corporate shared value played a crucial role in collaboration, as evidenced by initiatives carried out by rice milling units, showing significant concern for consumers, mutual benefits, social responsibility, environmental sustainability, and social innovations.

Information sharing and collaboration were important factors for all companies and partners to strategize in producing competitive food products. The results showed that information sharing, relationship quality, and shared value positively and significantly affected supply chain collaboration. The ability and willingness of actors to share information was due to the interdependence, trust, and relationship commitment among actors directly included in supply of raw materials, production processes, and products distribution. Furthermore, information-sharing activities and supply chain collaboration significantly affected the competitiveness of main food products.

The exploration of several factors that facilitated information-sharing activities and the development of a supply chain collaboration system was used as the strategy to improve the competitiveness of main food products. The results showed that supply chain actors shared information due to dependence, trust, and relationship commitment. Information sharing was

identified as an important factor affecting collaboration due to relationship quality and corporate shared value. Furthermore, it contributed to increasing the competitiveness of main food products, along with collaboration among actors.

Success in developing collaboration, including the functions of each actor, also required the role of other parties and government policy support to improve the competitiveness of rice main food products. Moreover, policies required were programs capable of facilitating the commitment of actors to strive for their competitive advantage in producing rice main food products that met the consumers' expectations.

This study recognized limitations, particularly the failure to test other variables directly contributing to collaboration and competitiveness. These variables included dependence, trust, relationship commitment, and corporate shared value. Additionally, consumers were not included as respondents to determine the level of satisfaction for assessing the competitive advantage of business units from upstream to downstream levels. The analysis was only conducted in one of the production centers, thereby limiting wide application to other areas in Indonesia. An in-depth analysis based on the growing studies on other relevant variables to developing supply chain collaboration was not carried out, particularly in producing competitive food products to meet consumers' desires. To address these limitations, future studies should focus on solving specific collaboration problems for effective and efficient supply chain sustainability.

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Appendix 1.
Validity Test Results

Variable/Item	Factor Loading	Variable/Item	Factor Loading
Dependency		Relationship Quality	
Dep01	0.780	RQ01	0.783
Dep02	0.781	RQ 02	0.839
Dep03	0.771	RQ 03	0.838
Dep04	0.876	RQ 04	0.777
Dep05	0.866	RQ l05	0.808
Trust		Corporate Shared Value	
Trust01	0.788	CSV01	0.787
Trust02	0.851	CSV 02	0.832
Trust03	0.849	CSV 03	0.809
Trust04	0.829	CSV 04	0.872
Trust05	0.814	CSV 05	0.852
Relationship Commitment		Collaboration	
Com01	0.729	Collab01	0.834
Com02	0.719	Collab02	0.869
Com03	0.810	Collab03	0.787
Com04	0.745	Collab04	0.843
Com05	0.874	Collab05	0.720
Information Sharing		Competitiveness	
IS01	0.747	Compet01	0.840
IS02	0.814	Compet 02	0.844
IS03	0.835	Compet 03	0.886
IS04	0.829	Compet 04	0.872
IS05	0.783	Compet 05	0.854

Appendix 2
Reliability Test Results

	Cronbach's Alpha	Composite Reliability
Dependency	0.875	0.909
Trust	0.884	0.915
Relationship Commitment	0.834	0.884
Information Sharing	0.861	0.900
Relationship Quality	0.868	0.905
Corporate Shared Value	0.887	0.917
Collaboration	0.870	0.906
Competitiveness	0.911	0.934

Source: Data Analysis Results

Appendix 3
Hypothesis Test Results

	Original Sample	Standard Deviation	T Statistics	P Values
Dependency → Information Sharing	0.248	0.040	6.627	0.000
Trust → Information Sharing	0.550	0.043	12.720	0.000
Relationship Commitment→ Information Sharing	0.243	0.052	4.694	0.000
Information Sharing → Collaboration	0.420	0.086	4.906	0.000
Relationship Quality → Collaboration	0.197	0.077	2.565	0.011
Corporate Shared Value -> Collaboration	0.313	0.069	4.547	0.000
Information Sharing -> Competitiveness	0.098	0.037	2.663	0.008
Collaboration -> Competitiveness	0.870	0.034	25.604	0.000

Appendix 4
R-Square Test Results

	R Square	R Square Adjusted
Information Sharing	0.851	0.848
Collaboration	0.716	0.712
Competitiveness	0.899	0.898

Appendix 5
Total Effect Test Results

	Collaboration	Competitiveness	Information Sharing
Collaboration		0.870	
Competitiveness			
Corporate Shared Value	0.313	0.273	
Dependency	0.104	0.115	0.248
Information Sharing	0.420	0.463	
Relationship Quality	0.197	0.171	
Relationship Commitment	0.102	0.113	0.243
Trust	0.231	0.255	0.550

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