Developing A Two Person Game Theory To Improve Performance in Vertical Partnership Alliances

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Abstract —The increasing rate of industrial development and growing knowledge intensity are constantly reforming most of businesses. The competitiveness in global market has changed, company for no longer creating, producing and delivering goods by themselves, but to having a partner which collaboratively improve how they do business. Strategic alliances in supply chain is a partnership between parties that can create new and more beneficial values. There are many studies determining factors that affect the performance of alliances and how the performance of alliances is assessed. The changes of value between partnership may affect the result of performances. Game theory is the study of mathematical modelling of multi-person decision problems. The objective of this study is to apply game theory to improve performance in vertical partnership relationship. The performance will be determined based on series of simulation of some scenarios. The scenarios describe the level of factors that affect performances. It is expected that game theory would help each ally to make decision and improve the performance in partnership.

Key words – Supply Chain, Strategic Alliances, Partnership, Game Theory, Performance

I. INTRODUCTION

Globalization and global economy, in which goods, service, people, skills, ideas and capital move freely from one country to another, have significantly changed and complicated the competitive landscape of companies. The increasing rate of industrial development and growing knowledge intensity are constantly reforming most of businesses. Customers are more selective to choose which product they will use. Consequently, the competitive in global markets are not the same as they are used to be. Industrial development indicated by the emergence of new player has resulted in a more fierce competition among all players.

According to Hitt, Ireland and Hoskisson [1], Strategic alliances are partnership between firms whereby resources, capabilities, while core competencies are combined to pursue mutual interests in designing, manufacturing, or distributing goods or services. Strategic alliances is formed as a consequence of competitive challenges and opportunity to create partnership.

Companies do not create, produce or deliver goods by themselves any longer. In order to be competitive, they need strategic partners which help them doing other jobs. By creating strategic alliances, each party of supply chain can provide competitive yet collaborative results. Alliances are not only created among competitors, but also between non-competitors. An example of alliances between non-competitors is vertical partnership. Based on Prahalad et. Al. [2], vertical partnership is relationship made by a party to the subsequent value chain or previous value chain, for example: Supermarket X sells products with private label, which is produced by company Y. In this example, Supermarket as retailer and Company Y as supplier form a vertical partnership.

To be successful in alliances, there are some influencing factor. Sambasivan and Nget Yen [3] maintain that factors affecting performance in alliances are social factor, trust, communication,

and commitment. Decision making in strategic alliances in the supply chain also affect performance. The changes of value between partnership may affect the result of performances. Therefore, right decision making in alliances is need to improve performance.

This paper provides a preliminary study how scenarios should be developed and the theory behind the creation of scenario of vertical partnership.

II. PROBLEM IDENTIFICATION

The alliances discussed in this study is vertical partnership. In the vertical partnership, an alliance is created between non-competitor between retailer and its key supplier.

The scenario is developed based on an alliance between Supermarket X and Company Y. Supermarket X has a role as the retailer and Company Y has a role as the supplier. This scenario replicated a global phenomenon in Indonesia that has mode and more modern retails As shown in Figure 1, the number of modern retailers in Indonesia has significantly increased in the last five years.
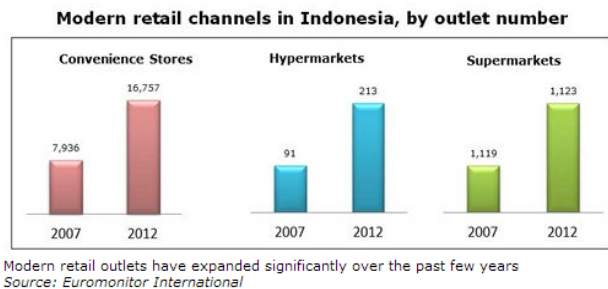

Figure 1 The Number of Modern Retail in Indonesia
(2007-2012)

In order to maintain its competitiveness and to expand their businesses to other areas, retailers need to have strong position in their sector. One strategy of the retailers in maintaining their selling position is by providing more and more fast moving products (the daily need products of consumers) that are packaged and branded under their own brand. For example: Toserba Yogya and Griya provide have their own brand, YOA. To be able to provide these products, a retailer does need a key supplier that can continuously supply as the retailer, for this example: Yogya, does not produce the product itself.

