

An Investigation of the Relationships Between Internal Integration, Antecedents and Functional Performance in Vietnam

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Abstract

Supply chain integration has been considered to be a source of competitive advantage for firms as it improves relationships and the flow of information and resources both between internal functions in an organization and between supply chain partners. This study examines the relationship between internal integration and functional performance. It also examines the three key antecedents to internal integration: communication, leader support and conflict. A questionnaire survey is used to collect data from a sample of 152 production managers. The data are analyzed using regression. The results indicate that communication, conflict and leader support are antecedents of internal integration and also impact functional performance. Internal integration is also found to mediate the relationships between communication and leader support with functional performance, but not for the relationships between conflict and functional performance. This is also the contribution of the paper, which is the first to examine and suggest these mediating effects between communication, leader support, internal integration and functional performance.

Keywords: Supply chain management, antecedents, integration, and performance.

1. Introduction

Supply chain management has received increasing practical and theoretical interest since the 1990s. Research has shown that improved management of the key business processes within and across the organizations within a supply chain does improve performance. For example, it helps reduce operating costs, improve productivity and improve customer relationships (Gimenez and Ventura, 2005). Integration within the organisation (internal supply chain integration) and across organizations within a supplier network (external supply chain integration) provides a source of competitive advantage by encouraging better flows of materials and information from suppliers to end users (Gimenez and Ventura, 2005).

Several studies have therefore explored the antecedents of supply chain integration to find a way to improve integration (Le Meunier-FitzHugh and Piercy, 2007). Some factors have been found as antecedents of integration. However, after reviewing these factors this study only focuses on three factors consisting of communication, conflict and leader support because of two reasons. Firstly, the conclusion on the impact of these factors on integration continues to be controversial. Some studies have verified the positive relationship between communication (Pagell, 2004) and conflict (Ruekert and Walker, 1987) with internal integration. However, others have discovered a negative correlation between these two factors and internal integration (e.g., Gupta et al., 1985; Le Meunier-FitzHugh and Piercy, 2007). Similarly, leader support has been examined to ascertain its impact on performance (Gupta et al., 1985); however, some other research has

not found a significant relationship between these two factors (Pagell, 2004). Secondly, these three factors (communication, conflict and leader support) were discovered to have effect on functional performance (e.g., Prabhu and Robson, 2000; Parkan, 2005; Laios and Tzetzis, 2005). As discussed above, these factors also influence internal integration, which then affects functional performance. This study thus proposes a hypothesis that internal integration may mediate the relationship between communication, conflict and leader support with functional performance. For example, more communication does not mean improved performance in the event that there is no or little cooperation or integration between agents or members. This is similar to conflict and leader support. Without integration the impact of these two factors on performance is reduced. Examining this hypothesis therefore help to extend previous research and discover more complex relationships between integration, its antecedents and functional performance.

This paper first presents a literature review and theoretical context and uses this to derive the research hypotheses and model. Then the data collection and analysis methods are described and the findings are presented and analyzed. The implications of the study are discussed and the paper concludes with some suggestions for future research.

2. Literature review

This section describes the three antecedents of internal integration used in this study, exploring the linkages between integration, its antecedents and functional performance. The review of the literature is used to derive the hypotheses and the research model for this study.

2.1. The relationship between communication, conflict and leader support with internal integration

Internal integration

Internal integration examines integration across various parts of a single organization (Pagell, 2004). This integration side has been studied at three different levels. At the strategic level of analysis, Hayes and Wheelwright (1984) concluded in their research that to enhance the competitive advantage of a firm, the business strategy needs to be supported by various functional level strategies. Each function needs to be strategically integrated into the whole for a firm. Beside the strategic level, several studies have examined integration between functions - usually in dyads (Pagell, 2004). A considerable stream of research has emphasised the examination of the integration of R&D and manufacturing functions (Sussman and Dean, 1992). The purpose of these studies is to propose an approach to developing new products more effectively. The integration of marketing and manufacturing is also frequently studied (Boyer and Hult, 2005). Like the integration of R&D and manufacturing, this integration aims for a more coordinated and less functional way of managing between the two main functions in order to increase the firm's profitability (Safizadeh et al., 1996). As well as the two popular functional dyads above, other two-function integration has been examined. Pagell (2004) concluded that the integration between human resource strategy and manufacturing strategy leads to improved performance. Narasimhan and Das (2001) found that integrating purchasing with manufacturing enhances manufacturing performance. Narasimhan and Kim

