Determining Factors Influence The Co-Innovation Strategy for Small and Medium Sized Enterprises (SMEs) in The Agri-Food Sector in Indonesia

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Student : Iman Indrajaya Widigdo

Supervision : Dr. Valentina Materia and Dr. Gerben van der Velde

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ABSTRACT

Co-innovation is the innovation process of resources exchange or combined by sharing complementary resources, knowledge, and competencies with other partners through several stages of strategy. Through co-innovation, an organization can increase their competitive advantage and reduce the risk in innovation projects. In developing countries, co-innovation strategy holds a very important role in accessing and enhancing learning and innovation. The application of co-innovation concept in developing countries is relatively recent but increasing rapidly, including in Indonesia. According to Tepic et al (2013), there are five stages in the co-innovation process, namely the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage. However, studies about the co-innovation strategy in SMEs with partners are limited; in previous studies, co-innovation strategy was mostly implemented in large companies and conducted in developed countries.

The aim of this study is to determine the factors influencing the co-innovation strategy in each stage for SMEs. A number of hypotheses are presented and the items to measure each variable in each stage of co-innovation strategy were used to build the questions in the questionnaire. The results show that in the initiation stage, getting access to new market, having discussion with colleagues and avoiding conflict were perceived as the most important factor. In the partner selection stage selecting a partner with complementary resources was perceived as important criteria to choose a partner. Moreover, in the formalization stage using a contract and creating a detailed contract was perceived as an important element in determining mutual rights and obligations of the organizations, as long as the negotiated terms are acceptable to both parties. In the implementation stage, creating a joint team and existence of trust within the team member were perceived as two of the most importance factors. In the evaluation stage, harmonizing the interaction between the organization and partners was perceived by respondents as the most important factor for success indicator in a partnership. Moreover, In terms of possible future relationship of the alliance, the result of the statistic showed that whether the alliance is a success or a failure, the respondents decided to continue the partnerships with the current partners.

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Chapter 1

Introduction

1.1 Background

Innovation for an organization is a way to achieve competitive advantages (Stel, 2011; Kamsak and Bulutlar 2010). The increases in competitiveness through the development of innovative products, however, are associated with high-cost, high-risk activities which organizations are increasingly seeking to undertake with partners with complementary resources (Bento and Hanna, 2016; Fernandes and Brandao, 2016). In a fast-changing and unstable business environment, smaller firms increasingly conduct collaboration with one or more partners in the pursuit of various goals, such as accessing new markets, risk sharing in innovation projects, and achieving competitive advantages (Teng, 2007; Hoskisson et al., 2011). The purpose of this collaboration is to obtain competitive benefits that will be difficult to reach individually (Stanislawski and Lisowska, 2015). For small and medium-sized enterprises (SMEs), collaboration with partners allows them to gain more resources for innovation processes since they are known to have several limitations, such as financial, technology and human resources (Najib et al., 2014; Kolakovic & Milovanovic 2010; Saebi and Foss 2015).

In developing countries, inter-firm collaboration holds a very important role in accessing and enhancing learning and innovation (Pietrobelli and Rabellotti, 2011). The application of collaboration concept in developing countries is relatively recent but increasing rapidly (Lundvall et al., 2009), including in Indonesia. Moreover, in developing countries, forming such collaboration is a new way through which enterprises can take and obtain advantages by learning and gaining resources from external sources (Tavallaei et al., 2014). The inflow of technological information from external sources is an essential component of the innovation and learning process in developing countries (Pietrobelli and Rabellotti, 2011). Thus, a co-innovation strategy would be an important tool to conduct collaboration in an organization in developing countries (Lee et al., 2013). Co-innovation is similar to

cooperation and collaboration, but it is focused on controlling and coordinating partnership processes through several stages (Bremmers, 2008; Tepic et al., 2013). When the organization do not have capabilities to innovate on its own, they explore co-innovation with other organizations (Bossink, 2002).

Co-innovation is an innovation process of sharing complementary resources, knowledge, and competencies with other partners (Bossink, 2002; Dawson et al., 2014). By conducting co-innovation with partners and using their complementary resources, skills and capabilities, the organization can increase the number of ideas and innovations (Chesbrough, 2003). The stages of co-innovation are the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage (Tepic et al., 2013; Kale and Singh, 2009; Das and Teng, 2002). It is possible to determine the factors influencing the co-innovation strategy in each stage by using SMEs in the agri-food sector.

The focus of this research is on co-innovation strategy for SMEs in the agri-food sector in developing countries. The interest in the agri-food sector, which is motivated by the innovation process for SMEs, has led to a greater dependency on interaction for innovation with external parties (Kühne et al., 2013). In addition, innovation in the food sector is not purely based on research and development, but rather it involves a learning process and interaction between different actors (Weaver, 2008). Small food firms tend to rely on information from customers, suppliers, similar enterprises and research institute as sources of innovation (Avermaete et al., 2003). Nowadays, SMEs will struggle to sustain competitive advantages if they only utilize their own resources (Stanislawski and Lisowska, 2015). Therefore, SMEs need co-innovation strategy with other firms to develop sustainable competitiveness (Najib et al., 2014).

However, studies about the co-innovation strategy in SMEs with partners are limited; in previous studies, co-innovation strategy was mostly implemented in large companies and conducted in developed countries (Tepic, 2013; Bossink, 2002). It is worth addressing the particularities of co-innovation from the perspectives of SMEs, which are major actors in innovation (Maula et al., 2006). Additionally, conducting co-innovation remains a challenge for most SMEs for a number of reasons, such as

the lack of resources, and the limited financial resources for internal R&D (Gasman et al., 2010). Therefore, to fill this gap, it is necessary to determine the factors influencing the co-innovation strategy in each stage using SMEs perspective, especially in the agri-food sector.

The content of this research is divided into six chapters. The first chapter accommodates the background and objectives of this study, the research questions and the research framework. The second chapter discusses the theoretical framework and the literature review, which mainly study the co-innovation stages: the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage. The methodology is elaborated in the third chapter. The fourth chapter shows the results, followed by discussion in the fifth chapter. Finally, the sixth chapter engages the limitation and the conclusion of this research.

1.2 Research Objectives

The main aim of this research is to determine factors influencing the co-innovation strategy for SMEs in the agri-food sector in Indonesia. The objectives of this research are:

1. To determine the factors influencing the co-innovation strategy for SMEs in the agri-food sector in the initiation stage.
2. To determine the factors influencing the co-innovation strategy for SMEs in the agri-food sector in the partner selection stage.
3. To determine the factors influencing the co-innovation strategy for SMEs in the agri-food sector in the formalization stage.
4. To determine the factors influencing the co-innovation strategy for SMEs in the agri-food sector in the implementation stage.
5. To determine the factors influencing the co-innovation strategy for SMEs in the agri-food sector in the evaluation stage.

1.3 Research Framework

The purpose of this research framework is to describe the research activities, which are carried out to achieve the research objectives. It involves theoretical research, empirical research, data analysis, result and discussion, and conclusion. In the theoretical research, a literature study was conducted to discover factors which influence the co-innovation strategy for SMEs in conducting collaboration with external parties.

For the empirical research, a case study of SMEs in agri-food sector in Indonesia is selected. Indonesia agri-food sector is the biggest sector involving SMEs. According to the latest data from the Indonesian Bureau of Statistic (2016), in 2016 70% of SMEs are engaged in this sector. During the empirical research, an online survey was submitted to SMEs operating in the food sector to collect quantitative data. The result from the data collection will be analyzed using statistical techniques.

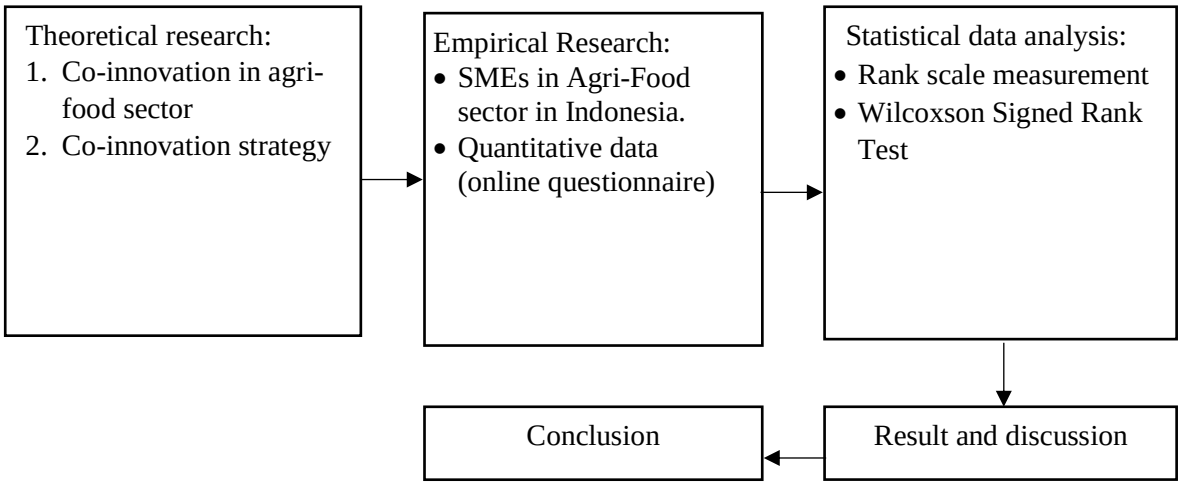

Figure 1. Research Framework

1.4 General Research Question

The general question of this research can be summed up as:

What factors influence the co-innovation strategy for SMEs in the agri-food sector in Indonesia?

1.5 Specific Research Question

1. What factors influence the co-innovation strategy for SMEs in the initiation stage?
2. What factors influence the co-innovation strategy for SMEs in the partner selection stage?
3. What factors influence the co-innovation strategy for SMEs in the formalization stage?
4. What factors influence the co-innovation strategy for SMEs in the implementation stage?
5. What factors influence the co-innovation strategy for SMEs in the evaluation stage?

Chapter 2

Literature Review

2.1 Co-innovation Strategy for SMEs in Developing Countries.

Co-innovation is the innovation process of sharing complementary resources, knowledge, and competencies with other partners (Bossink, 2002; Dawson et al., 2014). Bossink (2002) also states that co-innovation is similar to collaboration, which means creating partnerships or alliance to share complementary resources. The globalization era triggers international competition and thus threatens even small regional companies in far eastern companies (Sag et al., 2016), including Indonesia. Thus, SMEs operating in developing countries are no longer safe in their own market, and to ensure their survival in today's highly competitive and rapidly changing environment, they need to innovate continuously and faster than their rivals (Sag et al., 2016). However, speeding up innovation process requires significant resources. Thus, the organization should search for and acquire external resources created by others instead of building on their own (Chesbrough, 2003).

Application of collaboration concept to developing countries is relatively recent but is increasing rapidly (Lundvall et al., 2011). In developing countries, similar to developed countries, the organizations can form collaboration with other successful organizations to share their knowledge and learn from each other to become more innovative and to gain competitive advantages (Tavallaei et al., 2014). Collaboration activities have great potentials to increase competitiveness for SMEs in Indonesia due to the fact that the profile of SMEs in Indonesia is usually limited in human resources, financial resources, and technology (Najib et al., 2014). Thus, a co-innovation strategy is a way for organizations, especially for SMEs with limited resources, to speed up their innovation processes (Sag et al., 2016; Tepic and Omta, 2013). Additionally, the study conducted by Najib et al (2014), which is using the small and medium food processing enterprises in Indonesia as respondents, stated that SMEs in Indonesia are already aware that collaboration with other actors have a positive impact to develop sustainable competitiveness.

2.2 Co-innovation for SMEs in Agri-Food Sector

In Indonesia, the number of SMEs is more than the number of large enterprises (Setyanti and Farida, 2016). According to the latest data from the Indonesian Bureau of Statistic (2016), in 2016 there were 57 million SMEs and 70% of them are engaged in food sector. SMEs also give positive contribution for economic growth, not only in developed country, but also in developing country (Setyanti and Farida, 2016). However, increasing customer expectations, globalization and frequent changes in the environment force SMEs to continuously create new forms of competitive advantages (Schulze et al., 2008). The fast changes in consumer demands put increasing pressure on agri-food companies to engage in innovation to safeguard their profitability (Sakar and Costa, 2008).

In this rapidly changing environment, innovation is the key factor for SMEs to develop competitiveness and succeed in the market (Lee et al., 2012). Therefore, if the companies wish to meet new demands, they have choices of either building all necessary competence in-house, or enter collaborative relationships with partners with complementary resources on product development (Olsen et al., 2008). SMEs have been noted to use external resources to shorten innovation time and to reduce risk and cost of their operations (Hagedoorn, 1993). Furthermore, organization from the agri-food sector are progressively collaborating with other firms to manifest the innovation goals that they could not have achieved without the supplementary resources or skills from their partners (Hagedoorn et al., 2006; Ziggers and Henseler 2009). The food firms is thought to draw not only on R&D but also on interaction with other actors, where the technological and scientific information produced outside the firms play an important role (Acosta and Ferrandiz, 2013). When the organization do not have capabilities to innovate on its own, they explore to co-innovation with other organizations (Bossink, 2002). Therefore, by conducting the co-innovation strategy with partners with complementary resources, the organization can increase the number of ideas and innovations (Chesbrough, 2003).

