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# THE PREDICTIVE VALUE OF BEHAVIOURAL CHARACTERISTICS ON THE SUCCESS OF STRATEGIC ALLIANCES

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**ABSTRACT**

An increasing number of companies are setting up strategic alliances with suppliers and customers. However, the majority of these alliances do not succeed. Our aim is to understand how different behavioural characteristics are associated with alliance success. We hypothesize that alliance attributes, communication behaviour and alliance management are predictors of cost and service benefits. Furthermore, we found that while alliance attributes are related with both cost and service benefits, communication behaviour and alliance management are only associated with service and cost benefits respectively. We also see that alliance attributes explain most of the variance of supply chain success and are thus better predictors of alliance success than other behavioural characteristics. Furthermore, we provide insight into the way managers can build up supply chain performance by setting up strategic alliances.

Keywords: Strategic alliances, Supply chain management, Operational performance

## 1. INTRODUCTION

Although the fundamental importance of supply chains is widely accepted (e.g. Saunders 1997, Gattorna 1997) and there exists a rich continuum of strategies for alliances amongst supply chain partners (Holweg et al. 2005), little is known about the magnitude of the different behavioural characteristics driving performance improvements of these alliances. Moreover, some recent studies point out that supply chain alliances are no guarantee for success (D'Avanzo et al. 2003, Holweg et al. 2005, Vereecke and Muylle 2006). This calls for an investigation of the relationship between the success of strategic alliances in the supply chain and the behavioural characteristics of these alliances.

As described by previous researchers (e.g. Vickery et al. 2004, Tan et al. 1998), managers recognize that integrated business processes (not individual functions or systems) create value for the firm's customers and that these processes reach beyond the boundaries of the firm by drawing suppliers and customers into the value creation process. Building on the work of Mohr and Spekman (1994) and Monczka et al. (1998), who described alliance success, we identified three key antecedents of strategic alliances in a supply chain context: Alliance attributes, Behavioural communication and Alliance management. Since previous research only measured the impact of the individual behavioural characteristics (e.g. Alliance attributes like trust, interdependence, coordination and commitment) on alliance success, no information is yet available on the predictive value of the three behavioural characteristics (Alliance attributes, Behavioural communication and Alliance management) on alliance success. Our objective is thus to identify which behavioural characteristic explains most of the supply chain performance improvements.

The formation of strategic alliances in a supply chain context is motivated primarily by the potential gains in competitive advantage in the marketplace (Mohr and Spekman 1994). These strategic alliances enable the partners to create economies of scale in joint production and to optimize the production and logistic processes between the partners. However, some studies claim that the rate of success in developing these integrated processes is rather low (e.g. Holweg et al. 2005). Furthermore, it is not clear how performance is influenced by the different behavioural characteristics. In our study, we will assess the influence of each behavioural characteristic on both the service and cost benefits associated with the alliance. This will enable us to gain more insight into the benefits of strategic alliances.

As suggested by Yang (2009), researchers should, based on the traditional linear regression methods, investigate the connection between the behavioural characteristics and the alliance performance. This study is a first attempt to do so. Our aim is thus to test the predictive value of the different behavioural characteristics on both Cost and Service benefits. Furthermore, we will expand the research framework of Mohr and Spekman (1994) and Monczka et al. (1998) by testing its applicability in a different geographical context.

We begin our paper by establishing the definition of strategic alliances and providing a brief overview of the literature on strategic alliances and alliance success in a supply chain context. We describe in-depth the behavioural characteristics of strategic alliances as described by Mohr and Spekman (1994) and Monczka et al. (1998) as Alliance attributes, Communication behaviour and Alliance management. Based on these measures, we test the magnitude of each of the higher-order characteristics on operational performance improvements as perceived by managers. Finally, the implications of the study and avenues for further research are discussed.

## 2. THEORETICAL BACKGROUND AND CONCEPTUAL FRAMEWORK

The domain of strategic alliances spans both contractual and equity arrangements. Since we believe that the way in which partners are brought together (i.e. contractually or equity arrangements) may influence the behaviour in the alliance, this study focuses only on strategic alliances based on non-traditional contractual arrangements. According to the definition of Yoshino and Rangan (1995), strategic alliances, which are different from simple buy-sell contractual arrangement, require the following necessary and sufficient conditions: (1) independence of the parties, (2) shared benefits among the parties and, (3) ongoing participation in one or more key strategic areas, such as technology, products, markets, etc. Another classification of supply chain alliances consists of four levels: traditional alliances, operational alliances, technological alliances and strategic alliances, with strategic alliances representing the most advanced form of alliance. (En et al. 2007, Perona and Saccani, 2004) In addition, we limit our definition of strategic alliances towards strategic alliances focusing on coordination of logistics, purchasing and/or operations activities. Consequently, we describe strategic alliances as “long-term cooperative relationships designed to increase the strategic operating capability of two individual firms, with the aim of achieving significant benefits to both parties. These alliances will last provided that they continue to offer significant value to each of the parties.

Some of the main benefits of this type of relationships are the increase in the synchronization of the Supply Chain, the reduction of the total costs, the improvement of quality and cycle time, as well as a strong competitive position which exceeds any possible contribution from traditional relationships." Using this definition as a basis for our study, we employ the measures for the behavioural characteristics as described by Mohr and Spekman (1994) and Monczka et al. (1998) to test the predictive value of these characteristics on the success of the alliance. Our hypotheses focus on three major behavioural characteristics of the alliance posited to be predictors of success: Attributes of the alliance, Communication behaviour and Alliance management.

Previous literature of Mohr and Spekman (1994) and Monzcka et al. (1998) tested frameworks for alliance success. These frameworks are based upon two premises. First, alliances tend to exhibit behavioural characteristics that distinguish these more intimate alliances from more traditional (conventional) relationships. Second, while alliances tend to exhibit these behavioural characteristics, more successful alliances will exhibit these characteristics with more intensity than less successful alliances. This reasoning is supported by the resource-based view (RBV) and the relational view. The resource-based view argues that sustainable advantages result from resources controlled by a single firm (Barney 1991). However, the rapid growth of alliances across many firms has expanded this view by recognizing the importance of resources which lie outside of a firm's boundaries (Mathews 2003). According to this view, complementary resource combinations of firms working together can be a source of collaborative advantage. Our study is thus positioned within a framework of collaborative advantage (Dyer and Singh 1998), rather than one of competitive advantage. This collaborative advantage is a resource that requires a long-term orientation and may create greater benefits than a traditional zero-sum based approach to competition (Dyer 2000). Specifically, we rely on the relational view (Dyer and Singh 1998), an extension of RBV incorporating social network theory (Granovetter 1985, Burt 1992, Eisenhardt and Schoonhoven 1996). In summary, this view suggests that firms can obtain extra relational rents from strategic alliances.