(2001) demonstrated that integrating information decisions into logistics can improve supply chain performance. Studies also addressed the integration of information technology into an entire organization (Ganeshan, 2002). Besides functional dyads, some research has studied integration of three internal functions. For example, Pagell (2004) shows that integration of operations, purchasing and logistics improves firm performance. Finally, some studies have been done on integration within a function. For example, Dean and Snell (1996) focused on integrated manufacturing and Ellinger et al., (1997) researched integrated logistics.

Communication and internal integration

Communication between departments can be informal or formal. Formal communication refers to scheduled meetings and conferences, whereas informal communication refers to casual contacts or unplanned meetings (Le Meunier-FitzHugh and Piercy, 2007). Communication is considered to be one of the major antecedents for integration and is mentioned as important in many studies (Rouzies et al., 2005). However, the direction of effect of communication on integration is still controversial. Communication could be the biggest barrier to R&D-marketing integration (Gupta et al., 1985). In contrast, communication has been found to have a positive effect on internal integration (Pagell, 2004), e.g., between sales and marketing integration (Le Meunier-FitzHugh and Piercy, 2007). Nevertheless, other researchers balanced the two opinions above (Rouzies et al., 2005). These authors argued that there is a U-shaped relationship between the total amount of communication and the degree of integration. In other words, too little

or too much communication may lead to low levels of integration. However, with ‘quiet’ culture and limited information sharing of eastern countries like Vietnam more communication is necessary and expected to positively influence internal integration in an organization. Thus, this study proposes the following hypothesis:

Hypothesis 1: Internal communication (COM) positively influences internal integration (INTE).

Conflict and internal integration

Conflict can be described as either functional or dysfunctional. Functional conflict occurs when there are judgmental differences about how best to achieve common objectives or tasks, but is characterised by a “constructive challenging of ideas” and a respect for each other’s viewpoints. Dysfunctional conflict has negative outcomes and occurs when there are disputes and there is hostility or distrust towards each other. Interdepartmental (dysfunctional) conflict is defined as working at cross-purposes, having incompatible goals, being obstructive, and not appreciating each other’s roles and has a negative impact on collaboration (Le Meunier-FitzHugh and Piercy, 2007). Though functional conflict may enhance performance, dysfunctional conflict may attenuate it (Anderson and Narus, 1990). Thus, many empirical studies indicate a negative relationship between conflict and perceptual outcomes such as satisfaction (Gaski, 1984); whereas others show that conflict resolution results in positive outcomes (Ruekert and Walker, 1987). The conflict mentioned in this study is dysfunctional conflict and thus it is expected to negatively influence the level of integration between functions and between organizations.

Hypothesis 2: Internal dysfunctional conflict (CONF) positively influences internal integration (INTE).

Leader support and internal integration

Previous studies have also identified the effect of leader support on co-operation among functions in an organization (Gupta et al., 1985). Wheelwright and Clark (1992) describe a process to achieve integration between design and manufacturing that is based on communication, building specific capabilities to support integration, top management support, and promotion and compensation systems. Leader support impacts significantly on the effectiveness of most operations both inside and outside an organization. Different backgrounds and objectives can often lead to increased conflict and reduced linkage among functions in organizations. However, strong support from leaders will shorten these gaps and help to increase integration (Le Meunier-FitzHugh and Piercy, 2007). However, the impact of leader support on internal integration has not been found in the research by Pagell (2004). Therefore, the relationship between leader support and internal integration is proposed to be examined in this study:

Hypothesis 3: Leader support (LEADSUP) positively influences internal integration (INTE).