The paradigm of co-innovation is interesting especially in food sectors because of their many chains, but this potential has not been fully utilized (Saguy, 2011). The closed innovation based on self-reliance of R&D also is simply too slow and too costly to help organizations stay ahead of the competition (Lee et al., 2012). Hence, innovation has

gone through evolutionary steps to co-innovation with external parties during the past three decades (Lee et al., 2010).

However, Fortuin and Omta (2009) stated that there is a scant evidence of the use of this potent tool in this agri-food sector. This is also proven by Olsen et al. (2008) and Sakar and Costa (2008), who mentioned that the co-innovation strategy research in food industry have not been subjected to much scholarly attention, especially for SMEs. One possible reason for the low exposure on product development collaboration in the food industry is that companies have not been motivated to enter product development alliances, as they largely have possessed the necessary development and production competencies in-house (Olsen et al., 2008). Thus, relevant knowledge has to be extracted from general literature covering issues such as co-innovation strategy.

2.3 Co-Innovation Strategy

Throughout the years, innovation has evolved from closed collaboration to collaborative innovation such as open-innovation and co-innovation (Lee et al., 2010). In the past, firms were already quite eager to share their innovations with other firms. However, due to the fierce demand for diversity from the consumers, collaboration and partnerships have recently become almost mandatory to any firm who wants to aim for competitive advantage within the industry (Lee et al., 2012). The co-innovation is presented as the new paradigm of innovation which can help organization create value through collaboration (Lee et al., 2012). Some observers stated that co-innovation as open innovation, which postulates that organizations can and should use external resources to generate innovation (Chesbrough, 2003; Romero and Molina, 2011). Others equate co-innovation to the concept of collaborative innovation, which focuses on creating partnerships or alliance to share complementary resources (Bossink, 2002).

Co-Innovation alliance is a business relationship, in which two or more independent firms or research institutes work cooperatively on a specific project, which is aimed at the development and commercialization of new products or services that are defined based on activities, geographic location and time (Tepic et al., 2013). Co-innovation is similar to cooperation and collaboration, but it is focused on controlling and coordinating partnership processes through co-innovation stages (Bremmers, 2009; Tepic et al., 2013). Co-innovation is the innovation process by sharing complementary resources,

knowledge, and competencies with other partners through several stages of strategy (Bossink, 2002; Dawson et al., 2014). On the basis of previous studies (Tepic et al., 2013; Kale and Singh, 2009; Das and Teng, 2002), the stages of co-innovation are the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage.

2.3.1 The Initiation Stage

In co-innovation partnerships, value is created through the linkage of internal and external resources. Thus, organization should have a clear understanding of the resources or assets that are required to meet their goals (Slowinski and Sagal, 2010). In order to initiate a co-innovation trajectory, the organization first need to recognize the opportunities and resources they intend to gain from their partners (Tepic et al., 2013). The shift towards a co-innovation strategy then starts with the internal alignment within the organization. This is essential for the success of the new strategy (Tepic et al., 2013), because such partnership often involves several functional groups and senior leadership, all of which must thoroughly understand and be committed to the objectives and terms of the partnership (Slowinski and Sagal, 2010).

In order to conduct the co-innovation strategy, first the organization has to define what specific need they required from partners to increase their competitive advantage (Slowinski and Sagal, 2010). In alliance, any initiative begins with the awareness of a need (Whipple and Frankel, 1998). Defining the need is a challenge for an organization when initiating a collaboration with external parties. It requires time and effort to generate specific resources from partners (Tolhurs and Brown, 2013). If the need for collaboration is considered insufficient, then adequate resources may not be allocated and the collaboration activities will struggle to get off the ground (Tolhurs and Brown, 2013). To mitigate this situation, the organization must understand the purpose or driven factors for a firm to conduct collaboration.

There are several factors which prompt an organization to collaborate with other parties. Creating economies of scale has been described as an important driver to collaborate (Glaister and Buckley, 1996). In addition, the use of partnership is to gain access to valuable resources belonging to partners; such resources could be specific skills or more abstract resources, such as knowledge (Das and Teng, 2000). Gulati (1995) also stated that partnerships could improve the market position or gain access to new markets.

Chesbrough and Crowther (2006) found that the most common reason for organization to collaborate with external parties is to gain their partners' technological capability. Vrande et al (2009) found that market-related consideration is also another motive for a collaboration with external parties, i.e. to gain access to a new market. Additionally, companies tend to form alliance with knowledge resources or business partners in order to reduce development cost and time or risk in innovation processes (Stell, 2011). In conclusion, the purpose of conducting co-innovation strategy for SME are mainly for technology, to reduce risk and cost, and to market channels to introduce them effectively in innovation market (Narula, 2004).

2.3.2 The Partner Selection Stage

This stage is described as one of the most crucial factors of co-innovation success (Lambe and Spekman, 1997). Potential partners are not only supply chain actors such as suppliers and customers, but also competitors or knowledge institutions, such as universities and research centers (Miotti and Sachwald, 2003; Batterink, 2009). The ability to acquire information from a potential partner enables organizations to evaluate a potential partner's skills and resources more accurately (Dyer and Singh, 1998).

Shah and Swaminathan (2008) argued that there are three characteristics of a partner which have positive influence on co-innovation process: partner complementary, partner commitment, and partner compatibility or fit. Partner complementarity is the extent to which a partner contributes non-overlapping resources to the relationship, which mean one partner brings resources the other lacks and vice versa (Dyer and Singh, 1998). The greater the complementarity between partners, the greater the likelihood of co-innovation success (Kale and Singh, 2009). In addition, Murray and Kotabe (2005) suggested that an organization should choose a partner with complementary resources. If all partners have the same type of resources, there will be little information to share and few benefits to receive (Jiang et al., 2008). Complementarity is important, because organizations tend to seek the transfer of skills or information which complements their existing knowledge base (Stel, 2011). In fact, establishing an alliance requires each partner to contribute unique resources and functional capacities that the other lacks (Wu et al., 2009). For SMEs, Hoffmann and Scholsser (2001) emphasized that looking for complementary or required resources is a crucial factor.

However, partner complementarity alone is insufficient for co-innovation success. A partner must be compatible with the focal firm and committed to the relationship. Partners compatibility refers to the fit between the main organization and the partners' working style and culture. According to Emden *et al*. (2006) there are two types of partners fit: strategic fit and relational fit. A strategic fit describes how well a firm and its partners are aligned strategically (Slowinsky and Sagal, 2003). It can happen when the objectives of the allied partners match and do not conflict, which implies a shared vision and a compatibility of strategies (Stel, 2011). Hence, a strategic fit can reduce the possibility of the partners act opportunistically in the partnership (Tepic et al., 2013). Whereas, relational fit refers to partners that have a compatible culture or a fit organizationally, and they are willing to adapt with the requirements for collaboration changes (Emden *et al.,* 2006). Similar cultural background is helpful to avoid difficulties in the collaboration process (Sarkar et al., 2001). Cultural differences might lead to misunderstanding, conflicts and difficulties in cooperating (Prahalad, 1998).

Moreover, in the SME context, the degree of cultural and organizational compatibility between firms is also an important variable in determining the success or failure of an alliance (Swoboda et al., 2011). Incompatibility between cultures may lead to poor communication, resulting in ineffective decision-making, complicated problems resolution and inadequate leadership style (Stel, 2011). Therefore, understanding the cross-cultural patterns and dealing with them effectively should be considered essential (Prahalad, 1998). If the partners are incompatible, it will be impossible to serve both company's needs due to mismatch in organizational culture and strategies, leading to the failure of the alliance in reaching its objectives (Nielsen, 2010). Misfits defined as strategic differences in motivational intent are likely to create tension between partners and often leads to failure in terms of outcome (meeting the objective of the alliance) or ultimately to termination of the alliance if not resolved (Nielsen, 2010). Therefore, misfits can be considered as potential failure factors, causing a lower success rate or underperformance of the co-innovation alliance (Stel, 2011).

Furthermore, partner commitment is also important in this stage. Commitment includes not only the willingness of a partner to make resource contribution required by the alliance, but also to make short-term sacrifices to achieve the desired longer-term benefits (Gundlach *et al.,* 1995). The basis of commitment within an alliance is formed when one partner perceives the other partner as willing and able to perform as promised

(Whipple and Frankle, 1998). Das and Teng (2001) found trust and commitment of partner as key factors which help minimize uncertainties and reduce the threat of opportunism in collaboration process. Commitment may also lead to improved level of partner collaboration (Muthusamy and White, 2005). It is important that the managements in all alliance partners are equally committed, for if they are not, the partnership is likely to fail (Cools and Roos, 2005). Furthermore, management involvement plays a strategic role in the allocation of funds or other resources to co-innovation alliance (Stel, 2011).

Another characteristic that SMEs should consider in the partner selection stage is partner reputation (Dyer, 1997). Before allying with a partner, the organization should make clear whether this partner has a reputation for dealing fairly and performing well (Das and Teng, 2001). By contrast, partners with a bad reputation are likely to behave opportunistically and be difficult to work with (Jian et al., 2007). Reputation is an important source of mutual trust because it helps lower transactional costs, minimizes potential opportunistic behaviors, and decreases inter-partner conflicts (Das and Teng, 2001). Reputational considerations should play an important role in each firm's search for future alliances (Gulati, 1995). Partner reputation can also produce trust in an alliance (Adams and Goldsmith, 1999). Firms which are more established, with more successful records of accomplishment, may be more likely to be involved in alliance (Adams and Goldsmith, 1999). Saxton (1997) found that perception of initial and overall relationship satisfaction increased with higher partner reputation in management quality.

2.3.3 The Formalization Stage

The formalization stage of the partnership has also been hailed important to the success of a partnership (Kale and Singh, 2009). In this stage, all aspects of the partnership must be carefully planned, negotiated, and captured in an alliance agreement to avoid misunderstanding during the later stages of co-innovation (Tepic et al., 2013). In addition, being a bilateral process, it is important that the negotiated terms are acceptable to both parties (Slowinski and Sagal, 2010). When negotiation is successful, the firms will be able to reach an agreement, often in the form of a contract (Tepic et al., 2013). According to Kale and Singh (2009), there are two alliance governance: contractual governance and relational governance. Contractual agreement is one of the effective governances for a partnership (Mayer and Argyres, 2004). According to Tepic et al (2013), organizations use a contract to describe the mutual rights and obligations, such

as each party's contribution to the partnerships, as well as the organizational processes necessary to solve problems and divide the expected outcomes of the alliance. Additionally, according to Reuer and Arino (2007), there are several ways in which a contract can help to manage exchange hazards. Firstly, a contract clearly sets forth mutual rights and obligations of partners by specifying each firm's input to the alliance, procedures by which exchange will occur and disputes will be resolved, and expected outputs from the relationship. Secondly, a contract also limits information disclosures by partners during the operation of the alliance, specifying how each partner will interact. Third, a contract can include the intellectual property protection and the specification of breaches that might necessitate termination or adjustment in partnership. Hence, the use of contractual agreement can act as an anchor point in the partnership to enhance information exchange about each partner's interests and the possibilities of complementarities in competencies (Tepic et al., 2014). Moreover, claims on intellectual property also have an important role in formalization stage (Kale and Singh, 2009). This is in line with Olander et al, (2010) who stated that contractual agreement such as intellectual property right could safeguard knowledge and potentially minimize the risk and fear of being exploited. To a certain extent, contractual safeguards are necessary, especially when specific assets are required for a limited period (Reuer and Arino, 2007). Contract can be used to decrease opportunistic behavior by the contract partners, which affect the performance of the alliances (Dekker, 2004).

However, Kadefors (2004) discovered that overly detailed contractual specification and close monitoring had negative impact for trust among partners, and consequently for the collaboration process. Putting a lot of emphasis on legal safeguards rather than on cooperation is considered a major pitfall in alliances (Jagersma, 2005). When a contract becomes excessively detailed, it becomes inflexible and complicates monitoring compliance (Poppo and Zenger, 2002). Less detailed contract can act as a trust mechanism and help develop trust by clarifying roles and responsibilities to the parties (Mayer and Argyres, 2004).

Another governance mechanism in partnership is relational governance. Kale and Sing (2009) argued that relational governance could reduce the transaction cost of the partnership in several ways. First, contracting costs are minimized because firms trust their partners to behave fairly. Second, monitoring costs are lower because third-party monitoring is not required. Lastly, the costs of complex adaptation are lowered because

partners are willing to be flexible in response to unforeseeable circumstances. Furthermore, trust in inter-firm relationship is an important source of competitive advantages because it can reduce transaction cost (Zaheer et al., 1998) and enhance greater information-sharing routines (Krishnan et al., 2006). Inter organizational trust is deemed crucial to the success of alliances (Curall and Inkpen, 2002) because trust can counteract fear of opportunistic behavior (Gulati, 1995). A lack of trust on the future behavior between partners leads to the failure of the alliance project and results in increased transaction costs (Hoffmann and Scholsser, 2001).

Similar with contractual governance, relational governance also has several drawbacks. Over-investing in trust relationship can also lead to inefficiencies or business risks (Ring and Van de Ven, 1994). It can lead to complacency, an acceptance of less-than satisfactory outcomes from a relationship (mer. Furthermore, too much trust can lead to betrayal, blind faith with risk of malfeasance, less information exchange between partners, or unnecessary obligations (Gargiulo and Ertug, 2006).