Our research builds further on the framework developed by Mohr and Spekman (1994) and Monczka et al. (1998). While Mohr and Spekman (1994) included Alliance attributes, Communication behaviour and Conflict resolution techniques as behavioural characteristics in their framework, Monczka et al. (1998) also included the selection process as a behavioural characteristic. Furthermore, Mohr and Spekman (1994) developed behavioural characteristics associated with strategic alliances from a dealer's perspective (i.e. downstream), while

Monczka et al. (1998) measured similar behavioural characteristics from the buyers perspective of strategic alliances. Since similar measurement scales and results were obtained for the two types of respondents, we did not make a distinction in our research between buyers and suppliers. We asked the respondent to fill in the survey on a strategic alliance in which they were involved. We believe that this approach enables the respondent, based on their experience, to fill in the questionnaire more accurately.

Next to the operations and the strategic management literature, also the marketing literature focuses on strategic alliances. The literature stream on relationship management (RM) (e.g. Johnson 1999, Palmatier et al. 2006, Palmatier 2008) shows for instance that RM is more effective when relationships are more critical i.e. are strategic in nature. Furthermore, this literature stresses to include multiple relational constructs. Research focusing only on limited relational constructs may provide misleading results. Previous research that offers either commitment or trust as the cornerstone relational construct may suggest that commitment or trust may be the aspect effecting performance. According to Palmatier et al. (2006), this view may be too narrow. A relationship may for instance be truly effective only when most or all of its key aspects are strong. Consequently, it is important in our research study to measure multiple characteristics of strategic alliances.

## 3. HYPOTHESES DEVELOPMENT

### 3.1 Behavioural characteristics of strategic alliances

Strategic alliances require a proactive long-term view to relationship management, leading to closer, co-operative links with the key partners (Lawson et al. 2009, Chen et al. 2004). Behavioral characteristics can be described as the fundamentals to forge these strategic alliances. Based on a comprehensive literature study, we describe here the different behavioural characteristics of strategic alliances. Many studies focus on separate antecedents such as the relational attributes as trust or power (e.g. Ireland and Webb 2007), while others focus on information sharing (e.g. Zhou and Benton 2007) or on managing the alliance (e.g. Mentzer et al. 2000). Only few empirical studies explore the formation of strategic alliances and include multiple antecedents (Mohr and Spekman 1994, Monczka et al. 1998). Based on the literature, we identified three antecedents of strategic alliances: Alliance attributes, Communication behaviour and Alliance management (Mohr and Spekman 1994, Monczka et al. 1998) (see Figure 1). In the next paragraphs, we describe these three behavioural characteristics in more detail.

Insert Figure 1 About Here

#### 3.1.1 Alliance attributes

A lot of attention has been given to Alliance attributes such as interdependence, trust, commitment and coordination (e.g. Ireland and Webb 2007). We describe each of these Alliance attributes in more detail.

Interdependence exists when one actor does not entirely control all the conditions necessary for achievement of an action or a desired outcome (Pfeffer 1988). Resource dependency theory provides the major organizational view regarding power and management in strategic alliances. According to this view, firms are seen as interdependent entities seeking to manage the uncertainty affecting them (Pfeffer 1988). These interdependencies create patterns of dependencies among the firms, a situation in which firms that own or control valuable, scarce resources hold power over firms seeking those resources to the extent that the dependency is not mutual. Firms lacking control over scarce resources can manage the

resulting uncertainty through strategic alliances (Pfeffer and Salancik 1978). Previous empirical studies investigated the relationship between dependence, control and performance of inter-company relationships and found that a firm is less opportunistic when it depends on its partner (Provan and Skinner 1989) and that it can also positively influence other outcomes such as delivery performance (Handfield 1993).

Another Alliance attribute is trust. A large variety of dimensions of trust are described in the literature. Drawing on the literature in social psychology and marketing, trust can be defined as the perceived credibility and benevolence of the partner in the relationship (Geyskens et al. 1998). Based on this definition, trust can be measured by two dimensions. The first dimension focuses on the objective credibility of the partner in the alliance and the expectancy that the partner's word or written statement can be relied on. The second dimension, benevolence or goodwill, is the extent to which one partner is genuinely interested in the other partner's welfare and is motivated to seek joint gains (Johnston et al. 2008). As mentioned by Sako (1992) this second dimension, which is also called goodwill trust (Sako 1992), is particularly interesting in long-term buyer-supplier relationships and is responsible for creating a relational culture (Ireland and Webb 2007). Since our study focuses on strategic alliances, which are long-term in nature, we focus on the second dimension of trust: benevolence or goodwill trust. The important point here is that trust creates the feeling that the inter-firm relationship is beneficial for both parties. In addition, trust is considered to create a form of business harmony between two parties due to interaction frequency. The main purpose of increasing trust is that it is found to enhance integration while lowering administrative costs.

Commitment, another Alliance attribute, is defined as an exchange partner believing that the alliance is so important as to warrant maximum efforts at maintaining it (Morgan and Hunt 1994). We can measure this by the willingness of partners to exert effort on behalf of the alliance, which may occur in the form of an organization's time, money, facilities, etc. These type of resources are often referred to as 'asset specific' resources, since they are directed specifically towards the other party (Monczka et al. 1998). Previous studies (e.g. Monczka et al. 1998) suggest that successful alliances result when both buyers and suppliers demonstrate a willingness to commit a variety of assets to a set of future transactions.

Finally, also coordination can be described as an Alliance attribute. Coordination reflects the set of tasks each party expects the other to perform and is directed at mutual objectives that are consistent across organizations (Anderson and Narus 1990). We can formulate our hypotheses as:

**H1:** The degree of success of a strategic alliance in terms of Cost benefits is positively influenced by the level of Alliance attributes.

**H2:** The degree of success of a strategic alliance in terms of Service benefits is positively influenced by the level of Alliance attributes.

### 3.1.2 Communication behaviour

Communication behaviour deals with the level of information sharing, the quality of this information and how this information is used and translated into the business processes of the partner.

Information sharing in the supply chain is about the sharing of knowledge among partners to serve downstream customers effectively and efficiently. This knowledge includes information on the production status and the planning process, but also on changes in the business environment and the goals of the companies. More specifically, information needs to be shared at different levels. While operational integration is geared towards transaction efficiency improvements, integration at the strategic level requires shared or matching objectives (Lamming et al. 2004). Information sharing is an important issue in supply chain management, particularly as a component of supply chain practices that have recently become popular, such as Vendor Managed Inventories (VMI) and Collaborative Planning, Forecasting and Replenishment (CPFR). To guarantee the success of these supply chain management practices, it is essential that the better-informed downstream member of the alliance shares its demand information with the less-informed upstream member (Lee et al. 1997). Also upstream partners may share information with their downstream partners about for instance production plans and future deliveries. These information flows between alliance partners may lead to a better coordination of the stock levels and to logistic superiority in the strategic alliance (Freedman 1994).