Private label has shown its impact to attract consumers. As the product is their own product, retailers tend to locate the own brand product in a strategic location and attractive

shelves (See Figure 2). There is a reciprocal relationship between retailer and supplier. In this case, retailer need suppliers to create product with their private label. Moreover, retailer need supplier to distribute their product.

Figure 2 Supermarket Strategies to Attract Consumers
http://www.slideshare.net/PhuongLuu1/nielsen-grocery-report-2012-24605926

III. THEORETICAL FRAMEWORK

There are many factors influence the performance of alliance. This part discusses the previous studies that have conducted research about factors that affect performances alliances and value crate as performances alliances. Also, this part discusses how this study select relevant and important factors in vertical partnership. The explanation of each factors influences performances can be seen in Table I and the value of performances can be seen in Table II.

1. Factors Influences Alliances Performances

There are many previous study discussed about factors that influences alliances performances. The difference between each studies is determining the factors that influence the success of alliances differ from each other. Sambavisan and Nget Yen [3] says that factors which influence performance in alliances are commitment, communication, trust, and social-culture factors. According Chen et al. [5], factors that influence performance in alliances are economic factors, trust, long-term orientation, and conflict.

To conclude that, there are nine factors that influence alliances performance. There are socio-cultural factors, economic factors, trust, long-term orientation, conflict, supplier performance, promise strategies, communication and commitment. The main focus in this study is three factors (trust, commitment, and communication).

TABLE I
RESEARCH SYNTHESIS ON FACTORS INFLUENCES ALLIANCES PERFORMANCES

Factors Infuence Performances	Type of Alliances	Title
Sosio-cultural factors	International Joint Ventures	de Macedo-Soares, T Diana,L.van Aduard, & Moraes, S. (2013). The Strategic Implications Of Alliances For The Internationalization Of Firms In Emerging Countries: The Case Of Totvs. [6]
	Vertical Partnership	Sambasivan, M., & Ching, N. Y. (2010). Strategic alliances in a manufacturing supply chain. [3]
Economic factors	International Joint Ventures	de Macedo-Soares, T Diana,L.van Aduard, & Moraes, S. (2013). The Strategic Implications Of Alliances For The Internationalization Of Firms In Emerging Countries: The Case Of Totvs. [6]
	Vertical Partnership	Chung, J., Sternquist, B., & Chen, Z. (2006). Retailer-buyer supplier relationships: The japanese difference. [5]
	Vertical Partnership	Sternquist, B., Ogawa, T., & Cooper, A. D. (2002). Japanese department store buyer-supplier relationships. [7]
	Vertical Partnership	Sternquist, B., Ogawa, T., & Cooper, A. D. (2002). Japanese department store buyer-supplier relationships. [7]
	Vertical Partnership	
Trust	Vertical Partnership	Sahay, B. S. (2003). Understanding trust in supply chain relationships. [8]
	Vertical Partnership	Sternquist, B., Chen, Z., & Huang, Y. (2003). Buyer-supplier relationships in china. [9]
	Vertical Partnership	Chung, J., Sternquist, B., & Chen, Z. (2006). Retailer-buyer supplier relationships: The japanese difference. [5]
	Vertical Partnership	Sambasivan, M., & Ching, N. Y. (2010). Strategic alliances in a manufacturing supply chain. [3]
Satisfaction	Vertical Partnership	Sternquist, B., Chen, Z., & Huang, Y. (2003). Buyer-supplier relationships in china. [9]
	Vertical Partnership	Chung, J., Sternquist, B., & Chen, Z. (2006). Retailer-buyer supplier relationships : The Japanses Difference. [5]
Long-term orientation	Vertical Partnership	Sternquist, B., Chen, Z., & Huang, Y. (2003). Buyer-supplier relationships in china. [9]
	Vertical Partnership	Chung, J., Sternquist, B., & Chen, Z. (2006). Retailer-buyer supplier relationships: The japanese difference. [5]
Conflict	Vertical Partnership	Chung, J., Sternquist, B., & Chen, Z. (2006). Retailer-buyer supplier relationships: The japanese difference. [5]
	Vertical Partnership	Sternquist, B., Ogawa, T., & Cooper, A. D. (2002). Japanese department store buyer-supplier relationships. [7]
Supplier Performance	Vertical Partnership	Sternquist, B., Ogawa, T., & Cooper, A. D. (2002). Japanese department store buyer-supplier relationships. [7]
Promise Strategies	Vertical Partnership	Sternquist, B., Ogawa, T., & Cooper, A. D. (2002). Japanese department store buyer-supplier relationships. [7]
Communication	Vertical Partnership	Sambasivan, M., & Ching, N. Y. (2010). Strategic alliances in a manufacturing supply chain. [3]
Commitment	Vertical Partnership	Sambasivan, M., & Ching, N. Y. (2010). Strategic alliances in a manufacturing supply chain. [3]
Trust, Commitment, Communication	Vertical Partnership	Setyamichelle, N. (2014). Pengembangan *Two-Person Game Theory* untuk Meningkatkan Performansi Aliansi *Vertical Partnership*.