However, there are different views on the relationships between contractual governance and relational governance. One view suggests that one type of mechanism substitutes the other, for example, relational governance reduces the need for formal governance (Gulati, 1995). Another sees these mechanisms as being complementary in alliance success, for instance, relational governance amplifies the positive effects of contractual governance (Popo and Zenger, 2002) and enables partners to more easily accept formal contractual governance despite the incomplete and ambiguous nature of contractual clauses (Gulati and Nickerson, 2008). In addition, trust and contract are complementary modes of governance that supplement each other (Olaisen and Revang, 2017). The presence of both is found to increase the alliance performance (Solitander and Tidstrom, 2010).

2.3.4 The Implementation Stage

The implementation stage is also referred to as the operation stage (Das and Teng, 2002). In this stage, the organization and partners are collaborating and implementing all the agreements of the partnership (Das and Teng, 2002). The implementation stage is the continuous coordination of process among parties through which the partners learn to adjust their activities to each other (Sobrero and Schrader, 1998). The actual coordination is not only achieved through governance mechanisms, but is realized by

day-to-day interaction of the employee involved in the collaboration activities (Doz *et al.*,1989). Therefore, the purpose of implementation stage is for actors to exchange sufficient information so that they can adjust their mutual behaviors in a meaningful way for any associated distribution of rights among the partners (Nielsen, 2010).

One of the important factors in this phase is trust (Tepic and Omta, 2013). Although the building of trust starts in the earlier stage, the process has to be accelerated because the actual collaboration begins in this phase. Moreover, trust is essential in order for the alliance partners to be willing to share key information on a strategic and operational level (Sonneberg, 1992). Trust not only enables them to share valuable expertise with their alliance partner, but also protects against opportunistic behavior by the partner (Kale et al., 2000). The development of interpersonal trust is important because operational level staff are involved in the partnership and it impacts the day-to-day efficiency of the operations (Zaheer *et al.*,2001). It is linked to the social bond that develops between these individuals as they work regularly with each other, and understand each other's working style (Schreiner et al., 2009). Interpersonal trust most often develops between the individuals from collaborating firms who interact with each other (Gulati, 1995). Therefore, by conducting several meetings, employees are able to meet with each other and develop relationships (Dyer *et al.,* 2001). Furthermore, these meetings serve as a way for team members to obtain a clear and consistent insight into the objectives of the partnership and to understand how the terms of the agreement should guide their actions (Slowinski and Sagal, 2010). New working routines result in an intense relationship, such as working groups, brainstorming, and frequently meetings. Thus, firms can learn about each other and build up inter-firm trust through ongoing contacts and interaction (Gulati, 1995). Similar with the study developed by Tepic et al (2013), these activities have been important for the building of trust and stimulating openness. Finally, a lack of trust is considered a reason for alliance failure and therefore it is important to the performance of the alliance (Larson, 1992).

The creation of inter-organizational team projects is also important in this stage (Scarbrough, 2003; Temmink, 2015). According to Salas et al. (2008), creating a project team can help the organization to have a clear set of tasks and teamwork with partners. Furthermore, Kale and Singh (2009) also stated that developing a clear guideline and creating a formal role or structure in team project could help managing coordination in the partnership. Developing a clear guideline on what specific tasks need to be carried

out by each partner, for example who is accountable for each task and a timetable for implementing them, can help facilitate coordination by improving the clarity and predictability of partner actions, minimizing frustration, and increasing decision-making speed. This opinion was also supported by Hoffmann and Scholsser (2001), who stated that defining a clear guideline with a timetable could be the basis to manage the alliance in a goal-oriented and controlled manner. Second coordination mechanism is the creation of a formal role or structure with clear authority and decision-making ability to oversee ongoing interactions between partners and facilitate information and resource sharing. For example, a firm can appoint a separate dedicated alliance manager to manage partnership or both partners can create an alliance review committee for this role (Kale and Singh, 2009). The determination of role and structure (e.g. project leader) in project team is also important to help overcoming difficulties in the collaboration process (Nissen et al., 2014).

Moreover, higher levels of managerial support provided by the partners to the alliance may lead to enhanced learning within the alliance (Stel, 2011). Steensma and Lyles (2000) concluded that direct personal involvement of senior management could facilitate learning, however, higher level of technical support provided by the foreign partner did not automatically enhance alliance learning. Furthermore, management plays a role in managing and solving conflicts or problems in a co-innovation alliance, which, when undertaken wisely, may lead to more learning within the alliance (Kale et al., 2000). The role of management in co-innovation projects is fourfold: making sense, role modeling, team building and supporting. In making sense, top managers motivate and engage their employees personally by connecting personal needs to the fundamental purpose of the organization. In role modeling, top managers strive to obtain the desired mind-set, which should be shaped from the top downwards in order to promote new values into the existing corporate culture alliance. The third role of management is to build a strong and committed team of alliance managers. Fourth and last, management supports the co-innovation activities when needed, persistently and consistently (Vries and Treacy, 2002; Aiken and Keller, 2006

2.3.5 The Evaluation Stage

In the evaluation stage, the outcomes of the alliance become tangible and can be evaluated (Das and Teng, 2002). According to Ouchi (1997), the study stated that there are two evaluation outputs that can be distinguished by the organization in alliance partnership, output control and process control. Output control is the measuring mechanism which focuses on the outcomes or the specific outputs of alliance activities, such as economic or financial outcome. Output control focuses on monitoring the results of the partner's exerted efforts (Celly and Frazier, 1996). Moreover, Jiang et al. (2007) also stated that output control is related to the ability of the partners to achieve economic and strategic objectives and relies on an accurate and reliable assessment of alliance outcomes. Furthermore, Lambe et al. (2002) stated that financial measures such as sales and profitability could also be categorized as output control. By contrast, process control is the evaluation mechanisms which clearly specifies the appropriate behavior of the partners and the satisfying processes of partner interactions (Ouchi and Mary, 1975). In addition, Reuer and Ariño (2002) also stated that the process control parameter also includes how well the alliance partners interacted with each other, how flexible each partner was to requests made by the other partner, the satisfaction with the governance structure, and the overall satisfaction with the alliance.

However, output control is normally demotivational because of the potential environmental uncertainties (Celly and Frazier, 1996). Criticisms of financial measures have been directed mainly at inability to reflect non-financial domains (Gong et al., 2005). Additionally, profit and market share are quite meaningless as measures of performance, at least in the short run (Yan and Gray, 2001). This was also supported by Jiang et al, (2008) who argued that when this outcome-based control mode was adopted on its own, problem could emerge because outcomes could not be measured before they were fulfilled, and the others cannot be measured at all due to environmental uncertainties. Process control can also have opposing effects on alliance activities (Jiang et al., 2007). If a firm frequently utilizes process control to coordinate alliance activities, the incessant monitoring and frequent checking are required. Such actions will destroy booth goodwill and trust between partners (Jiang et al., 2008). Thus, Ouchi and Maguire (1975) suggested that output and process controls are not substitute for each other; firms may use either or both method.

After evaluation, the organization has to decide on the future of the alliance. Several outcomes are possible, such as stabilization, reformation, and termination (Das and Teng, 2002). When the alliance is operating successfully, the organization may try to maintain the collaborative relationship and invest more resources and capabilities to retain its added value in the future (Jiang et al., 2008). Dissatisfaction can arise due to inter-partner conflicts, discrepancy between expected and actual outcomes, or both (Tepic et al., 2013). Adjustment is needed to correct some of the inopportune decision (Das and Teng, 1997). This situation provides partners a chance to share information on what should be fixed for the next steps and give a second chance to survive. When firms fail to make these adjustments, the partnership is likely to be terminated. However, the evaluation phase might also result in an alteration of the initial partnership agreement or even its termination (Das and Teng, 2002). It should be noted that reformation and termination do not necessarily signal failure. Reformation and termination may be the best option under certain circumstances, such as the achievement of pre-set objectives (Das and Teng, 2002). According to Ring and Van de Ven (1994), the parties typically conclude that the relationship should be terminated in two conditions: when the parties have lived up to their promises and the deal is completed, or as a consequence (or failure) of a condition (e.g. breach an agreement).

However, there are several advantages of maintaining the partnership with current partner related to alliance experience. Previous alliance experience might help the organization to have a better understanding on their partners and/or resources (Gulati, 1995). Social mechanisms such as trust, goodwill and mutual understanding on each other's culture and organizational routines can arise from prior experience with the partner and a partner's reputation (Gulati, 1995). In addition, prior alliance are positive predictors of future relationship stability by providing a wide range of advantages and benefits for the partners (Richard and Yang, 2007). Firstly, through learning from the success and failure of prior relationships, firms accumulate substantial experience and lessons on how to avoid past mistakes, how to manage the partnership, and how to reduce risks in the future (Killing, 2012). Secondly, experience derived from repeated ties provides information about each other's cultures, systems, structures and strategies, facilitating effective communication and mutual understanding (Saxton, 1997). Thirdly, repeated ties can engender close bonds and enhance mutual trust among partners which can discourages opportunism and reduce transaction cost (Richard and Yang, 2007).

2.4 Theoretical Framework

Given several articles that have studied co-innovation strategy (Tepic, 2013; Kale and Singh, 2009; Das and Teng, 2002; Bossink, 2002), it is not feasible to examine every aspect in detail. Therefore, we briefly review only factors prior researches considered most important. Figure 2 provides an overview of the main phase of co-innovation strategy life cycle and factors in each stage that are important to co-innovation success.

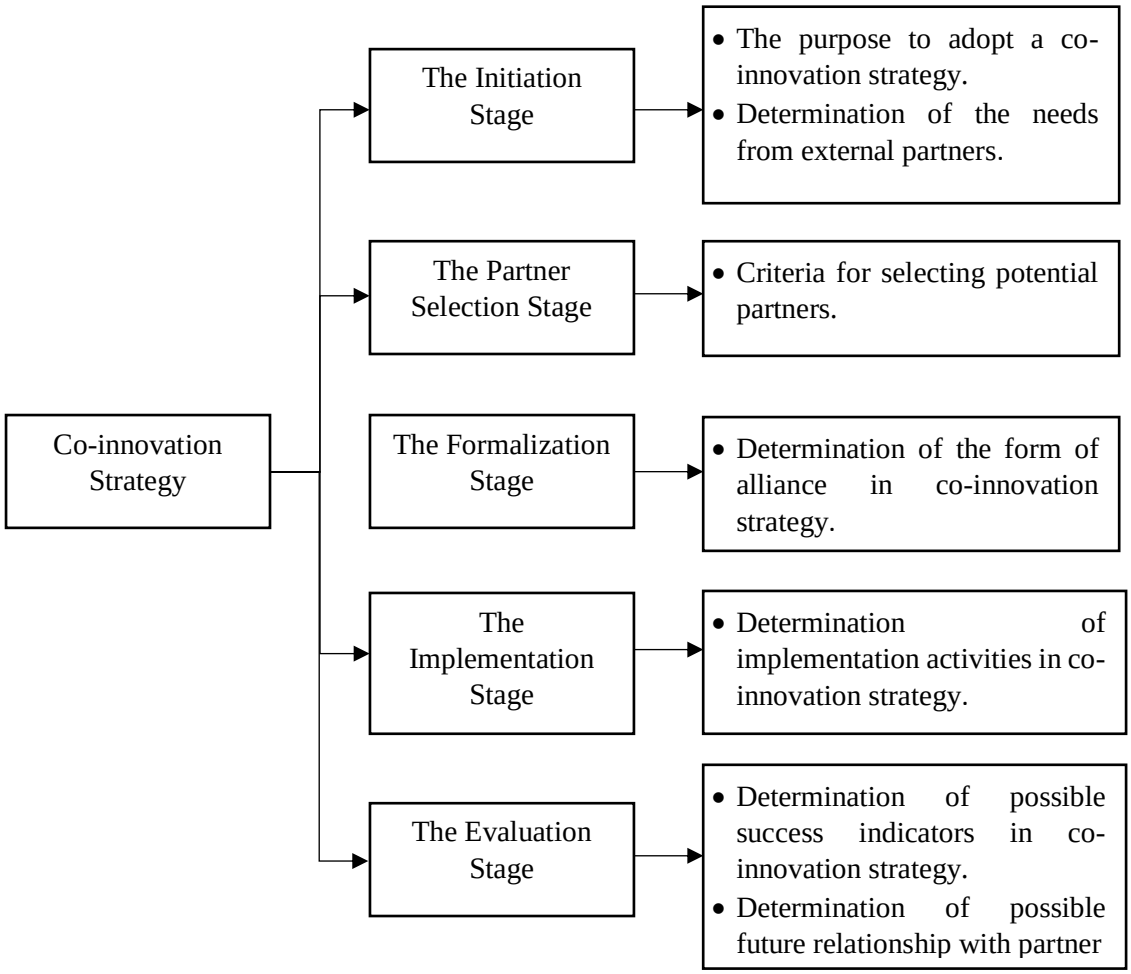

Figure 2. Theoretical Framework

2.5 Hypothesis

Based on the existing literature review, we can deduce the factors influencing the co-innovation strategy in each stage. Five hypotheses are developed and tested in this study. Those hypotheses are listed below:

1. Hypotheses in the initiation stage:

   (1a) There are no difference of ranks based on the level of importance in determining the purpose to adopt co-innovation strategy.