Daft and Lengel (1986) found that the major problem in information processing is often not the lack of data, but clarity of the data. Furthermore, Petersen (1999) concluded that while much has been written about supply chain integration, little empirical research has been conducted to determine whether information quality helps to create better performing supply chains. The literature described Information quality as an important indicator of the clarity and usefulness of the information (Sum et al. 1995, McGowan et al. 1998). It is measured by the degree to which the information shared between supply chain partners meets the needs of the different partners (Petersen 1999). Researchers have identified different dimensions of Information quality. Neumann and Segev (1979), for instance, described high quality information as being accurate, frequently exchanged, recent and containing the appropriate content. Bailey and Pearson (1983) also described several dimensions of information quality as accurate, timely, precise, reliable, current and complete.

Finally, Information Participation or the extent to which partners engage jointly in planning and goal setting (Anderson et al. 1987) is essential to improve supply chain performance (Monczka et al. 1998). Companies sharing information with their partners should also be willing to openly discuss their practices and processes with partners (Mentzer et al. 2000). When companies for example engage in joint R&D projects, partners need to understand each other's competencies and technology roadmaps, and need to share information on their latest developed technologies. Another example is a JIT system, where two partners need to have in-depth information on each other's production process and capabilities and use this information in the own planning system. As such, the information should not only be available, but should also be processed and translated into useful information for the partner. We formulate the following hypotheses:

**H3**: The degree of success of a strategic alliance in terms of Cost benefits is positively influenced by its degree of Communication behaviour.

**H4**: The degree of success of a strategic alliance in terms of Service benefits is positively influenced by its degree of Communication behaviour.

### 3.1.3 Alliance management

Tan et al. (1998) examined the relationship between operational practices, supply chain management practices and firm performance. They concluded that supply chain management practices and tools must be implemented concurrently to achieve superior performance. Furthermore, Hsu et al. (2009) showed that supply chain management practices positively affect performance. The literature describes leadership capabilities and performance measurement systems as management related characteristics of strategic alliances (Mentzer et al. 2000).

The ability of managers to lead supply chain projects is crucial for strategic alliances (Russell and Hoag 2004). Without a champion moving the alliance forward, nothing significant will ever be accomplished (Mentzer et al. 2000).

Second, supply chain projects require companies to share information on the performance related issues in order to measure and control the performance of the strategic alliance. The main purpose of measuring and controlling the performance of strategic alliances is to help companies understand their own supply chain situation and to set up a common understanding for supply chain management (Li and Dai 2009).

Consequently, our final two hypotheses are:

**H5**: The degree of success of a strategic alliance in terms of Cost benefits is positively influenced by the degree of Alliance management.

**H6**: The degree of success of a strategic alliance in terms of Service benefits is positively influenced by the degree of Alliance management.

### 3.2 Strategic alliance success

The challenge of supply chain managers is to identify and implement strategies that minimize cost while maximizing flexibility in an increasingly competitive and complex market (Wadhwa et al. 2008). Strategic alliances are thus expected to increase operational performance in two very distinct areas: cost reductions and service gains (Bowersox 2000, Campbell and Sankaran 2005). This is in line with other research measuring operational performance (Frohlich and Westbrook 2001, Rozenzweig et al. 2003. Vereecke et al. 2006). Frohlich and Westbrook (2001) showed for instance that high levels of integration with both suppliers and customers lead to improvements in different areas of performance such as cost reductions and service gains.

Cost and flexibility are arguably two of the most distinct dimensions of operational performance (Boyer and Lewis 2002). They are associated with different structural and infrastructural choices (Kotha and Orne 1989, Safizadeh et al. 2000).

According to the Transaction Cost Economics theory (TCE) (Coase 1937), strategic alliances should help companies to decrease the 'cost of running the system' by adapting and smoothing the supplier processes. Cost efficiency enables manufacturers to be more price-responsible and to subsequently gain higher margins than competitors due to lower manufacturing costs (Hill 1994). Carr and Pearson (1999) found that, over time, buying and selling firms were able to develop relationships that involved increased communication, cooperation, and coordination of all activities associated with the production of goods and services, which helped firms to reduce their costs.

Kotha and Orne (1989) find that integration can also help to develop flexible operations. Process flexibility is increasingly important in hypercompetitive environments, in which frequent changes in volume, product mix and schedules occur. Rosenzweig et al. (2003) contends that the development of process flexibility requires a great deal of closeness to supply chain entities. Consequently, process flexibility is believed to create higher customer satisfaction in the supply chain. Although a lot of studies focus on the link between strategic alliances and performance improvement, no research attempts to link the specific behavioural characteristics to the different types of performance improvements.

# 4. METHODOLOGY

## 4.1 Survey instrument and data collection

Based on the literature review, a survey has been designed to measure the behavioural characteristics of strategic alliances. The survey asked for the behavioural characteristics of both the least and the most successful strategic alliance as perceived by managers. The unit of analysis is thus the strategic alliance established between a respondent company and one of its strategic alliance partners.

The targeted informants for the study were supply chain managers, logistics managers and purchasing managers from Belgian companies with more than fifty employees. The choice was made to focus on managers with appropriate supply chain knowledge and companies of sufficient size. The initial contact list of 300 companies was randomly developed from the CRM database of the sponsoring university for the study. The university has an extensive list of supply chain managers that have participated in executive education programs, thus we were able to select participants based on their function and company. An initial effort was made to contact participants to request whether they are engaged in strategic alliances with buyers and/or customers. This resulted in a sample of 200 companies. The extra effort devoted to making such an initial contact has been shown in prior studies to be an effective method of improving both response rate and reliability of the data (Zhao et al. 2008). The next step was to send the questionnaire to these 200 companies via e-mail. Following Dillman's (1978) total design method for survey data collection, follow-up phone calls have been made in order to maximize the response rate. The final results included 56 responses or 112 strategic alliances. As mentioned before, the survey asked the respondent to complete items with respect to strategic supplier or customer alliances, with the result that 34 surveys focused on customer alliances (downstream) and 78 focused on supplier alliances (upstream). This approach was used to allow respondents to clearly focus on supplier or customer integration, since we believe that most managers have no in-depth experience with both suppliers and customers. We believe this leads our respondents to give more accurate responses than when asked to simultaneously fill out a survey for both an upstream supplier and a downstream customer as in Frohlich and Westbrook (2001). Furthermore, we believe that by reflecting on a specific alliance rather than general practices, respondents are more likely to report actual rather than projected or socially desirable practices (Choi et al. 1996).

Table 1 provides a demographic overview of the sample, which consists of companies in the primary goods, chemical, pharmaceutical, consumer goods, media and informatics industries. The largest groups in the sample are the chemical and consumer goods industry. This is representative of Belgian industry which possesses a large proportion of firms in these industries. The sample is biased towards larger companies (based on annual sales and number of employees), which is acceptable since the goal of the study is to focus on larger firms. In addition, the sample is biased toward supplier relationships with 68% of the respondents describing an upstream relationship. This may be a function of the job positions of the respondents, which are all supply chain focused, and thus more likely to look upstream than downstream.