2.2. The relationship between internal integration and functional performance

The relationship between internal integration and functional performance has been researched in some areas. For example, in terms of production management, internal integration is revealed to have an effect on product development performance and production manage-

ment performance (Kahn, 1996). In terms of the logistics area, marketing/logistics collaboration is found to have an impact on logistics performance. Firms that develop greater collaborative integration indicate higher relative logistics performance compared to less integrated firms. The performance of highly integrated firms on service elements that go above and beyond the basics, such as meeting key customers' needs, accommodating special customer service requests, and accommodating new product introductions is significantly better than for low integration firms (Sezen, 2005). The above reviewing leads to the next hypothesis:

Hypothesis 4: Internal integration (INTE) has a positive relationship with functional performance (FUNPER).

2.3. The relationship between communication, conflict and leader support with functional performance

Communication and performance

Effective internal communication will enhance functional performance in an organization (Parkan, 2005). More communication will help the employees to know which part of the organization that they should deal with in order to produce efficiency. Moreover, more communication means more sharing necessary information, action plan and performance, which increase trust and integration between two departments. More integration will in turn reduce production rework, the cost of finished product, manufacturing cycle time, work-in-progress inventories and improve product quality. Therefore, high quality service and product will be provided with low price to compete in the competitive market (Parkan, 2005). Therefore, the

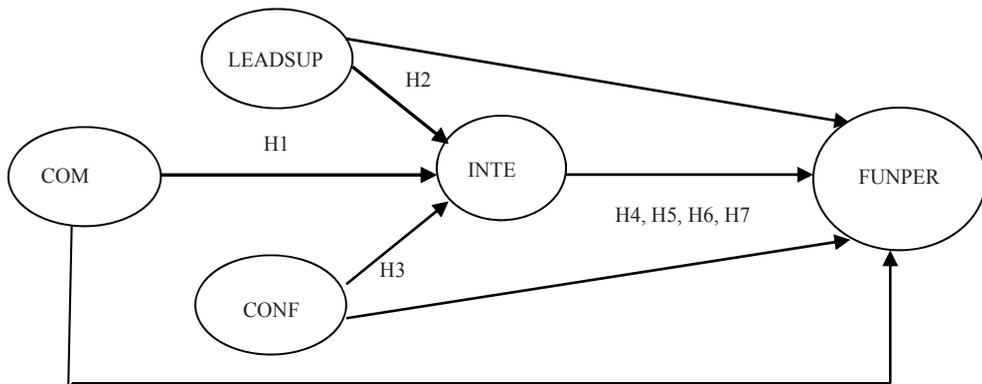
impact of communication on performance is expected to be partially mediated by integration. In other words, communication based on a cooperative or integrative spirit will improve performance more. In contrast, more communication may not lead to an increase and may even reduce performance without this spirit. Thus,

Hypothesis 5: Integration mediates the relationship between communication and functional performance (FUNPER).

Conflict and performance

Laios and Tzetzis (2005) and Said (2009) state that conflict negatively affects functional performance. Amason (1996) hypothesizes that decision makers who experience higher levels of conflict will produce lower quality decisions, have lower levels of understanding of their decisions, and have lower levels of commitment and affective acceptance of their decisions. Given the above conclusions, in addition to the possible impact of decision quality on performance (Elbanna, 2006), Moreover, many authors have argued that conflict is the source of political behavior (Mintzberg, 1983). If there is no conflict, people have no need to use political tactics to influence the decision outcomes in order to achieve their own interests. This result is because political behavior is undertaken to overcome resistance or contest. Without resistance or conflict there is no need to employ such behavior (Pfeffer, 1992). Previous research provides strong evidence that political processes are unlikely to reduce cooperation between agents in an organization; consequently, they negatively affect organizational outcomes such as increasing the cost of finished product, work-in-progress and reducing

Figure 1: Research framework



the quality of product (e.g. Nutt, 1993). Therefore, integration is also expected to mediate the relationship between conflict and functional performance.

Hypothesis 6: Integration mediates the relationship between conflict and functional performance (FUNPER).