   (1b) There are no difference of ranks based on the level of importance in determining the needs from external partner.
2. There are no difference of ranks based on the level of importance in determining criteria for selecting partner
3. There are no difference of ranks based on the level of importance in determining the form of alliance in co-innovation strategy.
4. There are no difference of ranks based on the level of importance in determining the implementation activities in co-innovation strategy.
5. Hypotheses in the evaluation stage:

   (5a) There are no difference of ranks based on the level of importance in determining possible success indicator for co-innovation strategy

   (5b) There are no difference of ranks based on the level of importance in determining the possible future relationship with partner if the alliance succeeds.

   (5c) There are no difference of ranks based on the level of importance in determining the possible future relationship with partner if the alliance fails.

Chapter 3

Methodology

The purpose of this chapter is to give an overview of the research method that is used in this study. To explore the factors influencing co-innovation strategy for SMEs in the agri-food sector in Indonesia, a quantitative method is used. So far, there is a lack of study on SMEs in agri-food sector regarding their co-innovation strategy, especially in Indonesia. Therefore, to fill this gap, we adopt some theories from similar studies in large companies in the past to know what can happen in the context of SMEs. In this research, quantitative method is used to collect the data. Quantitative study is explaining phenomena by using numerical data and analyzing the data using mathematic-based methods, in particular, statistics (Creswell, 2013). The factors in each stage of co-innovation strategy is measured using rank scale. The respondents are presented with several items and asked to rank them in order of level of importance (Lawal, 2003).

3.1 Case Selection

In this research, we use SMEs in Indonesia as a case study. The number of SMEs in Indonesia is larger than the number of large companies. From 56 million SMEs, 70% of them are engaged in the food sector (BPS, 2016). Co-innovation strategy is a helpful tool for SMEs in conducting collaboration with partners. The five stages of co-innovation strategy (the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage) can help SMEs learn the process of partnership with external parties. Therefore, in this study, we will study the factors influencing each stage of the co-innovation strategy, specifically for SMEs in agri-food sector in Indonesia.

3.2 Operationalization.

This section is divided into two subsections. Sub-section 3.2.1 explains the measurement used to answer the research questions, including the factors in each stage of co-innovation strategy, which are extracted from different existing studies. Sub-section 3.2.2 elaborates the method used for data collection and the design of the questionnaire. The complete questionnaire can be seen on Appendix 1.

3.2.1 Scale and Measurement

Based on the literature study, co-innovation strategy can be defined as a five-stages innovation process combining complementary resources owned by multiple partnering firms. Hence, in this study, these five stages become the variable to be measured. In this section, the items mentioned to measure each variable in each stage of co-innovation strategy are used to build the questions in the questionnaire.

The Initiation Stage

As mentioned before, the initiation stage is the first step in co-innovation strategy. In this stage, the organization needs to understand the aim of the collaboration with external partners. There are several factors which lead the organization to collaborate with other parties. According to Chesbrough and Crowther (2006), the reason for organization to collaborate with external parties is to gain the partner's technological capability. In addition, Gulati (1995) and Narula (2004) also stated that partnerships could improve the market position or gain access to new markets. Moreover, another reason why organizations need to collaborate with partners is to reduce development cost or risk in the innovation process (Stell, 2011).

After the organization decided the aim of the collaboration with external parties, then they should recognize the opportunities and resources that they want to gain from the partners (Tepic et al., 2013). The shift towards a co-innovation strategy then starts with the internal alignment within the organization, which is essential for the success of the new strategy (Tepic et al., 2013). Because such a partnership often involves several functional groups and senior leadership, all of them must thoroughly understand and be committed to the objectives and terms of the partnership (Slowinski and Sagal, 2010). In addition, recognizing the resources does not only rely on R&D but also on interaction with other actors, since technological and scientific information produced outside the organization plays an important role (Acosta and Ferrandiz, 2013). Based on this theory, we develop the variables in determining the needs for knowledge and resources from partners, which include discussion activities with colleagues, internal conflict, and the dependency with research and department.

Those items are mentioned in Table 1. below.

Table 1. Measurement indicators for Initiation Stage.

Factor	Adopted Items (code)
The purpose of co-innovation	The purpose of co-innovation is to access partner's technological capability (Init1A).
	The purpose of co-innovation is to gain access to new markets (Init2A).
	The purpose of co-innovation is to reduce risk and failure in the innovation process (Init3A).
Determining the needs for knowledge and resources from external partners	Determining the need of specific knowledge or resources from other organization could be done by discussing with colleagues within my organization (Init1B).
	Determining the need of specific knowledge or resources from other organization could be done if there is no internal conflict or disagreement among the members of my organization (Init2B).
	Determining the need of specific knowledge or resources from other organization could be done by getting information from the research department only (Init3B).

The Partner Selection Stage

The items to measure the partner selection stage are extracted from several literatures. Hence, the criteria for selecting partners will be elaborated in this section. Shah and Swaminathan (2008) argued that there were three partner characteristics with positive influence on co-innovation process: partner complementary, partner commitment, and partner compatibility or fit. According to Emden *et al*. (2006), there were two types of

partners fit: strategic fit and relational fit. A strategic fit describes how well the organization and its partners are aligned strategically (Slowinsky and Sagal, 2003). A strategy fit between alliance partners exists when strategic drivers of the alliance partners match and do not conflict, which implies a shared vision and a compatibility of strategies (Stel, 2011). Whereas relational fit denotes that the organization should look for partners with a compatible culture or an organizational fit who are willing to adapt with the requirements for collaboration change (Emden *et al.*, 2006). Another criterion is partner reputation. Before allying with a partner, the organization should also make clear whether this partner has a reputation for dealing fairly and performing well (Das and Teng, 2001). Those items are mentioned in Table 2. below.

Table 2. Measurement indicator for Partner Selection Stage

Factor	Adopted Items (code)
Criteria for selecting partner.	Selecting a partner that has complementary resources (Part1)
	Selecting a partner that has a good reputation (Part2)
	Selecting a partner that has similar culture and value to my organization (Part3).
	Selecting a partner that has similar objectives goal for collaboration process (Part4).
	Selecting a partner that has commitment and trust from top to bottom levels of the organization (Part5)

The Formalization Stage

In this stage, the form of alliance should be determined for the co-innovation strategy. Several variables are extracted from literature. According to Tepic et al (2013), organization use a contract to describe the mutual rights and obligations, such as each party's contribution to the partnerships, as well as the organizational processes necessary to solve problems and divide the expected outcomes of the alliance. Contract

may also include the intellectual property right. Olander et al, (2010) stated that intellectual property right could safeguard knowledge and potentially minimize the risk and fear of being exploited. However, Kadefors (2004) found that detailed contractual specification and close monitoring had negative impact for trust and, consequently, for the collaboration process. Less detailed contract can act as a trust mechanism and help develop trust by clarifying roles and responsibilities to the parties (Mayer and Argyres, 2004). In contrast, Kale and Sing (2009), argued that relational governance could reduce the transaction cost in the partnership in several ways. First, contracting costs can be minimized because the organization trust their partners to behave fairly. Second, monitoring costs are lower because third-party monitoring is not required. Based on this literature, we developed the variables in the formalization stage in Table 3. below.

Table 3. Measurement indicators in Formalization Stage.

Factor	Adopted Items (code)
Form of alliance	A contract makes sure that the description of the tasks to perform jointly within the partnership is clear and agreed upon by everybody (Form1).
	Detailed contracts can be a safeguard for sharing knowledge activities (Form2).
	A complex contract can reduce trust in partnership (Form3).
	Using intellectual property rights should make the collaboration process more open (Form4).
	Trust can reduce the need for contract and monitoring in collaboration process (Form5).

The Implementation Stage

In the implementation stage, the organization and the partners implement all agreements on the partnerships taken during the formalization stage. The actual collaboration between employees from the organization and partners begins in this stage. Several variables were also extracted from literatures related to what should organizations do in the implementation stage. The creation of inter-organizational team project is important in this stage (Scarbrough, 2003). According to Salas et al. (2008), creating a project team

can help the organization to have a clear set of tasksand can guide the teamwork between partners. Furthermore, Kale and Singh (2009) also stated that developing a clear guideline and creating a formal role or structure in team project could help managing coordination in the partnership. Additionally, Aiken and Keller (2006) stated that the role of management was important to support their employees in the collaboration process with partners. Based on this literature, we mentioned the variables of the implementation stage in Table 4. below.

Table 4. Measurement indicators in Implementation stage.

Factor	Adopted Items (code)
Implementation stage activities	Creating a team project of employees from both parties makes the collaboration process more efficient (Impl1).
	Trust within the team members is also important to ensure the stability of the collaboration process (Impl2).
	Choosing a leader in the team project can facilitate the decisions making process in partnership (Impl3).
	Developing a clear guideline on what specific tasks need to be carried out by each member enables a more efficient collaboration (Impl4).
	Conducting meetings more frequently enables the development of interpersonal trust (Impl5).
	Involvement of top management can help the employees to deal with new working routines while in collaboration with employees from different partners (Impl6).

The Evaluation Stage

In the evaluation stage, the organization and partner should first determine the indicator of success of the partnership. According to Child et al. (2005) and Ouchi (1997), there are two evaluation outputs which can be distinguished by an organization in an alliance partnership: output control and process control. Output control is the measuring mechanism which focuses on the outcomes or the specific outputs of alliance activities, such as its economic or financial outcome. Moreover, Jiang et al. (2007) also stated that output control relates to the ability of the partners to achieve economic objectives and relies on an accurate and reliable assessment of the outcomes of the alliance. By contrast, process control is the evaluation mechanism which clearly specifies the appropriate behavior of the partners and the fulfilling processes of partner interactions (Ouchi and Mary, 1975). In addition, Reuer and Ariño (2002) also stated that the process control parameters also included how well the alliance partners interacted with each other.

After the indicator of success is determined and evaluation is completed, the organization should determine the possible future relationship with partner. The options in this sense are stabilization, reformation, and termination of the partnership (Das and Teng, 2002). If the alliance is operating successfully, the organization may try to maintain the collaborative relationship and invest more resources to retain its added value in the future (stabilization). Unsatisfactory outcomes require the organization to carefully assess the origins of the discontentment and attempt to make necessary adjustments (reformation) (Das and Teng, 1997). Otherwise, if the organization fail to make these adjustments, the partnership is likely to be terminated. According to Ring and Van de Ven (1994), the parties may conclude that the relationship should be terminated in two conditions: when the parties have lived up to their promises and the deal is completed, as a consequence of a condition (e.g. breach of an agreement). Based on this literature, we developed the variables in the evaluation stage in Table 5. below.

Table 5. Measurement indicators in Evaluation Stage.

Factor	Adopted Items (code)
Success indicators in partnerships	Financial measures, such as profit/return of investment (ROI), can be indicators to evaluate the performance of partnership (Eva1A).
	Harmonization in interactions between my organization and partner organizations can be an indicator to evaluate the performance of partnership (Eva2A).
	On time outcome from a collaboration process can be an indicator to evaluate the performance of partnership (Eva3A).
Possible future relationship with partners if the alliance success/fails	If the partnership is successful, the organization decides to terminate the relationship and move to a new project to gain new sources of knowledge with a new partner (Eva1B).
	If the partnership is successful, the organization decide to continue the relationship with the current partners and starts with a new project (Eva2B).
	If the partnership fails, the organization decides to make an adjustment in agreements and gives a second chance to it (Eva1C).
	If the partnership fails, the organization decides to terminate the partnership and starts looking for a new partner (Eva2C).

3.2.2 Method for data collection and design of questionnaire

In this study, the samples were collected using the purposive sampling method in which the researchers select the samples based on pre-determined criteria. The samples taken in this study have these criteria:

1. Small and medium enterprises in agri-food sector.
2. Have innovation-oriented activities.
3. Have collaborated with other parties.

An online, structured, closed questionnaire was conducted in this study as the primary data collection. Qualtrics was used as this program has a feature to prevent double responses from the same respondent and can be accessed through mobile application. There are several advantages in using a closed online questionnaire, such as the freedom for respondents to answer the question, the guarantee of anonymity, and the fact that it is not time-consuming (Sahu, 2016). The questionnaire is divided into three parts: a short introduction about the research, general information for respondents, and followed by the question about factor influence of co-innovation strategy in each stage. Furthermore, each question containing the adopted items above is accompanied with ranking measurement which allows respondents to choose from the most important factor to the least important. Additionally, the last part of the survey inquires about which stage is the most critical in the co-innovation strategy.

3.3 Statistical Techniques

In order to examine the hypothesis about the factors influencing the co-innovation strategy in each stage, a Wilcoxon signed rank test is conducted by using Statistical Package for Social Sciences (SPSS) version 25. The Wilcoxon signed rank test is a non-parametric or distribution free test, it can be used for ordered categorical data where numerical scale is inappropriate, but it is possible to rank the observation (Ott and Longnecker, 2015). The null hypothesis for this study is that there is no significant difference/equal in respondent's rank in each stage of co-innovation strategy. The result test should be significant at the 0.05 level (Field, 2009). If the significant value is less than 0.05, then null hypothesis will be rejected, which means that there are significant difference in respondent's ranks. To determine which is presumed by the respondent as more important or less important, we look to the median value as all paired-variable means in descriptive statistic table.

Chapter 4

Results

This chapter will evaluate the quantitative results, which are divided into two sections. The first section is the demographic information about respondents. The second section is the result of Wilcoxon sign rank test related to factors influencing co-innovation strategy in each stage followed by the determination of which factors are perceived to be most important and least important factors by respondents.