Insert Table 1 About Here

**4.2 The measures**

The questionnaire items on Alliance attributes and Communication behaviour have been adopted from previous research by Mohr and Spekman (1994) and Monczka et al. (1998). We used 1 to 7 likert-scales (1= completely disagree, 7= completely agree) to measure these items. A confirmatory factor analysis on these existing scales showed good measurement properties. Except for the construct commitment, as described by Mohr and Spekman (1994) and Monczka (1998), no support was found in our measurement model (i.e. low factor loadings and high cross-loading). As such, we decided to drop the commitment construct from our study. The Alliance management items have been added based on the review of the recent literature as discussed above. Operational performance is measured by Cost and Service benefits. We asked the respondents to indicate to which degree the strategic alliance helped the firm to create cost and service benefits in the supply chain (1= very little, 7= very much). Cost benefits are measured as reductions in inventories, gains in efficiency in use of human resources and product and process cost reductions. Service benefits are measured by improved customer service, delivery speed, speed to market of new products and increased flexibility. The draft of the questionnaire has been pre-tested on a sample of 10 experts (academics and people in the field), upon which some minor changes have been made.

As described in the literature, we define three types of antecedents: Alliance attributes, Communication behaviour and Alliance management techniques. A list with all items as found in the literature is in Appendix A.

Since there were pre-existing scales for most of the constructs, we conducted Confirmatory Factor Analysis (CFA). Furthermore, we took great care to reach scale validity in three ways: content validity, construct validity and criterion-referenced validity (Thorndike 1996). For purpose of this study, content validity refers to the degree to which the scales properly reflect the antecedents of collaboration and measure the performance improvements of a specific relationship. Since our questionnaire is based on a comprehensive in-depth literature study on the behavioural characteristics of strategic alliances, content validity is accomplished. To guarantee construct validity several variables have been measured through multiple item measures. The reliability of these variables has been assessed by calculating the construct reliability. AVE (average variance extracted) has been used to reject or confirm the assumption that some theoretical constructs underlie the items (Fornell and Larcker 1981).

## 5. STATISTICAL ANALYSIS AND RESULTS

We analyzed our data by using partial least squares (PLS), specifically PLS Graph version 3.0. PLS uses component-based estimation, maximizes the variance explained in the dependent variable, does not require multivariate normality of the data and accommodates both formative and reflective constructs (Chin 1998). It is particularly useful for smaller sample sizes, since it places minimal demands on measurement scales and distributional assumptions (Chin 1998, Wold 1982).

Multiple Imputation (Fishman and Cummings 2003) was used to replace missing values. Both Maximum likelihood estimation (ML) and multiple Imputation (MI) are known to be superior to ad hoc missing data techniques, such as listwise and pairwise deletion, with respect to both bias and efficiency (Enders 2001). One advantage of MI over maximum likelihood estimation is its computational simplicity. The data analyses comprise three steps: (1) the creation of m imputed datasets, (2) the analysis of the m datasets and (3) pooling of the m sets of parameter estimates into a single set of estimates. Our data set has 4.5% missing observations and 13 missing patterns. To test for the applicability of MI, we used Little's MCAR tests ($\chi^2$ = 2476. 55, df=3237, p=1.00). The insignificant p-values confirmed that our data are missing completely at random (MCAR). We chose five imputations (m = 5) to achieve 98 percent efficiency. Furthermore, according to the concept of superefficiency of Rubin (1996), we used all the questionnaire items for the imputation model.

In the next paragraph, we will first discuss the measurement model before analysing the structural model.

### 5.1 Measurement Model

For the measurement model, each construct was modelled to be reflective, with the exception of the dependent variables, which are modelled as formative. These formative items, in contrast to the reflective constructs, do not necessarily have to co-vary, are not interchangeable, and the direction of causality is from the items to the latent construct (Jarvis et al. 2003). Reflective constructs were validated using standard factorial validity for PLS as described by Gefen and Straub (2005), whereas formative constructs were validated following the recommendations of Diamantopoulos and Winklhofer (2001) and Petter et al. (2007).

For reflective constructs, the internal consistency and convergent validity were evaluated by examining the item-to-construct loadings, composite reliability, and average variance extracted (AVE). All item loadings were found to be higher than 0.60 and most of them even higher than 0.70. Furthermore, t-tests indicate that all items are significant at a 0.01 level. As shown in Table 2, the values of composite reliabilities are all higher than 0.805 (Nunnally and Bernstein 1994), and values of AVE are all above 0.511 (Fornell and Larcker 1981). Next, discriminant validity was assessed by examining if the squared correlation between a pair of latent variables was less than the AVE associated with each construct (Appendix B). Except for the AVE not being higher than the square of the Pearson correlation between Information sharing and Information participation, no problems with discriminant validity are reported. To further analyse discriminant validity, we calculated the item cross-loadings based on the procedure recommended for PLS (Gefen and Straub 2005). Each item loaded higher on its principal construct than on other constructs (Appendix C). While cross-loadings derived from this procedure will be inevitably higher than from typical exploratory factor analysis (Gefen and Straub 2005), the cross-loading differences were much higher than the suggested threshold of 0.1 (Gefen and Straub 2005). Only the cross-loading between Information participation item b showed high correlation with the Information sharing construct (although, still lower than with its own construct). Since we want to keep the original constructs as much as possible and since this represents no important violation, we decided to keep the Information participation item as described in the literature. In summary, these results collectively suggest good measurement properties.

Formative constructs require a different approach for validation, since the assessment of convergent validity is not meaningful for these constructs (Chin 1998, Petter et al. 2007). To evaluate discriminant validity for formative constructs, we examined item-construct correlations and correlations with other constructs. All loadings and cross-loadings for the two formative constructs demonstrated an adequate level of discriminant validity**.** Overall, the measurement instruments exhibited sufficiently strong psychometric properties to support valid testing of the proposed measurement models.

Insert Table 2 About Here

**5.2 Common Method Bias**

Since our performance measures are self-reporting, we should test for Common Method Bias (CMB). First, we tried to minimize common method bias through the design of the survey. The survey instrument contains for instance questions in reverse order, used established scale items and reduced evaluation apprehension (Podsakoff et al. 2003). Furthermore, we carefully selected our respondents by first calling the respondent and asking some questions to create a sample of companies involved in strategic alliances. Finally, we asked questions about two specific strategic alliances that the respondent had to select, which should help to increase the correctness of the answers. After data collection, we performed the Harmon one-factor test recommended by Podsakoff and Organ (1986). A factor analysis combining independent and dependent variables revealed no sign of a single-factor accounting for the majority of covariance. In addition, the correlations between the performance indicators and the relational antecedents were almost all significant and were between 0,075 and 0.709. Finally, results of the structural models demonstrated different levels of significance for path coefficients. The above evidence collectively suggests that common method bias is not a significant issue in this study.