Leader support and performance

A relationship between leader support and functional performance has been found in some research (Prabhu and Robson, 2000). If strategy and practices are formally in place, the organization is much more likely to have attained a high level of performance. These strategies and practices can influence performance with respect to certain operational activities, and the success of these activities can provide a measure of how successful leader management strategies and support have been (Prabhu and Robson, 2000). Leader support is important for all activities in an organization, and is necessary for increasing integration (Le Meunier-FitzHugh and Piercy, 2007) such as motivating employees between departments to work together, and making joint decision which in

turn will improve the cost and quality of product and may reduce rework and production cycle time. Similarly, integration is therefore expected to influence the relationship between leader support and functional performance.

Hypothesis 7: Integration mediates the relationship between leader support and functional performance (FUNPER).

All of these relationships and hypotheses can be combined into a conceptual research framework, as shown in Figure 1.

3. Methodology

This research follows the sequential stages of questionnaire development, sampling, and data analysis.

The questionnaire was developed based on previous studies. The communication construct is based on items of Paulraj and Chen (2007). The leader support construct is derived from the research of Mollenkopf et al., (2000). The conflict construct is developed from adjusting the items of Le Meunier-FitzHugh et al., (2007). The internal integration construct borrows from research by Ellinger (2000). Final-

ly, functional performance items are adjusted based on the research by Narasimhan and Das (2001) (see Appendix A).

The population consists of production managers in a variety of manufacturing sectors. The potential participants were identified from the database of the Vietnamese Ministry of Plan and Investment by a randomly stratified sampling. The data were collected through questionnaires sent in person to 500 production managers. In order to raise the reliability of measurement, respondents were asked to discuss their responses with others in the supply chain management department or functional executives, as appropriate. After one month, a total of 178 completed responses were returned, and of these 178 responses, 26 incomplete responses were discarded. Accordingly, the analysis that follows and all reported statistics are based on a sample of 152 manufacturing organizations.

The data analysis was conducted through a strict process consisting of sequential steps. Firstly, Skewness and Kurtosis criteria were used to check multivariate normality of items of factors. Then these items' reliability was assessed using Cronbach's Alpha. Next, the validity of factors on the measurement was assessed by exploratory factorial analysis (EFA). Furthermore, the assumption of variance homogeneity was examined by Levene's test. Then, correlation was examined to provide a first sight of the relationships among variables. Finally, research hypotheses for mediating relationships were tested. SPSS were used for the data analysis process.

4. Research findings

Descriptive statistics of scales

The scores of variables range from 1 to 7

in general, which implies that there is no constraint on their variability. Their means fluctuated around the average mean of 4, ranging from a max of 4.30 to a min of 3.72. The standard deviation, which implies the variation of each variable, fluctuated around 1 with a max value of 1.243 and a min value of 0.875. Finally, all absolute values of skewness and kurtosis were less than their thresholds of 3 and 5 respectively. Therefore, these variables are distributed normally.

Multivariate normality

Skewness and Kurtosis are two ways to examine multivariate normality (Field, 2005). Means of skewness and kurtosis were -.51 and -.92 respectively. While skewness values ranged between -.0573 and .1546; that of kurtosis values were .5735 and .1437. All values of skewness and Kurtosis showed deviations from perfect normality, but were still within the acceptable levels. All scales thus distributed normally and met the condition of multivariate normality. This sample was thus applicable to further multivariable data analysis.

Reliability

This study used Cronbach's Alpha to test the reliability of scales. All the values were higher than the threshold of .7. In addition, most of the values of *Cronbach's Alpha of Item Deleted* were lower than their values of Cronbach's Alpha and their values of *Corrected Item-Total Correlation* were higher than the threshold of .25 (Field, 2005). Although some items had their values of *Cronbach's Alpha of Item Deleted* higher than their values of Cronbach's Alpha, their values of *Corrected Item-Total Correlation* were higher than the threshold of .25. The scales therefore satisfied the assumption of

internal consistency reliability in general.

Validity

Validity is tested by Exploratory Factorial Analysis (EFA) technique to provide insights into the underlying latent variables. The result of EFA performed by SPSS showed that all constructs have eigenvalues more than 1 (see Appendix B).