4.1 Demographic of Respondents.

The online questionnaire was distributed to SMEs in agri-food sector in Indonesia with 42 recorded responses, yet only 25 responses were usable for further analysis. The reason was some of respondents did not have experience working with partner. From 25 respondents, all had experiences working together with partners outside their organizations for an innovation project. The majority of respondents were male (56%), and the rest were female. Moreover, in term of ages, most respondents are 18-30 years old (48%) and 30-40 years old (40%) and the rest of the respondents are 40-50 years old (8%) or older (4%). Furthermore, the job position of the respondents who contributed in this study were the CEO/Owner (68%), followed by both managers and employees (16%). The summary of the respondents' demography is presented in Figure 3-5.

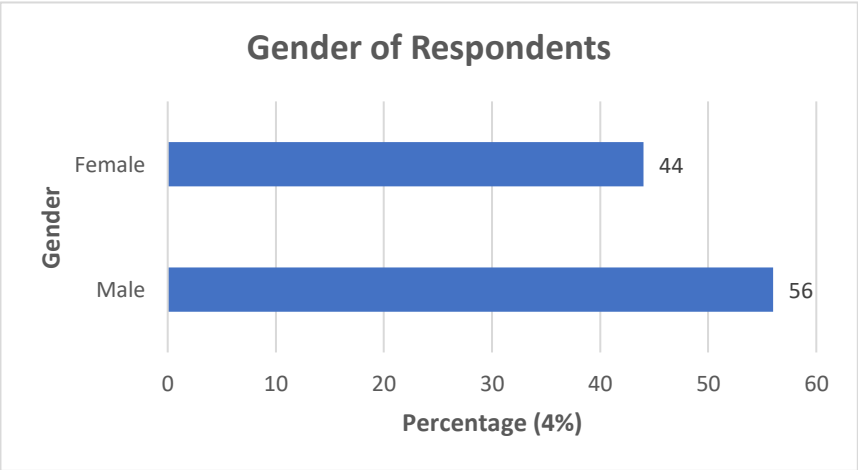

Figure 3. Summary of Gender of Respondents

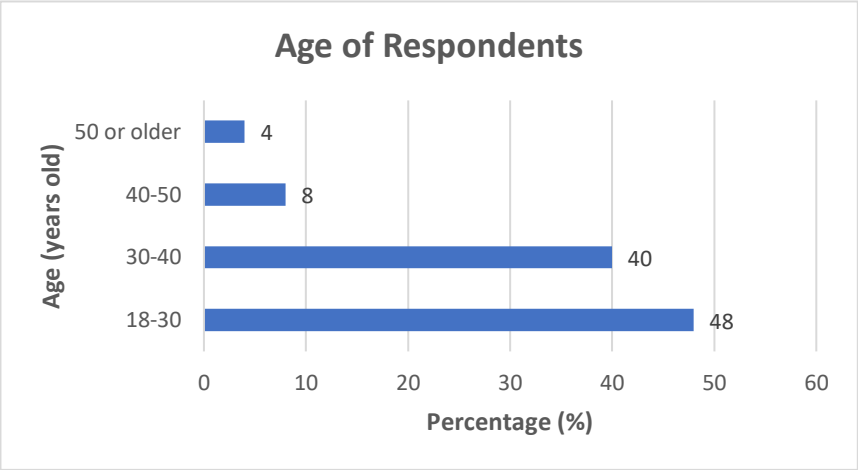

Figure 4. Summary of Age of Respondents

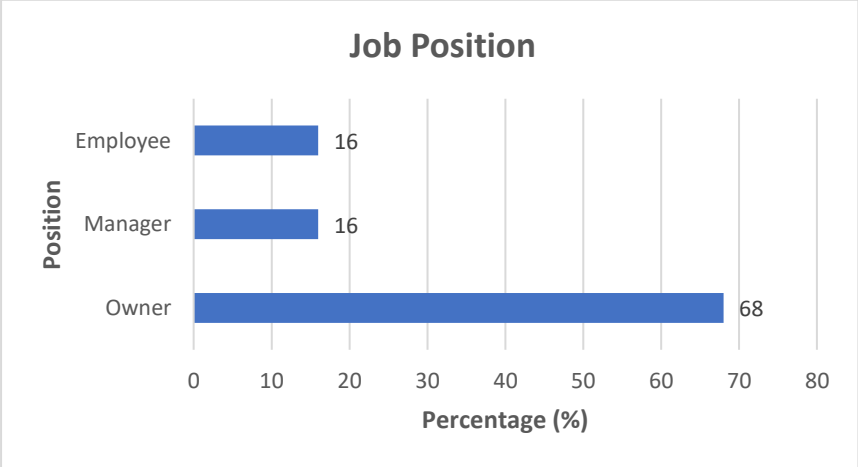

Figure 5. Summary of Job Position of Respondents

4.2 Wilcoxon Signed Rank Test Analysis and Hypothesis Testing

4.2.1 The Initiation Stage

In this stage, we tested the hypothesis 1a and 1b. Therefore, a Wilcoxon signed rank test is executed. First, we examined hypothesis 1a, which stated that there were no difference of variables rank in determining the purpose of conducting co-innovation strategy. The result of test statistics and descriptive statistics are listed in Table 6 and Table 7.

Table 6. Test Statistics Results for Hypothesis 1a.

Test Statistics[a]			
	Init2A - Init1A	Init3A - Init1A	Init3A - Init2A
Z	-3.966[b]	-2.348[b]	-2.712[c]
Asymp. Sig. (2-tailed)	0.000	0.019	0.007

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Table 7. Descriptive Statistics Results for Hypothesis 1a.

Descriptive Statistics								
Variable	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Init1A	25	2.64	0.569	1	3	2.00	3.00	3.00
Init2A	25	1.32	0.557	1	3	1.00	1.00	2.00
Init3A	25	2.04	0.735	1	3	1.50	2.00	3.00

Based on Table 6, all variables had a significant value of <0.05, thus hypothesis 1a was rejected. There was a significant difference in the ranks on those variables in determining the purpose of the co-innovation strategy. According to Table 7, the difference in the rank can be seen in the median result. The variable code Init2A was perceived by respondents as the most important, followed by Init3A, and the least important is Init1A. For hypothesis 1b, the result can be seen in Table 8 and 9. Table 8 showed that only one pair of variables has no significant difference (Init1B and Init2B), while the other paired variables has significant difference of value (<0.05), thus hypothesis 1b was also rejected. It means there were significantly different rank of variables in determining the needs for knowledge and resources from external partners. The difference in rank can also be seen in Table 9 by looking at the Median value. The variables Init1B and Init2B

were perceived as the most important variables and Init3B was perceived as the least important variable.

Table 8. Test Statistics Results for Hypothesis 1b.

Test Statistics[a]			
	Init2B - Init1B	Init3B - Init1B	Init3B - Init2B
Z	-.015[b]	-3.413[b]	-2.638[b]
Asymp. Sig. (2-tailed)	0.988	0.001	0.008

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Table 9. Descriptive Statistics Results for Hypothesis 1b

Descriptive Statistics								
						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Init1B	25	1.72	0.614	1	3	1.00	2.00	2.00
Init2B	25	1.72	0.792	1	3	1.00	2.00	2.00
Init3B	25	2.64	0.700	1	3	2.50	3.00	3.00

4.2.2 The Partner Selection Stage

Based on the statistic result, hypothesis 2 was also rejected. This can be seen on Table 10. Only two pairs of variables had a value greater than 0.05 (Part5-Part2 and Part4-Part3), while the other paired variable had significant value of <0.05, thus, there were significant difference rank on those variables in determining the criteria of selecting partner.

Table 10. Test Statistics Results for Hypothesis 2.

Test Statistics[a]										
	Part2 - Part1	Part3 - Part1	Part4 - Part1	Part5 - Part1	Part3 - Part2	Part4 - Part2	Part5 - Part2	Part4 - Part3	Part5 - Part3	Part5 - Part4
Z	-4.337[b]	-4.507[b]	-4.146[b]	-4.328[b]	-2.576[c]	-2.540[c]	-1.442[b]	-.450[b]	-3.573[b]	-2.418[b]
Asymp. Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.010	0.011	0.149	0.653	0.000	0.016

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.
c. Based on positive ranks.

As you can see in the median value on Table 11, Part1 is the most important variable followed by Part3 and Part4 on second priority, the third priority variable was Part2, and the least important variable was Part5, all regarded to criteria in selecting a partner.

Table 11. Descriptive Statistics Results for Hypothesis 2

Descriptive Statistics								
						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Part1	25	1.28	0.458	1	2	1.00	1.00	2.00
Part2	25	3.80	1.155	1	5	4.00	4.00	4.00
Part3	25	2.76	0.663	2	4	2.00	3.00	3.00
Part4	25	2.84	1.028	1	5	2.00	3.00	3.00
Part5	25	4.32	1.314	1	5	4.00	5.00	5.00

4.2.3 The Formalization Stage

In this section, we tested the hypothesis 3, which was also rejected. This result can be seen on Table 12. Based on the significant value, only two pairs of variables had a significant value greater than 0.05 (Form2-Form1 and Form4-Form3), while the other had a significant value less than 0.05, that is why hypothesis 3 was also rejected.

Table 12. Test Statistics Results for Hypothesis 3.

Test Statistics[a]										
	Form2 - Form1	Form3 - Form1	Form4 - Form1	Form5 - Form1	Form3 - Form2	Form4 - Form2	Form5 - Form2	Form4 - Form3	Form5 - Form3	Form5 - Form4
Z	-.378[b]	-3.936[b]	-4.044[b]	-3.113[b]	-3.806[b]	-4.222[b]	-2.766[b]	.000[c]	-2.339[d]	-3.099[d]
Asymp. Sig. (2-tailed)	0.705	0.000	0.000	0.002	0.000	0.000	0.006	1.000	0.019	0.002

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.
c. The sum of negative ranks equals the sum of positive ranks.
d. Based on positive ranks.

There was a significant difference in the ranks on those variables in determining the form of alliance in the co-innovation strategy. Table 13 shows the different rank of variables based on the median value. Form1 and Form2 were perceived by the

respondent as the most important variables, followed by Form 5. The least important variables were Form3 and Form4.

Table 13. Descriptive Statistics Result for Hypothesis 3

Descriptive Statistics								
						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Form1	25	1.80	0.866	1	4	1.00	2.00	2.00
Form2	25	1.88	0.833	1	4	1.00	2.00	2.00
Form3	25	4.12	1.166	1	5	4.00	4.00	5.00
Form4	25	4.16	0.898	2	5	4.00	4.00	5.00
Form5	25	3.04	1.136	1	5	3.00	3.00	3.50

4.2.4 The Implementation Stage

In this stage, hypothesis 4 was also rejected. This can be seen in Table 14, where only two pairs of variables had a significant value greater than 0.05 (Impl2-Impl1 and Impl6-Impl5). The other paired variables had significant value less than 0.05. Table 15 shows the difference in the rank of those variables based on the median value. Thus, there is a significant difference in determining the implementation activities of co-innovation strategy. Impl1 and Impl2 were perceived as the most important variable, followed by Impl4, Impl3, and Impl5. The least important variable was Impl6.

Table 14. Test Statistics Results for Hypothesis 4

Test Statistics[a]															
	Impl2 - Impl1	Impl3 - Impl1	Impl4 - Impl1	Impl5 - Impl1	Impl6 - Impl1	Impl3 - Impl2	Impl4 - Impl2	Impl5 - Impl2	Impl6 - Impl2	Impl4 - Impl3	Impl5 - Impl3	Impl6 - Impl3	Impl5 - Impl4	Impl6 - Impl4	Impl6 - Impl5
Z	-.711[b]	-3.890[b]	-2.507[b]	-3.977[b]	-4.380[b]	-4.436[b]	-3.236[b]	-4.175[b]	-4.493[b]	-2.060[c]	-1.935[b]	-4.276[b]	-3.485[b]	-4.439[b]	-2.437[b]
Asymp. Sig. (2-tailed)	0.477	0.000	0.012	0.000	0.000	0.000	0.001	0.000	0.000	0.039	0.053	0.000	0.000	0.000	0.015

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

c. Based on positive ranks.

Table 15. Descriptive Statistics Results for Hypothesis 4

Descriptive Statistics								
Variable	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Impl1	25	1.80	1.354	1	6	1.00	1.00	2.00
Impl2	25	1.84	0.688	1	4	1.00	2.00	2.00
Impl3	25	3.84	0.800	3	6	3.00	4.00	4.00
Impl4	25	3.08	1.077	1	5	2.50	3.00	4.00
Impl5	25	4.68	1.406	1	6	3.50	5.00	6.00
Impl6	25	5.60	0.500	5	6	5.00	6.00	6.00

4.2.5 The Evaluation Stage

In this section, we tested three hypotheses: hypothesis 5a, 5b, and 5c. First, we tested hypothesis 5a. Based on Table 16, only paired variables Eva3A-Eva1A had a significant value greater than 0.05, while the other two paired variables were less than 0.05, thus the hypothesis 5a was rejected. The different rank of these variables can be seen on Table 17 based on the median value. Eva2A was perceived as the most important variable while Eva1A and Eva3A were the least important in determining the success indicator of the partnership.

Table 16. Test Statistics Results for Hypothesis 5a

Test Statistics[a]			
	Eva2A - Eva1A	Eva3A - Eva1A	Eva3A - Eva2A
Z	-3.969[b]	-.187[b]	-3.273[c]
Asymp. Sig. (2-tailed)	0.000	0.852	0.001

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.
c. Based on negative ranks.