### 5.3 Structural Model

With an adequate measurement model in place, the structural model was tested. A bootstrapping sample of 100 was used to estimate standard errors and to test the statistical significance of structural paths, since PLS does not provide t-tests. The resulting model explained a significant amount of variance in the dependent and the higher-order latent constructs. Figure 1 presents the final predictive model: it shows the standardized path coefficients.

Insert Figure 2 About Here

The structural model shows support for our 3 higher-order constructs Alliance attributes, Communication behaviour and Alliance Management. As indicated by figure 1, all first-order constructs had a significant effect on their higher-order construct. We thus showed the presence of three second-order behavioural characteristics: Alliance attributes, Communication behaviour and Alliance management. These characteristics were already described in the literature (Mohr and Spekman 1994; Monczka et al. 1998), but not yet tested as higher-order constructs.

Based on these results, the analysis enabled us to evaluate the relative influence of the higher-order constructs on performance: i.e. the Alliance attributes, Communication behaviour and Alliance management on both Cost and Service Benefits. The results are provided in Table 3. These results particularly supported H1 and H2 specifying positive direct effects of Alliance attributes on both Cost and Service benefits. For the effect of Communication behaviour and Alliance management, we saw mixed results. While the variance of Communication behaviour explained a significant proportion of the variance explained by the Service benefits, no significant results were found for the Cost benefits. Consequently, H4 could be supported while we could not support H3. The opposite is found for Alliance management. The variance explained by Alliance management is positively accounted for a significant variance of the Cost benefits, but not for the Service benefits. As such, our model predicts a positive effect of Alliance management on Cost benefits. In other words, H5 could be supported, whereas H6 could not be supported.

By looking at the relative variance of the different second-order latent constructs, we can state that the Alliance attributes account for most of the variance of the Alliance success. This is followed by the Communication behaviour and then finally the Alliance management variable explaining less of the variance in the Alliance success than the other two constructs.

Insert Table 3 About Here

## 6. DISCUSSION

Previous research has indicated that integration practices, which are the main objective of a strategic alliance, are not always a guarantee for success (Frohlich and Westbrook 2001; Holweg et al. 2005, Vereecke and Muylle 2006). This seems to suggest that not the mere fact of adopting integration practices improves performance. Rather, some characteristics of the adoption of integration practices determine the performance of the alliance. Therefore, we looked at strategic alliances with high levels of integration practices. Within these alliances, our aim was to understand which other characteristics migh influence the success of alliances. We focused on possible dimensions underlying the integration practices, referred to as behavioural characteristics, and studied to what extent these behavioural characteristics have an impact on the different operational performances such as cost and service.

Our results suggest that Alliance attributes, Communication behaviour and Alliance management, rather than the integration practices itself, predict the success of strategic alliances. Consequently, when these behavioural characteristics are present in larger proportions, the success of the strategic alliance is likely to be higher.

Our analyses also show that the Alliance attributes explain most of the variance in alliance success. This is followed by Communication behaviour. Alliance management, although still significant, explains least of the variance of the alliance success. These results suggest that building trust and coordination is the most important cornerstone for a successful alliance. Managers thus need to assure that the alliance is perceived to offer significant benefits to both partners and that they carefully plan their activities. Although communication behaviour and tools to help managing this alliance are also seen as significant contributors for alliance success, they are shown to be less crucial to the success of the alliance.

Interestingly, our analysis showed that Communication behaviour was not significantly related to cost benefits. Yet, it is strongly related to service benefits. Information sharing and participation of high quality information helps companies to detect possible supply problems or changes in demand. This information can in other words help companies to react faster and to improve customer service or to create new products to adapt to the changing market. The analyses suggest the opposite effect for Alliance management on alliance success: only a significant effect on cost benefits is detected. These results indicate that leadership and performance measurement help supply chain partners to reduce costs, but do not directly contribute to creating an agile supply chain. Finally, Alliance attributes are believed to both improve service and decrease costs in the strategic alliance.

The importance of behavioural characteristics shows that managers should not underestimate the time and energy required to create and sustain a strategic alliance. Building up alliance attributes and managing the alliance are time intensive. Furthermore, our study shows that two different governance mechanisms are important for strategic alliances: formal (e.g. leadership and performance measurement) and informal mechanisms (e.g. trust and coordination) are complements rather than substitutes and should both be present to create successful strategic alliances.

Our study also shows that strategic alliances might create both cost and service benefits for the manufacturer. We thus empirically showed that the creation of strategic alliances generates relational rents for the firm (Dyer 2000). Consequently, strategic alliances in which behavioural characteristics such as trust, information participation and leadership are present, are shown to create value for the firm. Furthermore, these findings suggest that for buyers to achieve the full set of benefits of a strategic alliance, they must focus on all three behavioural characteristics. Previous research mainly focused on the Alliance attributes and on the communication streams between partners, but not on the management of the alliances. This study shows the importance of structurally managing these alliances. As suggested by our analysis, alliance management enables the buyer to work in a cost efficient way. The results also show which choices companies can make in case of limited resources. While alliance attributes are the most important behavioural characteristics to invest in, the choice between communication behaviour and alliance management should be made based on the operational objectives one wants to accomplish (cost reductions or service improvements).

It is important to control for alternative explanations of our findings. We included the size of the manufacturing firm and the length of the strategic alliance as explicit controls in our model. No significant results of the effect of size and length of the alliance on our performance measures were obtained and hence we did not include them as control variables in the final model. Consequently, we could state that these two alternative explanations do not hold. This is also supported by other researchers. Stank (2001) found for instance that the best strategic alliances were remarkably similar regardless of industry, channel position or firm size. Similarly, Childerhouse and Tomwill, 2002, reported that 'exemplars' in supply chain management shared a number of common and transferable best practices.

The theoretical development presented here also has interesting practical implication. Supply chain managers, purchasing managers, logistics managers and customer service managers can benefit from this research since it offers insights in the importance of different behavioural characteristics in strategic alliances. It also highlights which aspects of the relationship require attention, depending on the kind of benefits one wants to accomplish through the alliance. An evaluation of the framework could help managers to identify opportunities for establishing alliance practices with appropriate performance improvements.

## 7. LIMITATIONS AND FUTURE RESEARCH

The findings from this research must be tempered by the limitations of the study. We tested our model for different types of companies, in different types of contexts. This increases the generalizability of our model, although it still raises some questions about possible contingencies such as for instance the supply chain strategy (Narasimhan et al. 2008). Future research should address and test these contingencies. In addition, data were collected from the manufacturer's side of the dyad. Consequently, the perception of the other party remains unknown. Collecting data on the perception of both partners in the supply chain is an avenue of future research. Another limitation of our research is the assumption of linearity. Recent research increasingly shows that there is a curvilinear relationship between for instance communication and performance (e.g., Patrashkova-Volzdoska et al. 2003, Hoegl and Wagner 2005). Since our aim was not to test the specific relationship between the characteristics and performance, we believe this assumption is valid. Future research, however, might focus on describing the shape of the relationship between the characteristics and performance.