B. Performance in Alliances

Performances in alliances can be categorized to three criteria. There are profit, satisfaction in relationship ans sales growth. The research studies about performances in alliances can be seen in Table II.

TABLE II
RESEARCH SYNTHESIS ON PERFORMANCES IN ALLIANCES

Criteria Alliances Performances	Reference
Profit	Ybarra, C. E., & Turk, T. A. (2011). Strategic alliances with competing firms and shareholder value. [10]
	Raskovic, M., Brencic, M. M., Fransoo, J. C., & Mörec, B. (2012). A Model Of Buyer-Supplier Relationships In A Transnational Company: The Role Of The Business Network Context. [11]
Sales Growth	Raskovic, M., Brencic, M. M., Fransoo, J. C., & Mörec, B. (2012). A Model Of Buyer-Supplier Relationships In A Transnational Company: The Role Of The Business Network Context. [11]
Satisfaction in Relationship	Raskovic, M., Brencic, M. M., Fransoo, J. C., & Mörec, B. (2012). A Model Of Buyer-Supplier Relationships In A Transnational Company: The Role Of The Business Network Context. [11]
	Sternquist, B., Ogawa, T., & Cooper, A. D. (2002). Japanese department store buyer-supplier relationships. [7]
Profit , *Sales Growth,* dan *Satisfaction in Relationship*	Setyamichelle, N. (2014). Pengembangan *Two-Person Game Theory* untuk Meningkatkan Performansi Aliansi *Vertical Partnership*.

IV. RESEARCH MODEL

According to research synthesis, in this study focuses to developing two person game theory to improve performance in vertical partnership alliances. According to Osborne [4], game theory is the study of a mathematical modelling of multi-person decision problems. Decision makers are called players and they interact to each other in a context called the game. Previous studies have been identified factors that would influence the performance and to assess how performance give impact based on different scenarios or strategies used by the allies. The value in these factor will affect the final result of performance alliances. The changes of value may result the changes of performance results. The problem is that performance created in alliances may not be the best output caused by decision that chosen from each party. Based to explanation, this study will focused in developing two person game theory to improve vertical partnership alliances.

The first stage in creating the research model is by making a classification type of alliances in supply chain. Based on Prahalad et. al. [2], alliances in supply chain divided into two groups (alliances between competitors and alliances between non-competitors). The second stage is to choose factors which affect performance in vertical partnership. In this research model, trust, commitment, and communication are used as factors that affect performances partnership. From the reference, Sahay [8], Huang et.al. [9], Chen et.al. [5] and Sambavisan and Ching [3] argue that trust is a factor that affects performance. Huang et al. [9] and Sambavisan and Ching [3] also maintain that commitment and communication have shown high correlation to performance in alliances. Based on Wilson [12] model, long term orientation has shown correlation to commitment. Based on those references, this research model build scenarios with

trust, commitment, and communication as affecting factors achieving its performance,that is profit, sales growth and satisfaction in relationship. In this research, performance assessment will be determined from series of simulation using some scenarios. In each scenario, the decision taken by the alliance is the combination of factors that would influence performance of alliances. Trust is identified from information shared between Supermarket X and Company Y. The more information shared between two parties, the higher level of trust they both hold. The information that can be shared is total sales, selling and purchase prices. Trust is also identified from the term of payment to supplier. The scenario of commitment shows total demand of sugar to supplier and special price given by Company Y. For communication, scenario is divided to two criteria (communication use communication media or face-to face communication)

V. CONCLUSIONS

As a preliminary study, this paper shows how game theory can be used as a basis for assessing performance in vertical integration. The paper has provided some theoretical framework about factors and criteria for developing scenarios and identified a relevant methods of game theory to be used. An example of scenario hase been presented.