Table 17. Descriptive Statistic Results for Hypothesis 5a

Descriptive Statistics								
						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Eva1A	25	2.44	0.583	1	3	2.00	2.00	3.00
Eva2A	25	1.28	0.614	1	3	1.00	1.00	1.00
Eva3A	25	2.40	0.707	1	3	2.00	3.00	3.00

Hypothesis 5b was also rejected. Based on Table 18, all variables had significant value of less than 0.05. The difference in rank can be seen on Table 19 where Eva2B was perceived as the most important variable and Eva1B was the least important in determining possible future relationship with partner when the alliance succeeded.

Table 18. Test Statistics Result for Hypothesis 5b.

Test Statistics[a]	
	Eva2B - Eva1B
Z	-3.000[b]
Asymp. Sig. (2-tailed)	0.003

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

Table 19. Descriptive Statistics Results for Hypothesis 5b.

Descriptive Statistics								
						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Eva1B	25	1.80	0.408	1	2	2.00	2.00	2.00
Eva2B	25	1.20	0.408	1	2	1.00	1.00	1.00

Moreover, hypothesis 5c was also rejected. Based on Table 19, all variables had significant values of less than 0.05. The difference in rank can be seen on Table 20 where Eva1C was perceived as the most important variable and Eva2C was the least important in determining possible future relationship with partner when the alliance failed.

Table 20. Test Statistics Results for Hypothesis 5c.

Test Statistics[a]	
	Eva2C - Eva1C
Z	-2.600[b]
Asymp. Sig. (2-tailed)	0.009

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Table 21. Descriptive Statistics Results for Hypothesis 5c.

Descriptive Statistics								
						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Eva1C	25	1.24	0.436	1	2	1.00	1.00	1.50
Eva2C	25	1.76	0.436	1	2	1.50	2.00	2.00

Chapter 5

Discussion

The objective of this study is to investigate factors influencing the co-innovation strategy in each stage, the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage. All of the variables in each stage of co-innovation strategy in section 3.2.1 were extracted from general literature covering issues related to co-innovation strategy. The findings show that all hypotheses developed in section 2.5 were rejected, indicating that there were difference rank on those variables in each stage of co-innovation strategy. From given variables, result from the respondents stated that some variables were perceived as the most important, while some were perceived less important in each stage of co-innovation strategy.

5.1 The Initiation Stage.

In determining the purpose of co-innovation strategy, the result showed that gaining access to new market was perceived as the most important factor, followed by reducing risk and failure in the innovation process, while the least important is getting access to technological capability. The possible reason is that organizations in developing countries generally form marketing alliance as one of the strategies in increasing the sale of their product (Lee et al., 2013). Moreover, Lee et al (2010) stated that SMEs are good at inventions but lack the necessary resources for commercialization. Similarly, Hemert et al (2013) confirmed that collaboration for SMEs was more important in the commercialization stage than in the early stages of innovation. In contrast, getting access to technological capability was perceived as the least important factor. After detecting external technology resources, the organization should be able to assimilate and integrate with their internal knowledge and technology. The plausible reason for this was that SMEs did not have the same in-house capabilities to detect, assimilate, and integrate external technology due to lack of skilled workers and internal knowledge (Spithoven et al., 2013). However, SMEs in Indonesia have already understood that by conducting co-innovation strategy they can reduce the risk and failure in the innovation process. During the development of new product or commercialization, collaboration is important to reduce the cost and the risk of innovation process (Hemert et al., 2013).

In terms of how to determine the needs for knowledge and resources from external partners, the result showed that having discussions with colleagues and avoiding

conflicts or disagreements among members of the organization were the most important factors. The reason behind this is that internal alignment within the organization is essential for the success of partnership (Tepic et al., 2013). Moreover, such partnership often involves employees and managers, all of which must thoroughly understand and be committed to the objectives and terms of the partnership (Sloweinski and Sagal, 2010). If the specific need for collaboration is deemed insufficient, then adequate resources may not be allocated and the collaboration activities may struggle to get off the ground (Tolhurs and Brown, 2013). In contrast, determining specific needs by getting information from research team only was perceived as the least important factor. The possible reason could be that SMEs in Indonesia had already realized that innovation based on self-reliance on R&D was simply too slow and costly (Lee et al., 2012). In addition, according to Acosta and Ferrandiz (2013), organization should not only rely on R&D but should also interact with other actors.

5.2 The Partner Selection Stage.

In the partner selection stage, the result showed that selecting a partner with complementary resources was perceived as the most important partner selection criterion. Murray and Kotabe (2005) suggested that organization should choose a partner with complementary resources. For SMEs, Hoffmann and Scholsser (2001) emphasized that looking for complementary or required resources was a crucial factor.

The second important factor was the selection of a partner who has similar culture and objective goals. This is related to cultural fit and strategic fit between the organization and partner. Similar cultural background is helpful to avoid difficulties in the collaboration process (Sarkar et al., 2001). Moreover, in the SME context, the degree of cultural compatibility between the organization and partner was also an important variable in determining the success or failure of an alliance (Swoboda et al., 2011). Additionally, strategy fit between alliance partners exists when the objectives of the alliance partners match, which implies a shared vision and a compatibility of strategies (Stel, 2011). Hence, a strategic fit can reduce the likelihood that the partners may act opportunistically in the partnership (Tepic et al., 2013).

The third most important factor was partner's reputation. Before allying with a partner, the organization should also make clear whether this partner has a reputation for dealing fairly and performing well (Das and Teng, 2001). Firms that are more established with longer track records may more likely be involved in an alliance (Adams and Goldsmith, 1999). Saxton (1997) found that perception of initial and overall relationship satisfaction increased with higher partner reputation on management quality. By contrast, partners with bad reputation are likely to behave opportunistically and be difficult to work with (Jian et al., 2008).

Partner trust and commitment were perceived as the least important factor in partner selecting criteria. Das and Teng (2001) found that trust and commitment of partners were key factors which helped minimize uncertainties and reduced the threat of opportunism in collaboration process. The possible reason why trust and commitment were perceived as the least important factor could be related to partner reputation, because partner reputation was also an important source of mutual trust and committed during the collaboration process (Jian et al., 2008; Adams and Goldsmith, 1999). That was why partner trust and commitment were the least important factor; because trust and commitment could also be achieved by selecting a partner with a good reputation.

5.3 The Formalization Stage.

Based on the results, using a contract and creating detailed contract in the formalization stage were perceived as the most important factors to make sure the description of the task was clear and agreed upon by everybody and can also be a safeguard for knowledge sharing activities. This was related to contractual management. According to Tepic et al (2013), the organization might use a contract to describe the mutual rights and obligations, such as each contribution to the partnerships or the organizational processes necessary to solve problems and divide the expected outcomes of the alliance. In addition, contracts could be used to decrease opportunistic behavior by the contract partners, which affect the performance of alliances (Dekker, 2004).

The second most important factor in the formalization stage was trust. This was related to relational governance. Kale and Sing (2009) argued that relational governance could reduce the transaction cost in partnership because the organizations trust their partners to behave fairly, and monitoring costs could be lower because it would not be required. Furthermore, trust could counteract fear of opportunistic behavior (Gulati, 1995). Lack

of trust in the future behavior between partners could lead to the failure of the alliance project and result in increased transaction costs (Hoffmann and Scholsser, 2001). Since contractual governance and relational governance were perceived as the two most important factors in this stage, we concluded that contractual governance and relational governance complemented each other. This was in line with the study from Poppo and Zenger (2002) which confirmed that contractual governance and relational governance could act as complementary mechanism in the success of an alliance. Moreover, Solitander and Tidstrom (2010) also stated that the presence of both contractual and relational governance could increase the alliance performance.

The least important factors in this stage were performing complex contract, which could reduce trust in partnership, and the use of intellectual property right. The plausible reason for this was that SMEs in Indonesia might already understand the need of detailed contract which could give clear description of the tasks and could be a safeguard for knowledge sharing activity. They might also perceived complex contract as an important element in determining mutual rights and obligations of the organizations, as long as the negotiated terms are acceptable to both parties (Slowinski and Sagal, 2010; Tepic et al., 2013). However, if the contract became excessively detailed with legal procedure and the terms were not acceptable by both organization and partners, the alliance would have a mojor pitfall (Jagersma, 2005). Another factor was intellectual property right (IPR). There were two reasons why this was also perceived as the least important factor in the formalization stage. First, since SMEs usually lack financial resources, they are not able to use the IPR from outside of the organization since it is too expensive (Burrone, 2005). Second, Libo (2015) found that due to the scale of SME and their resource constraints, most enterprises do not divide IPR management work since it also required human resources who are knowledgeable about the legal procedure of IPR. The lack of professional ability and organizational capability could severely limits the enterprise's intellectual property management level (Libo, 2015).

5.4 The Implementation Stage.

According to the analysis, the creation of a joint team between the organization and partners and the existence of trust within the team members were perceived as two of the most importance factors in the implementation stage. According to Salas et al. (2008), creating a project team could help the organization to have a clear set of task

work and team work with partners. In addition, Scarbrough (2003) also confirm that inter-organizational project teams were essential for collaboration and innovation. Moreover, project teams operated as units separated from the parent organization, which allowed them to focus on the project without any work interruption (Larson and Gray, 2011). Trust amongst team members is also important in this stage (Tepic et al., 2013). Trust not only enables them to share valuable expertise with their alliance partner, but also protects them against opportunistic behavior by the partner (Kale et al., 2000). Moreover, trust within team members can also lower the possibility of inter-partner conflict (Das and Teng, 1999).

The second most important factor was developing a clear guideline. Kale and Singh (2009) confirmed that developing a clear guideline on what specific tasks needed to be carried out by each partner and who would be accountable for each task could improve the clarity and predictability of the other partner's actions, reduce frustration, and increase decision making speed. Furthermore, a clear guideline with a timetable could be the basis for implementing the alliance in a goal oriented and controlled manner (Hoffmann and Scholsser 2001).

Choosing a leadership in team project was perceived by the respondents as the next important factor in the implementation stage. Kale and Singh, (2009) stated that the team leader could facilitate the decision-making process and be a mediator for conflict within team members. Therefore, the determination of role and structure (e.g. project leader) in project team was also important to assist in overcoming difficulties in the collaboration process (Nissen et al., 2014).

The next important factor is conducting more frequent meetings. Conducting several meetings enables employees to meet with each other and develop relationships (Dyer *et al.*, 2001). Furthermore, these meetings could serve as a mechanism for team members to obtain a clear and consistent insight into the objectives of the partnership and how the terms of the agreement should guide their actions (Slowinski and Sagal, 2010). Similar with the study developed by Tepic et al (2013), these activities are important for the building of trust and can help stimulate openness.

The least important factor in this stage was the involvement of top management. Steensma and Lyles (2000) concluded that direct personal involvement of senior management facilitated learning process in collaboration. Furthermore, management

plays a role in managing and solving conflicts or problems in co-innovation alliance, which, when undertaken wisely, may lead to more learning within the alliance (Kale et al., 2000). The plausible reason why the involvement of top management perceived as the least important factor might be related to the counter-productive effect. Excessive involvement by top managers may lead to over dependency on management and less flexibility and motivation on the part of the co-innovation team members (Stel, 2011). Bonner et al (2002) concluded that management intervention during the innovation process had a negative impact on project performance. Figure 6 showed the effect of management involvement to the performance of co-innovation strategy developed by Stel (2011).

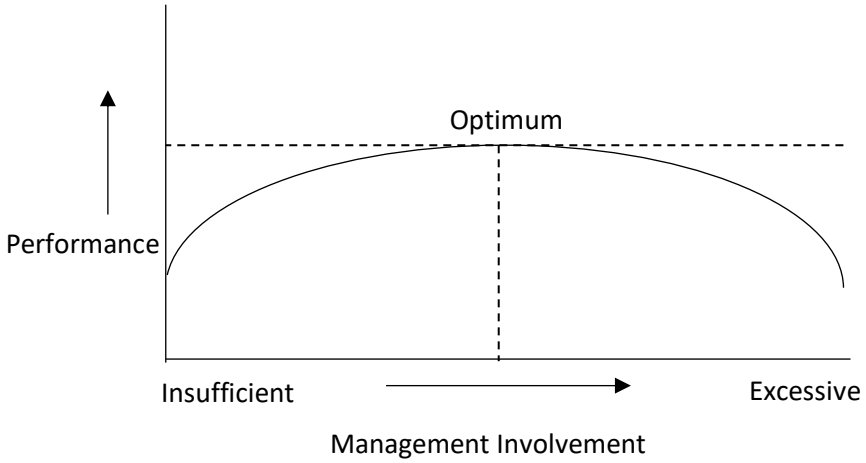

Figure 6. The Effect of Management Involvement to Co-Innovation Performance (Stel, 2011)

5.5 The Evaluation Stage.

Based on the literature review, harmonization in the interaction between the organization and partners fell into the category of process control. On the other hand, on-time outcome and financial measures fell into the category of output control. The result showed that harmonizing the interaction between the organization and partners was perceived by respondents as the most important factor for success indicator in a partnership. Whereas on-time outcome and financial measures were perceived by the respondents as the least important factors for success indicator. This is in line with the study done by Nakos and Brouthers (2008). They suggested that harmonization in alliance were better than financial and market indicators in evaluating the alliance performance. Harmonization in partnerships could increase mutual understanding and

bread mutual trust (Das and Teng, 2001). They might therefore enjoy a harmonious and stable relationship for the achievement of the joint objectives (Jiang et al., 2008). By contrast, Yan and Gray (2001) stated that financial indicator was quite meaningless as a measure of performance, at least in the short run. Additionally, output control was usually demotivational because of various potential environmental uncertainties where partners were held responsible for factors outside their control (Celly and Frazier, 1996). Jiang et al (2008) also confirmed that if the organization adopted solely in output control it would have negative impact on the alliance due to these environmental uncertainties.