Although, our results are intuitively acceptable, an alternative explanation for our findings may be the presence of a time-lag in the interaction of these variables. Alliance management may for instance take a number of years to improve the service of the supply chain. Longitudinal studies may help to shed light on this issue.

There are several research needs based on the results of the study. Future research based on case studies could provide here rich data and would be particularly valuable in substantiating the evolving nature of strategic alliances. Furthermore, the literature on strategic alliances should move towards processes and behavioural mechanisms that support working with partners to achieve benefits. This would help us to answer questions related to the management and the behavioural characteristics of the alliances. Furthermore, research has not yet systematically addressed the array of skills needed to help ensure that the partners' goals are achieved. Consequently, effort must be dedicated to the formation of management strategies that encourage the continued growth and maintenance of the alliance.

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# TABLES

## TABLE 1

### Demographic Characteristics of the respondents and respondent function

| | |
|---|---|
| **Type of relationship:** | **Companies activity:** |
| - Customer: 18 (32%) | - Chemical: 26 (46%) |
| - Supplier: 38 (68%) | - Consumer goods: 11 (19%) |
| **Annual sales**: | - Primary industry: 8 (14%) |
| - < 25 million €: 2 (4%) | - Informatics and media: 7 (12%) |
| - 26-50 million €: 6 (11%) | - Pharmaceuticals: 4 (8%) |
| - 51-100 million €: 7 (12%) | **Position in the supply chain:** |
| - 101-500 million €: 18 (32%) | - Upstream: 13 (25%) |
| - > 500 million €: 23 (41%) | - Manufacturing: 34 (61%) |
| **Number of employees**: | - Downstream: 8 (14%) |
| - 51-250: 8 (15%) | **Length of the collaboration:** |
| - 251 -500: 18 (32%) | - Average: 8.61 years |
| - 501-1000: 9 (16%) | - Standard error: 7.64 |
| - > 1000: 21 (37%) | |
| **Function of respondents:** | |
| - Supply chain Manager or Director: 30 | |
| - Purchasing Manager or Director: 7 | |
| - Logistics Manager or Director: 19 | |

## TABLE 2

## Factor loadings, construct reliability and AVE

| | Factor Loading | Construct Reliability | AVE |
|---|---|---|---|
| Trust items | | 0.948 | 0.820 |
| Trust_a | 0.899 | | |
| Trust_b | 0.923 | | |
| Trust_c | 0.892 | | |
| Trust_d | 0.907 | | |
| Coordination items | | 0.896 | 0.741 |
| Coordination_a | 0.855 | | |
| Coordination_b | 0.912 | | |
| Coordination_c | 0.812 | | |
| Interdependence items | | 0.857 | 0.603 |
| Interdependence_a | 0.604 | | |
| Interdependence_b | 0.768 | | |
| Interdependence_c | 0.887 | | |
| Interdependence_d | 0.819 | | |
| Information sharing items | | 0.867 | 0.621 |
| Information sharing_a | 0.839 | | |
| Information sharing_b | 0.849 | | |
| Information sharing_c | 0.740 | | |
| Information sharing_d | 0.716 | | |
| Information participation items | | 0.859 | 0.551 |
| Information participation_a | 0.782 | | |
| Information participation_b | 0.749 | | |
| Information participation_c | 0.718 | | |
| Information participation_d | 0.775 | | |
| Information participation_e | 0.681 | | |
| Information quality | | 0.955 | 0.811 |
| Information quality_a | 0.889 | | |
| Information quality_b | 0.937 | | |
| Information quality_c | 0.848 | | |
| Information quality_d | 0.910 | | |
| Information quality_e | 0.913 | | |
| Leadership items | | 0.913 | 0.778 |
| Leadership _a | 0.877 | | |
| Leadership_b | 0.891 | | |
| Leadership_c | 0.877 | | |
| Performance measurement items | | 0.805 | 0.582 |
| Performance measurement_a | 0.805 | | |
| Performance measurement_b | 0.832 | | |
| Performance measurement_c | 0.638 | | |

## TABLE 3

## Hypothesis testing results

| Path | | |
|---|---|---|
| H1: Alliance attributes -> Cost benefits | 0.353** | Supported |
| H2: Alliance attributes -> Service benefits | 0.306** | Supported |
| H3: Communication behavior -> Cost benefits | 0.163 N.S. | Not supported |
| H4: Communication behavior -> Service benefits | 0.327** | Supported |
| H5: Alliance management -> Cost benefits | 0.252** | Supported |
| H6: Alliance management -> Service benefits | 0.116 N.S. | Not supported |
| Path coefficient is significant at ** $p < 0.01$, $p < 0.05$, N.S.: not significant (1-tailed) | | |