Analysis of variance

Levene's test was used to assess the tenability of the assumption of equal variances (homogeneity of variance). Levene's test looks at whether there are any significant differences between group variances and so a non-significant result is indicative of the assumption being met (Field, 2005). Homogeneity of variance was significant in 5 variables at α of .05. It indicates that the variances of the sample's data were reasonably homogeneous across categories of firm size, industry type and ownership in general.

Hypothesis testing

This section examines the effect of communication (com), conflict (conf) and leader support (leadsup) on internal integration (inte) (H1, H2 & H3). Table 1 presents the output of the regression predicting the relationships among these variables.

The output presents the value of R and R^2 of .660 and .425. The value of R^2 is .425, indicating these variables (Com, Conf, Leadsup) account for 42.5% of the variation in internal integration. The F-ratio of 40.488, which is significant at $p < .001$, shows that the regression model overall predicts firm performance significantly well. The output in Table 1 shows that all the VIF values are far below a threshold of 10 and all the tolerance statistics are higher than a threshold of .2. These findings indicate that multicollinearity did not distort the regression model. Besides, the findings in Table 1 also indicate that the three variables (communication, conflict and leader support) have significant relationships with internal integration at $\alpha < 0.05$. Therefore, hypotheses H1, H2 and H3 are accepted.

The output provides the value of R and R^2 of .577 and .320. The value of R^2 is .320, indicating these variables (Com, Conf, Leadsup) account for 32% of the variation in functional performance. The F-ratio of 26.096, which is significant at $p < .001$, shows that the regression model overall predicts functional performance significantly well. The output in Table 2 shows that all the VIF values are far below a threshold of 10 and all the tolerance statistics are higher than a threshold of .2. These findings indicate

Table 1: The relationship between communication, conflict and leader support with internal integration

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	3.392	.468		7.253	.000		
Com	.376	.062	.408	6.015	.000	.705	1.419
Conf	-.294	.061	-.328	-4.783	.000	.774	1.293
Leadsup	.104	.059	.109	1.776	.048	.831	1.203

Table 2: The relationship between communication, conflict and leader support with functional performance (without internal integration in the regression)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	3.950	.404		9.784	.000		
Com	.122	.054	.167	2.260	.025	.802	1.247
Conf	-.287	.053	-.404	-5.415	.000	.751	1.331
Leadsup	.151	.051	.198	2.978	.003	.620	1.613

that multicollinearity did not distort the regression model. Moreover, the output in Table 2 shows that the three variables (communication, conflict and leader support) also have significant relationships with functional performance at $\alpha < 0.05$.

The last regression presents the value of R and R^2 of .590 and .332. The value of R^2 is .332, indicating these variables (Com, Conf, Leadsup and Inte) account for 33.2% of the variation in functional performance. The F-ratio of 20.876, which is significant at $p < .001$, shows that the regression model overall predicts functional performance significantly well. The output in Table 3 also shows that all the VIF values are far below a threshold of 10 and all the tolerance statistics are higher than a threshold of .2. These findings indicate that multicollinear-

ity did not distort the regression model. The findings in Table 3 verify that three variables including conflict, leader support, and internal integration have significant relationships with functional performance. Therefore, H4 is accepted (it confirms the significant relationship between internal integration and functional performance). However, comparing the outputs of Table 2 and Table 3 show that the relationship between conflict and functional performance is significant but unchanged both before and after adding the variable 'inte'. Therefore, the integration does not mediate this relationship; whereas the significance of the relationships between leadsup and com with functional performance are changed after putting inte into the regression. This means that the level of integration has an effect on these correlations. While

Table 3: The relationship between communication, conflict, leader support and functional performance (with internal integration)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	3.498	.462		7.565	.000		
Com	.072	.059	.098	1.210	.228	.768	1.301
Conf	-.248	.056	-.349	-4.408	.000	.718	1.392
Leadsup	.137	.051	.180	2.700	.008	.599	1.668
Inte	.133	.068	.168	1.952	.043	.775	1.290

integration partially mediates the effect of leadership on functional performance, this variable fully mediates the relationship between communication and functional performance, because whereas the first relationship is still significant, the second correlation is not significant after adding the variable *inte*. In short, while H5 and H7 are accepted, H6 is rejected.