In terms of possible future relationship of the alliance, the result of the statistic showed that whether the alliance is a success or a failure, the respondents decided to continue the partnerships with the current partners. The plausible reason for this could be related to prior alliance. Prior alliance is a positive predictor of future relationship stability because it provides a wide range of advantages and benefits for the partners (Richard and Yang, 2007). Firstly, through learning from the success and failure of prior relationships, firms can accumulate substantial experience and lessons on how to avoid past mistakes, how to manage partner relationships, and how to reduce risks in the future (Killing, 1983). Secondly, experiences derived from repeated ties provide information about each other's cultures, systems, structures, and strategies, facilitating effective communication and mutual understanding (Saxton, 1997). Thirdly, repeated ties can engender close bonds and enhance mutual trust among partners which can discourage opportunism and reduce transaction cost (Richard and Yang, 2007). Another possible reason is that searching for potential partners again can be costly given the various expenses associated with the search (Arrow, 1974). This was also confirmed by Deeds et al (1999) and Reuer and Arino (2004), who stated that small businesses in particular were often costly and might have adversely affect the organization because they spend more resource to locate a new partner. In addition, it requires extensive effort and time to build up a general understanding of all the norms, habits, and routines of the partners (Saguy and Sirotinskaya, 2014). Therefore, the organizations may decide to continue the relationship with the current partner regardless of the outcome of the partnership.

Chapter 6

Limitation and Conclusion

6.1 Limitations and suggestion for further research.

Although this research has offered an additional evidence about factors influencing co-innovation strategy in agri-food sector in developing countries, it has some limitations that are needed to be tackled in the future research. The first limitation arose from the sample size, which was not sufficient to represent the result of statistic analysis. The relatively small sample size (25 respondents) was too small to obtain a significant result. Hair et al (2006) stated that by increasing the sample size, the effect could be more statistically significant. Therefore, future research should enhance their sample sizes in order to be able to give significant analysis results.

The second limitation was that the research results cannot be statistically generalized to comparable cases. Therefore, future research should undertake a longitudinal research in which traces each stage of the co-innovation strategy in their natural field-settings from beginning to end. Longitudinal study can show changes in attitudes/ behaviors of both organization and partners during the co-innovation strategy and can therefore obtain more valid results.

Additionally, throughout the finding of this study, there have been other several implications made for future research. There may be other variables to be included in further research. Firstly, the role of partner has a similar power in the decision-making process with the SMEs in the collaboration process. Therefore, in future research, by engaging the role of partners in the co-innovation strategy analysis, it is also important to get more insight about how the organization and partners interact with each other. Secondly, the role of government in the co-innovation strategy is also important. According to Kim et al (2016) programs supporting innovations from the government, such as tax incentives, finance, technology development, human resources, purchasing, and law, are considered an important factor in innovation performance. Therefore, involving government programs might help SMEs feel convenient in conducting co-innovation strategy with partners and increasing the innovation activity.

6.2 Conclusion

This study has researched the factors influencing the co-innovation strategy for SMEs in agri-food sector, with a study case in developing country, Indonesia. The conceptual framework of this research was built from theoretical foundation of co-innovation strategy in developed country. The framework identified the factors that can influence the co-innovation strategy in each stage of the collaboration (the initiation stage, the partner selection stage, the formalization stage, the implementation stage, and the evaluation stage). In this research, we use SMEs in agri-food sector in Indonesia, since most of them are engaged in food sector and this type of SMEs organization has become the most studied object in terms of collaboration to increase the production of activities in innovation.

Statistical analysis was conducted to test the hypotheses using Wilcoxon signed rank test. The Wilcoxon signed rank test was done to examine which factors in each stage of co-innovation strategy greatly affected the success of the co-innovation strategy. In the initiation stage, the major findings revealed that the purpose of co-innovation strategy for SMEs was to get access to new market. This was important since collaboration for SMEs was more important in the commercialization stage than in the early stages of innovation. In contrast, getting access to technological capability was perceived as the least important factor. This was because SMEs still lacked skilled workers, equipment, and knowledge to integrate the external technology. Moreover, another finding revealed that SMEs were already aware of the importance of discussions with other colleagues and avoiding conflict or disagreement among members of the organization to determine the specific needs for knowledge and resources from external partners. In other words, internal alignment within the organization was essential for the success of partnership.

In the partner selection stage, selecting a partner with complementary resources was perceived as the most important factors for partner selecting criteria, followed by the importance of having similar culture and similar objective goal with partners. Moreover, partner reputation and partner trust and commitment were the next important factors in the partner selection stage. Partner reputation was an important source of mutual trust and commitment.

Meanwhile, in the formalization stage, SMEs still believed that using a detailed contract and performing trust with partners were the important factors. Trust and contract were complementary mechanisms which could increase the alliance performance. They

might also perceived that complex contract was also important in determining their mutual rights and obligations, as long as the negotiated were acceptable to both parties. In contrast, using intellectual property right was perceived as the least important factor. Since SMEs had minimum source of finance, they were not able to use the IPR outside of the organization since it would be too expensive to use.

In the implementation stage, creating a project team and trust within team member were perceived as the most important factors. After creating the team, developing a clear guideline and choosing a leadership in team project were the next factors to be implemented in this stage. Moreover, conducting more frequent meetings was perceived to be the next important factor, since these activities could build trust among team member. The involvement of top management was perceived as the least important factors. Direct personal involvement of senior management could facilitate learning process in collaboration. However, excessive involvement by top managers might lead to too much dependency on management and less flexibility and motivation on the part of the co-innovation team. This might be the reason why the involvement of top management was perceived as the least important factor.

In the evaluation stage, harmonization in interaction between the organization and partner was perceived as the most important factor, while on-time outcome and financial measures were perceived to be the least important factors. This is due to on-time outcome and financial measures having potential environmental uncertainties where partners could not be held responsible for factors they cannot control. In terms of possible future relationship of the alliance, the statistic result showed that whether the alliance was successful or failed, the respondents decided to continue their partnerships with the current partners. The reasons behind this might be related to prior alliance and cost. First of all, through learning from the success and failure of prior relationships, firms accumulated substantial experience and lessons on how to avoid past mistakes, manage partner relationships and reduce risks in the future. Secondly, searching for potential partners again can be costly given the various expenses associated with the previous search.

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Appendix:

A.1 **Questionnaire**

Introduction:

Welcome to the Co-innovation survey in small and medium enterprises (SMEs).

Co-innovation is defined as a process of exchange or combination of resources by means of sharing complementary resources, knowledge, and competencies with external innovation partners. Opting for co-innovation approach represents an opportunity for an organization to increase its competitive advantage and trigger its innovation process. This process happens through specific subsequent stages defined as: initiation, partner selection, formalization, implementation, and evaluation.

The aim of this survey is to study what factors are perceived as more relevant per each stage of the co-innovation strategy adopted by SMEs in the agri-food sector in West Java, Indonesia. The specific target of this survey is represented by employees and owners of selected SMEs: the survey intends to detect what is more relevant - in their personal experience - per each stage of the co-innovation strategy.

As employees or owners of the selected SMEs, we would like to thank you for taking part to this study and supporting us in this research.

The survey will take 15 minutes of your time and your participation is entirely anonymous and voluntary. Data from this research will be reported only in aggregate form and made available once the research is finished.

This research is led by Mr. Iman Indrajaya Widigdo, Msc. under the supervision of Dr. Valentina Materia and Dr. Gerben van der Velde from Wageningen University and Research, the Netherlands. If you have any question regarding this survey, or if you would like to add your comments or remarks, please contact the researchers:

Mr. Iman Indrajaya : 0620994760

Dr. Valentina Materia : valentina.materia@wur.nl

Thank you for your time and support. Please start the survey by clicking on the Continue button below

GENERAL INFORMATION

1. What is your gender?
    - Male
    - Female
2. What is your age?
    - 17 or younger
    - 18-30
    - 30-40
    - 40-50
    - 50 or older
3. What is your position in the organization?
    - CEO
    - Manager
    - Staff
4. What is the total number of permanent employees in your organization?
    - Less than 10
    - 10 – 49
    - 50 – 99
    - >100
5. For how long have you been working in this organization?
    - 1 year or shorter
    - 2-4 years
    - 5 years or longer
6. Do you have any experience working together with partners outside your organization for an innovation project?
    - Yes
    - No

Stages of the co-innovation approach: relevant factors influencing them

1. The Initiation Stage

The initiation stage is the first step in the co-innovation strategy. In this stage, the organization needs to make clear what the aim is of a collaboration with external partners, what it intends to achieve that cannot be obtained internally. Therefore, the organization has to determine what resources or knowledge are needed from external partners to improve its competitive advantages.

Based on your personal experience, please assign a score from 1 (the most important) to 3 (the least important) to the following items which describe the purpose of your organization to adopt a co-innovation strategy.

The purpose of co-innovation is to access partner's technological capability.

The purpose of co-innovation is to gain access to new markets.

The purpose of co-innovation is to reduce risk and failure in the innovation process.

Based on your personal experience, please assign a score from 1 (the most important) to 3 (the least important) on the following items which indicate how you perceive that the determination of needs for knowledge and resources from external partners should be done.

Determining the need of specific knowledge or resources from other organization could be done by discussing with colleagues within my organization.

Determining the need of specific knowledge or resources from other organization could be done if there is no internal conflict or disagreement among members of my organization.

Determining the need of specific knowledge or resources from other organization could be done by getting information from research the department only.

2. The Partner Selection Stage

The partner selection stage has been described as one of the most crucial factors of partnership success. Potential partners in this context are considered supply chain actors, such as suppliers and customers, but also competitors or knowledge institutions, such as universities and research centers.

Based on your personal experience, please assign a score from 1 (the most important) to 5 (the least important) on the following items which indicate what criteria are more relevant for you when selecting partners to involve in a co-innovation strategy.

Selecting a partner that has complementary resources.

Selecting a partner that has a good reputation.

Selecting a partner that has similar culture and value to my organization.

Selecting a partner that has similar objective goal for collaboration process.

Selecting a partner that has commitment and trust from top to bottom levels of the organization.

3. The Formalization Stage

The important task to be accomplished in the formalization stage is to specify what form the alliance should adopt, such as contractual clauses that bind the partners. Several aspects must be carefully planned, negotiated and captured in a partnership agreement to avoid misunderstandings between the organization and third parties.

Based on your personal experience, please assign a score from 1 (the most important) to 5 (the least important) on the following items which indicate what criteria might be relevant for you in the formalization stage to determine the form of alliance should be adopt in co-innovation strategy.

Using a contract makes sure that the description of the tasks to perform jointly within the partnership is clear and agreed upon by everybody.

Detailed contracts can be a safeguard for sharing knowledge activities.

A complex contracts can reduce trust in partnership.

Using intellectual property rights should make the collaboration process more open.

Trust can reduce the need for contract and monitoring in collaboration process.

4. The Implementation Stage

In the implementation stage, the organization and the partners implement all the agreements on the partnerships taken during the formalization stage. The actual collaboration between employee form the organization and partners begins in this stage.

Based on your personal experience, please assign a score from 1 (the most important) to 6 (the least important) on the following items indicating your perception on the factors which are mostly relevant in implementation stage of a co-innovation strategy.

Creating a team project between firm and partners, makes the collaboration process more efficient.

Trust within the team members is also important to ensure the stability of the collaboration process.

Choosing a leader in team project can facilitate the decisions making process in partnership.

Developing a clear guideline on what specific tasks need to be carried out by each member enables a more efficient collaboration.

Conducting more frequent meeting enables the development of interpersonal trust.

Involvement of top management can help the employees to deal with new working routines in collaboration with employee from different partners.

5. The Evaluation Stage

The evaluation stage plays an important role in the continuation and the future shape of the partnership. First, both organization and partners should determine what the indicators of success of the partnership are. After the evaluation in fact, the organization have to decide on the future of the partnership. The options in this sense are: stabilization, reformation and termination of the partnership. When the alliance is operating successfully,

the organization may try to maintain the collaborative relationship and invest more resources to retain its added value in the future (stabilization). Unsatisfactory outcomes require the organization to carefully assess the origins of the discontent and attempt to make the necessary adjustments (reformation). When the organization fail to make these adjustments, the partnership is likely to be terminated (termination).

Based on your personal experience, please assign a score from 1 (the most important) to 3 (the least important) on the following items which describe possible success indicators in a partnership.

Financial measures, such as profit/return of investment (ROI), can be indicators to evaluate the performance of partnership.

Harmonization in interactions between my organization and partners can be an indicator to evaluate the performance of partnership.

On time outcome from a collaboration process can be an indicator to evaluate the performance of partnership.

Based on your personal experience, please assign a score from 1 (the most important) to 2 (the least important) on the following items about what are the possible future relationship with partners when the alliance is success.