**FIGURE 1**

**Predictive model of the behavioural characteristics**

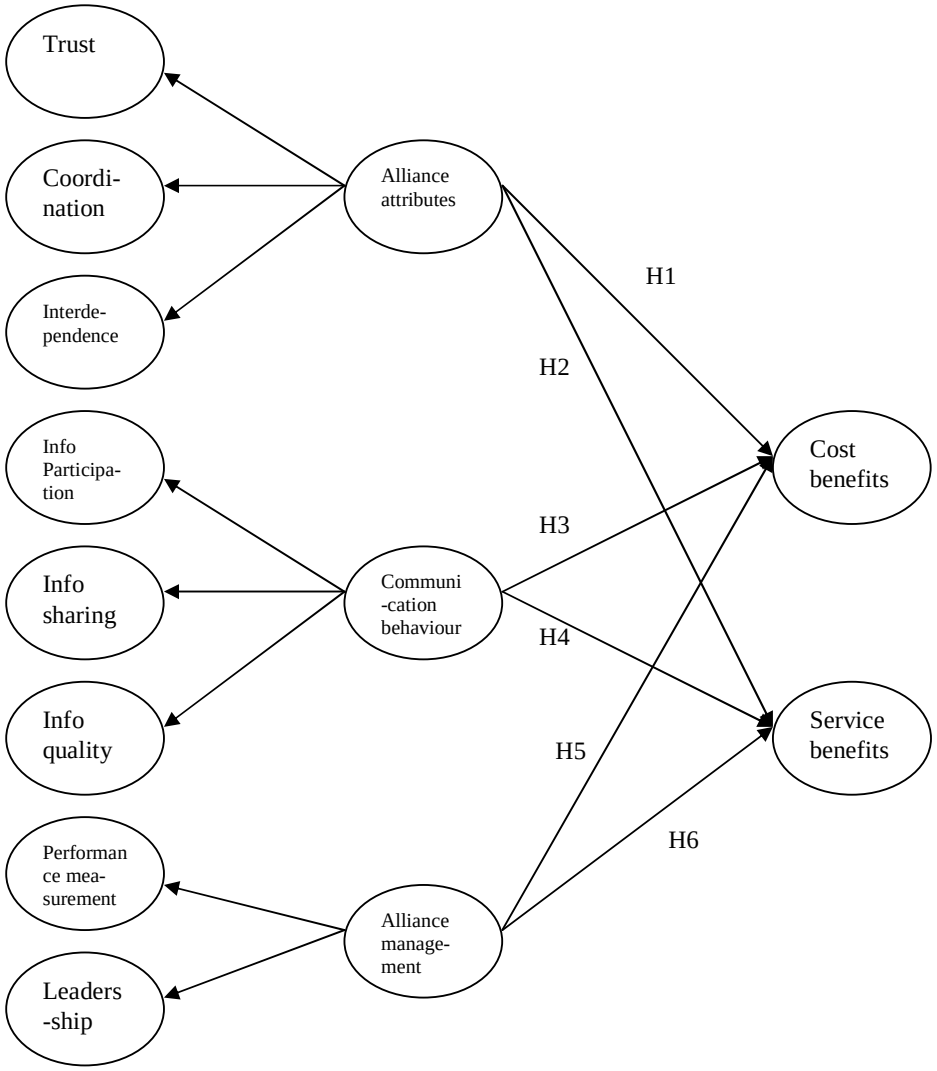
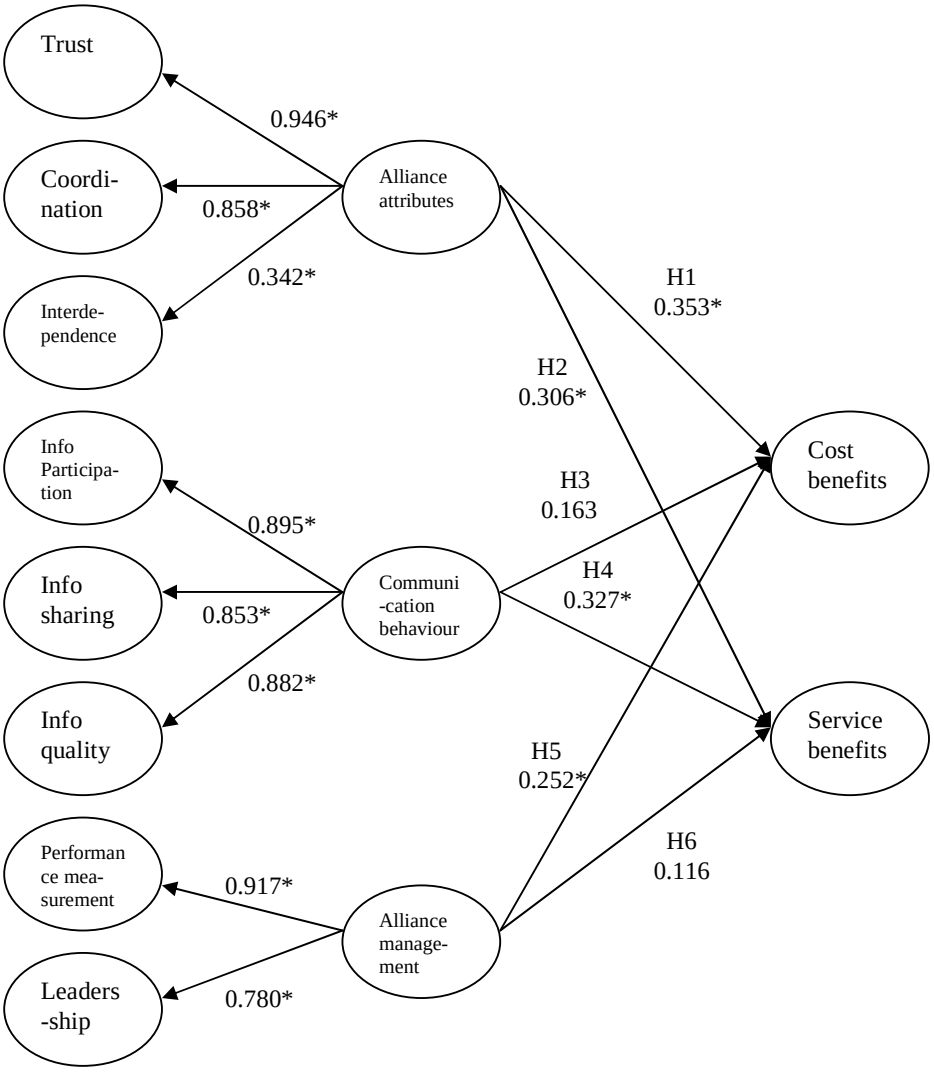


**FIGURE 2**

**Structural model: Predictive model of the behavioural characteristics**



# APPENDICES

# APPENDIX A

## Behavioural characteristics items

| Item | Statement |
|---|---|
| trust_a (Monczka et al, 1998) | The alliance is beneficial voor BU |
| trust_b | The alliance achieved a balanced agreement |
| trust_c | The alliance has a high level of business harmony |
| trust_d | The alliance offers significant benefits to both partners |
| interdependence_a (Monczka et al, 1998) | The alliance can easily be stopped without losses |
| interdependence_b | It is easy to end the alliance and start a new one |
| interdependence_c | Time to establish a new alliance will be extremely long |
| interdependence_d | Cost of establishing a new alliance would be high |
| coordination_a (Monczka et al, 1998) | Each party knows his role |
| coordination_b | Collaborative practices are planned carefully |
| coordination_c | The degree of coordination in the alliance is high |
| info_participation_a (Monczka et al, 1998) | Actively seeking for advice, guidelines and info from partner |
| info_participation_b | Partner takes part in planning activities and setting aims and goals |
| info_participation_c | We take part in planning activities, aims and goals of partner |
| info_participation_d | Actively seeking for proposals or suggestions for improvement from partner |
| info_participation_e | We react appropriately to partner's suggestions |
| info_sharing_a (Monczka et al, 1998) | We share confidential info about BU with partner |
| info_sharing_b | Partner shares info about his BU |
| info_sharing_c | We inform the partner in advance of changes in needs |
| info_sharing_d | Both parties share all useful info |
| communication_quality_a (Huber el al, 1987) | Communication is on time |
| communication_quality_b | Communication is exact |
| communication_quality_c | Communication is appropriate |
| communication_quality_d | Communication is complete |
| communication_quality_e | Communication is reliable |
| Performance_measurement_a (based on McCarter, 2005) | We have an ABC-system that provides info on activities across SC |
| Performance_b | we use a target costing process, extended into partners |
| Performance_c | Both parties work with open books |
| Leadership_a (based on McCarter, 2005) | There is a strong leader in both companies to lead SC changes |
| Leadership_b | There is common understanding of the degree of change that is needed |
| Leadership_c | There is a strong drive throughout the organization to make the integration work |
| Cost_benefit_a | reduce the inventory |
| Cost_benefit_b | reduce process costs |
| Cost_benefit_c | reduce process costs |
| Cost_benefit_d | Use your human resources more efficient |
| Service_benefit_a | Improve customer service |
| Service_benefit_b | Increase delivery speed |
| Service_benefit_c | Increase speed to market for new products |
| Service_benefit_d | Increase flexibility |