It is expected thatgame theory would help each party to choose decision and create the better performance in the alliance and the next step in this research is to run simulation (role play) to evaluate the performance of this alliance.
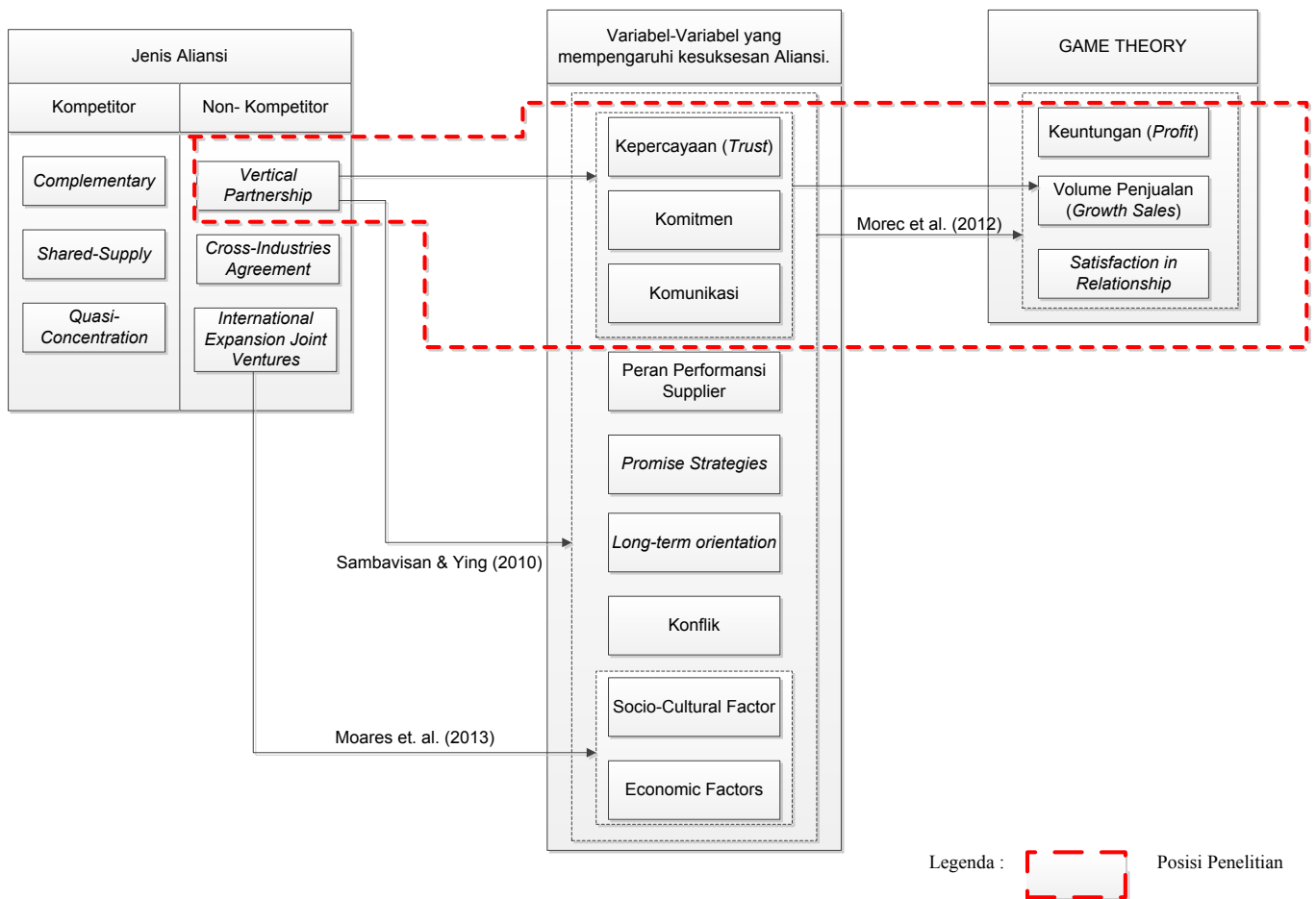
Fig. 3 Research Model
(Developing A Two Person Game Theory To Improve Performance in Vertical Partnership Alliances)

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