If the partnership is successful, the organization decides to terminate the relationship and move to a new project to gain new sources of knowledge with a new partner.

If the partnership is successful, the organization decide to continue the relationship with the current partners and starts with a new project.

Based on your personal experience, please assign a score from 1 (the most important) to 2 (the least important) on the following items about what are the possible future relationship with partners when the alliance is fails.

If the partnership fails, the organization decides to make an adjustment in agreements and gives a second chance to it.

If the partnership fails, the organization decides to terminate the partnership and starts looking for a new partner.

A.2 Wilcoxon Signed Rank Test

- The Initiation Stage

Ranks				
		N	Mean Rank	Sum of Ranks
Init2A - Init1A	Negative Ranks	24[a]	12.73	305.50
	Positive Ranks	1[b]	19.50	19.50
	Ties	0[c]		
	Total	25		
Init3A - Init1A	Negative Ranks	17[d]	14.41	245.00
	Positive Ranks	8[e]	10.00	80.00
	Ties	0[f]		
	Total	25		
Init3A - Init2A	Negative Ranks	7[g]	9.50	66.50
	Positive Ranks	18[h]	14.36	258.50
	Ties	0[i]		
	Total	25		

a. Init2A < Init1A
b. Init2A > Init1A
c. Init2A = Init1A
d. Init3A < Init1A
e. Init3A > Init1A
f. Init3A = Init1A
g. Init3A < Init2A
h. Init3A > Init2A
i. Init3A = Init2A

Ranks				
		N	Mean Rank	Sum of Ranks
Init2B - Init1B	Negative Ranks	13[a]	12.46	162.00
	Positive Ranks	12[b]	13.58	163.00
	Ties	0[c]		
	Total	25		
Init3B - Init1B	Negative Ranks	4[d]	9.00	36.00
	Positive Ranks	20[e]	13.20	264.00
	Ties	1[f]		
	Total	25		
Init3B - Init2B	Negative Ranks	5[g]	13.50	67.50
	Positive Ranks	20[h]	12.88	257.50
	Ties	0[i]		
	Total	25		

a. Init2B < Init1B
b. Init2B > Init1B
c. Init2B = Init1B
d. Init3B < Init1B
e. Init3B > Init1B
f. Init3B = Init1B
g. Init3B < Init2B
h. Init3B > Init2B
i. Init3B = Init2B

The Partner Selection Stage

Ranks				
		N	Mean Rank	Sum of Ranks
Part2 - Part1	Negative Ranks	3[a]	2.50	7.50
	Positive Ranks	22[b]	14.43	317.50
	Ties	0[c]		
	Total	25		
Part3 - Part1	Negative Ranks	0[d]	0.00	0.00
	Positive Ranks	25[e]	13.00	325.00
	Ties	0[f]		
	Total	25		
Part4 - Part1	Negative Ranks	2[g]	6.00	12.00
	Positive Ranks	23[h]	13.61	313.00
	Ties	0[i]		
	Total	25		
Part5 - Part1	Negative Ranks	2[j]	2.50	5.00
	Positive Ranks	23[k]	13.91	320.00
	Ties	0[l]		
	Total	25		
Part3 - Part2	Negative Ranks	21[m]	12.21	256.50
	Positive Ranks	4[n]	17.13	68.50
	Ties	0[o]		
	Total	25		
Part4 - Part2	Negative Ranks	20[p]	12.75	255.00
	Positive Ranks	5[q]	14.00	70.00
	Ties	0[r]		
	Total	25		
Part5 - Part2	Negative Ranks	7[s]	15.86	111.00
	Positive Ranks	18[t]	11.89	214.00
	Ties	0[u]		
	Total	25		
Part4 - Part3	Negative Ranks	11[v]	13.36	147.00

	Positive Ranks	14[w]	12.71	178.00
	Ties	0[x]		
	Total	25		
Part5 - Part3	Negative Ranks	4[y]	8.00	32.00
	Positive Ranks	21[z]	13.95	293.00
	Ties	0[aa]		
	Total	25		
Part5 - Part4	Negative Ranks	4[ab]	18.50	74.00
	Positive Ranks	21[ac]	11.95	251.00
	Ties	0[ad]		
	Total	25		

a. Part2 < Part1
b. Part2 > Part1
c. Part2 = Part1
d. Part3 < Part1
e. Part3 > Part1
f. Part3 = Part1
g. Part4 < Part1
h. Part4 > Part1
i. Part4 = Part1
j. Part5 < Part1
k. Part5 > Part1
l. Part5 = Part1
m. Part3 < Part2
n. Part3 > Part2
o. Part3 = Part2
p. Part4 < Part2
q. Part4 > Part2
r. Part4 = Part2
s. Part5 < Part2
t. Part5 > Part2
u. Part5 = Part2
v. Part4 < Part3
w. Part4 > Part3
x. Part4 = Part3
y. Part5 < Part3
z. Part5 > Part3
aa. Part5 = Part3
ab. Part5 < Part4
ac. Part5 > Part4
ad. Part5 = Part4

The Formalization Stage

Ranks				
		N	Mean Rank	Sum of Ranks
Form2 - Form1	Negative Ranks	12[a]	12.50	150.00
	Positive Ranks	13[b]	13.46	175.00
	Ties	0[c]		
	Total	25		
Form3 - Form1	Negative Ranks	2[d]	9.00	18.00
	Positive Ranks	23[e]	13.35	307.00
	Ties	0[f]		
	Total	25		
Form4 - Form1	Negative Ranks	2[g]	7.00	14.00
	Positive Ranks	23[h]	13.52	311.00
	Ties	0[i]		
	Total	25		
Form5 - Form1	Negative Ranks	4[j]	12.25	49.00
	Positive Ranks	21[k]	13.14	276.00
	Ties	0[l]		
	Total	25		
Form3 - Form2	Negative Ranks	2[m]	12.00	24.00
	Positive Ranks	23[n]	13.09	301.00
	Ties	0[o]		
	Total	25		
Form4 - Form2	Negative Ranks	2[p]	3.50	7.00
	Positive Ranks	23[q]	13.83	318.00
	Ties	0[r]		
	Total	25		

Form5 - Form2	Negative Ranks	5[s]	12.30	61.50
	Positive Ranks	20[t]	13.18	263.50
	Ties	0[u]		
	Total	25		
Form4 - Form3	Negative Ranks	12[v]	13.54	162.50
	Positive Ranks	13[w]	12.50	162.50
	Ties	0[x]		
	Total	25		
Form5 - Form3	Negative Ranks	20[y]	12.40	248.00
	Positive Ranks	5[z]	15.40	77.00
	Ties	0[aa]		
	Total	25		
Form5 - Form4	Negative Ranks	20[ab]	13.78	275.50
	Positive Ranks	5[ac]	9.90	49.50
	Ties	0[ad]		
	Total	25		

a. Form2 < Form1
b. Form2 > Form1
c. Form2 = Form1
d. Form3 < Form1
e. Form3 > Form1
f. Form3 = Form1
g. Form4 < Form1
h. Form4 > Form1
i. Form4 = Form1
j. Form5 < Form1
k. Form5 > Form1
l. Form5 = Form1
m. Form3 < Form2
n. Form3 > Form2
o. Form3 = Form2
p. Form4 < Form2
q. Form4 > Form2
r. Form4 = Form2
s. Form5 < Form2

t. Form5 > Form2
u. Form5 = Form2
v. Form4 < Form3
w. Form4 > Form3
x. Form4 = Form3
y. Form5 < Form3
z. Form5 > Form3
aa. Form5 = Form3
ab. Form5 < Form4
ac. Form5 > Form4
ad. Form5 = Form4

- The Implementation Stage

Ranks				
		N	Mean Rank	Sum of Ranks
Impl2 - Impl1	Negative Ranks	9[a]	15.33	138.00
	Positive Ranks	16[b]	11.69	187.00
	Ties	0[c]		
	Total	25		
Impl3 - Impl1	Negative Ranks	2[d]	10.00	20.00
	Positive Ranks	23[e]	13.26	305.00
	Ties	0[f]		
	Total	25		
Impl4 - Impl1	Negative Ranks	4[g]	17.63	70.50
	Positive Ranks	21[h]	12.12	254.50
	Ties	0[i]		
	Total	25		
Impl5 - Impl1	Negative Ranks	4[j]	3.25	13.00
	Positive Ranks	20[k]	14.35	287.00
	Ties	1[l]		
	Total	25		
Impl6 - Impl1	Negative Ranks	1[m]	1.50	1.50
	Positive Ranks	24[n]	13.48	323.50

	Ties	0[o]		
	Total	25		
Impl3 - Impl2	Negative Ranks	0[p]	0.00	0.00
	Positive Ranks	25[q]	13.00	325.00
	Ties	0[r]		
	Total	25		
Impl4 - Impl2	Negative Ranks	4[s]	9.63	38.50
	Positive Ranks	20[t]	13.08	261.50
	Ties	1[u]		
	Total	25		
Impl5 - Impl2	Negative Ranks	2[v]	4.25	8.50
	Positive Ranks	23[w]	13.76	316.50
	Ties	0[x]		
	Total	25		
Impl6 - Impl2	Negative Ranks	0[y]	0.00	0.00
	Positive Ranks	25[z]	13.00	325.00
	Ties	0[aa]		
	Total	25		
Impl4 - Impl3	Negative Ranks	16[ab]	14.69	235.00
	Positive Ranks	9[ac]	10.00	90.00
	Ties	0[ad]		
	Total	25		
Impl5 - Impl3	Negative Ranks	6[ae]	15.33	92.00
	Positive Ranks	19[af]	12.26	233.00
	Ties	0[ag]		
	Total	25		
Impl6 - Impl3	Negative Ranks	1[ah]	6.00	6.00
	Positive Ranks	24[ai]	13.29	319.00
	Ties	0[aj]		
	Total	25		
	Negative Ranks	2[ak]	17.25	34.50

Impl5 - Impl4	Positive Ranks	23[al]	12.63	290.50
	Ties	0[am]		
	Total	25		
Impl6 - Impl4	Negative Ranks	0[an]	0.00	0.00
	Positive Ranks	25[ao]	13.00	325.00
	Ties	0[ap]		
	Total	25		
Impl6 - Impl5	Negative Ranks	8[aq]	9.50	76.00
	Positive Ranks	17[ar]	14.65	249.00
	Ties	0[as]		
	Total	25		

a. Impl2 < Impl1
b. Impl2 > Impl1
c. Impl2 = Impl1
d. Impl3 < Impl1
e. Impl3 > Impl1
f. Impl3 = Impl1
g. Impl4 < Impl1
h. Impl4 > Impl1
i. Impl4 = Impl1
j. Impl5 < Impl1
k. Impl5 > Impl1
l. Impl5 = Impl1
m. Impl6 < Impl1
n. Impl6 > Impl1
o. Impl6 = Impl1
p. Impl3 < Impl2
q. Impl3 > Impl2
r. Impl3 = Impl2
s. Impl4 < Impl2
t. Impl4 > Impl2
u. Impl4 = Impl2
v. Impl5 < Impl2
w. Impl5 > Impl2
x. Impl5 = Impl2
y. Impl6 < Impl2
z. Impl6 > Impl2
aa. Impl6 = Impl2
ab. Impl4 < Impl3
ac. Impl4 > Impl3

ad. Impl4 = Impl3
ae. Impl5 < Impl3
af. Impl5 > Impl3
ag. Impl5 = Impl3
ah. Impl6 < Impl3
ai. Impl6 > Impl3
aj. Impl6 = Impl3
ak. Impl5 < Impl4
al. Impl5 > Impl4
am. Impl5 = Impl4
an. Impl6 < Impl4
ao. Impl6 > Impl4
ap. Impl6 = Impl4
aq. Impl6 < Impl5
ar. Impl6 > Impl5
as. Impl6 = Impl5

- The Evaluation Stage

Ranks				
		N	Mean Rank	Sum of Ranks
Eva2A - Eva1A	Negative Ranks	22[a]	12.91	284.00
	Positive Ranks	2[b]	8.00	16.00
	Ties	1[c]		
	Total	25		
Eva3A - Eva1A	Negative Ranks	12[d]	13.00	156.00
	Positive Ranks	12[e]	12.00	144.00
	Ties	1[f]		
	Total	25		
Eva3A - Eva2A	Negative Ranks	3[g]	14.83	44.50
	Positive Ranks	22[h]	12.75	280.50
	Ties	0[i]		
	Total	25		

a. Eva2A < Eva1A
b. Eva2A > Eva1A
c. Eva2A = Eva1A
d. Eva3A < Eva1A
e. Eva3A > Eva1A

f. Eva3A = Eva1A
g. Eva3A < Eva2A
h. Eva3A > Eva2A
i. Eva3A = Eva2A

Ranks				
		N	Mean Rank	Sum of Ranks
Eva2B - Eva1B	Negative Ranks	20[a]	13.00	260.00
	Positive Ranks	5[b]	13.00	65.00
	Ties	0[c]		
	Total	25		

a. Eva2B < Eva1B
b. Eva2B > Eva1B
c. Eva2B = Eva1B

Ranks				
		N	Mean Rank	Sum of Ranks
Eva2C - Eva1C	Negative Ranks	6[a]	13.00	78.00
	Positive Ranks	19[b]	13.00	247.00
	Ties	0[c]		
	Total	25		

a. Eva2C < Eva1C
b. Eva2C > Eva1C
c. Eva2C = Eva1C