We used 7-point likert scales with 1= strongly disagree and 7= strongly agree for the behavioral characteristics
We asked the following question for supply chain performance:
Specify to which degree the strategic alliance help you to enable you to: (1= very little, 7= very much)

# APPENDIX B

## Squared pairwise correlations and assessment of discriminant validity

| | Trust | Coord | Interd | InfPar | InfShar | InfQual | Leader | Perf | CosBen | SerBen |
|---|---|---|---|---|---|---|---|---|---|---|
| Trust | **.820** | | | | | | | | | |
| Coord | .464 | **.741** | | | | | | | | |
| Interd | .024 | .050 | **.603** | | | | | | | |
| InfPart | .334 | .304 | .051 | **.551** | | | | | | |
| InfShar | .304 | .324 | .100 | .605 | **.621** | | | | | |
| InfQual | .371 | .287 | .066 | .406 | .329 | **.811** | | | | |
| Leader | .557 | .500 | .036 | .441 | .505 | .446 | **.778** | | | |
| Perf | .184 | .191 | .072 | .262 | .206 | .099 | .216 | **.582** | | |
| CosBen | .503 | .238 | .006 | .308 | .265 | .282 | .354 | .421 | N/A | |
| SerBen | .421 | .203 | .030 | .334 | .238 | .345 | .354 | .360 | .529 | N/A |

AVE of the reflective constructs are presented on the diagonal.
Squared correlations are presented off the diagonal.

# APPENDIX C

## Item-factor loadings and cross-loadings

| | TRUST | COORD | INTERD | INFPAR | INFSHAR | INFQUAL | LEADER | PERF | COSBEN | SERBEN |
|---|---|---|---|---|---|---|---|---|---|---|
| trust_a | **.899** | .544 | .134 | .466 | .435 | .511 | .642 | .390 | .659 | .593 |
| trust_b | **.925** | .670 | .110 | .517 | .534 | .539 | .705 | .427 | .642 | .563 |
| trust_c | **.894** | .626 | .235 | .539 | .512 | .639 | .683 | .308 | .649 | .656 |
| trust_d | **.910** | .625 | .083 | .569 | .513 | .518 | .670 | .427 | .620 | .543 |
| coord_a | .536 | **.859** | .041 | .444 | .491 | .314 | .548 | .343 | .370 | .264 |
| coord_b | .646 | **.915** | .164 | .479 | .486 | .531 | .659 | .372 | .448 | .374 |
| coord_c | .583 | **.812** | .360 | .504 | .499 | .520 | .615 | .415 | .440 | .520 |
| inter_invert_a | (.55) | .021 | **.604** | .065 | .152 | .037 | .021 | .023 | (.131) | (.058) |
| inter_bi | .126 | .192 | **.745** | .151 | .221 | .210 | .182 | .174 | .103 | .195 |
| inter_c | .111 | .161 | **.887** | .150 | .226 | .179 | .131 | .183 | .0113 | .119 |
| inter_d | .148 | .222 | **.819** | .244 | .327 | .258 | .173 | .304 | .110 | .146 |
| info_particip_a | .444 | .395 | .150 | **.784** | .557 | .459 | .452 | .342 | .369 | .370 |
| info_particip_b | .425 | .458 | .348 | **.749** | .685 | .504 | .614 | .370 | .423 | .508 |
| info_particip_c | .522 | .346 | .250 | **.715** | .530 | .461 | .410 | .453 | .474 | .489 |
| info_particip_d | .392 | .388 | (.010) | **.777** | .604 | .475 | .535 | .365 | .403 | .420 |
| info_particip_e | .365 | .460 | .094 | **.683** | .498 | .459 | .438 | .378 | .394 | .346 |
| info_sharing_a | .376 | .355 | .289 | .620 | **.839** | .512 | .563 | .247 | .383 | .411 |
| info_sharing_b | .564 | .532 | .235 | .664 | **.849** | .584 | .707 | .351 | .514 | .517 |
| info_sharing_c | .327 | .437 | .233 | .528 | **.740** | .312 | .464 | .453 | .313 | .294 |
| info_sharing_d | .448 | .476 | .240 | .634 | **.716** | .357 | .473 | .418 | .390 | .280 |
| commu_a | .541 | .478 | .161 | .604 | .520 | **.889** | .614 | .311 | .547 | .557 |
| commu_b | .568 | .478 | .268 | .532 | .556 | **.937** | .636 | .235 | .505 | .578 |
| commu_c | .536 | .498 | .184 | .528 | .494 | **.849** | .580 | .266 | .382 | .414 |
| commu_d | .524 | .507 | .272 | .599 | .503 | **.910** | .586 | .337 | .462 | .472 |
| commu_e | .574 | .454 | .267 | .601 | .511 | **.913** | .592 | .266 | .488 | .615 |
| leadership_b | .675 | .616 | .165 | .530 | .633 | .592 | **.878** | .433 | .487 | .513 |
| leadership_c | .607 | .650 | .150 | .602 | .647 | .577 | **.891** | .360 | .481 | .476 |
| leadership_d | .691 | .609 | .186 | .630 | .605 | .601 | **.878** | .442 | .606 | .584 |
| performance_eva | .327 | .288 | .073 | .364 | .284 | .216 | .334 | **.805** | .380 | .346 |
| performance_eva | .273 | .370 | .270 | .329 | .271 | .170 | .264 | **.834** | .310 | .181 |
| performance_eva | .360 | .337 | .276 | .459 | .466 | .313 | .444 | **.636** | .435 | .356 |
| COSBEN* | .709 | .488 | .075 | .555 | .515 | .531 | .595 | .500 | **1** | .727 |
| SERBEN* | .649 | .451 | .173 | .578 | .488 | .587 | .595 | .394 | .727 | **1** |

PLS item cross-loadings were calculated according to the procedure suggested by Gefen and Straub (2005). While the cross-loadings for some of the constructs are relatively high, the differences between loadings on principal factors and on other constructs are higher than the threshold suggested by Gefen and Straub (i.e. difference of 0.1). Only the item info_participation_b indicated a smaller difference than 0.1 with the info_sharing construct.

*COSPER and SERPER are both formative construct, whose index score is computed as a unit mean their items.

numbers between () are present negative values.