5. Discussion and conclusion

This study has contributed to supply chain management in discovering some interesting insights into the complex relationships between internal integration, its antecedents and firm performance. Firstly, it confirms the findings of the previous research on internal integration, which suggests a positive relationship between internal communication (Souder, 1988; Pagell, 2004; Le Meunier-FitzHugh and Piercy, 2007), and leader support (Gupta et al., 1985; Le Meunier-FitzHugh and Piercy, 2007) with internal integration and a negative relationship between internal conflict and internal integration (Mollenkopf et al., 2000; Le Meunier-FitzHugh and Piercy, 2007). Secondly, this study is consistent with the supply chain literature that asserts that internal integration positively impacts functional performance (Vargas et al., 2000; Stank et al., 2001; Gimenez and Ventura, 2003 & 2005; Sanders and Premus, 2005; Rodrigues et al., 2004; Germain and Iyer, 2006). Furthermore, this research examines the mediating effect of internal integration on the relationships between leader support and communication with functional performance.

These findings lead to a new conclusion for the literature on the relationship between antecedents of internal integration and functional performance. These antecedents not only im-

ply impact internal integration but also have an effect on functional performance via integration. Increasing internal communication is therefore necessary for strengthening internal integration, which may lead to increasing functional performance. One of a manager's important jobs is to find useful ways to improve internal communication, such as encouraging closer physical proximity between functions by providing more spaces and opportunities for informal communication. Managers could also encourage staff to share information between departments, such as feedback on functional performance and plans to help to increase the understanding of each department's objectives, which reduces the perceived differences and role ambiguity between departments.

Besides communication, leader support also plays an important role in increasing internal integration and functional performance. First of all, managers need to understand the expectations of different functions in the organization. They should discuss and explore these expectations with the heads of functions. Then, the leaders need to arrange meetings for these heads to sit down and co-operate to solve any problems. Furthermore, the leaders have to keep their support fairly constant for all functions in order to avoid conflict between the functions. These actions will help to enhance internal integration and may result in strengthening functional performance.

While internal communication and leader support enhance internal integration and functional performance, internal conflict reduces these factors. Therefore, conflict should be managed more strictly. To limit conflict, all managers should understand the common goals

of the firm. In addition, communication between departments should be increased so that people in one department can understand the objectives of other departments, which reduces the difference in objectives between the functions but still meets the organisation's overall goal. Any role ambiguity among departments should be reduced. More communication and less conflict encourage people in different departments to participate in cooperation activities.

This study also has some limitations. First, it does not examine the relationship between antecedents of integration. Second, this paper only analyses relationships from the production manager's perspective. It would be interesting to include other perspectives, such as the purchasing manager's perspective. The survey was cross-sectional and so does not gather participants' perspectives and how they change over time, which could help to show the dynamics of concepts such as conflict and communication.

APPENDIX

Appendix A: The summary of scales

No.	Structure name	Scales	Coding	Sources
1	Communication, information sharing	- Two departments often share necessary information.	Com1	Paulraj and Chen (2007)
		- Two departments often inform about each department's performance.	Com2	
		- Two departments often share each department's plan.	Com3	
		- Two departments have good relationship with each other.	Conf1	
2	Conflict	- The goal of two departments is meeting each other.	Conf2	Meunier-FitzHug et al., (2007)
		- The objectives of two departments are not meeting each other	Conf3	
		- There is no or little conflict between two departments.	Conf4	
		- Top managers in the firm:		
3	Leader support	- Remind employees among different departments to work together to meet customers' needs.	leadsup1	Mollenkopf et al., (2000)
		- Encourage employees among different departments to sort out any differences that may arise between them	leadsup2	
		- Emphasise the importance of coordinating different department activities.	leadsup3	
		- Staffs of two departments often work together	Inte1	
		- Staffs of two departments work together as a team	Inte2	
		- Two departments conduct joint planning to anticipate and resolve operational problems	Inte3	
4	Internal integration	- Two departments achieve goals collectively	Inte4	Ellinger (2000)
		- Two departments develop a mutual understanding of responsibilities	Inte5	
		- Two departments make joint decisions about ways to improve overall cost efficiency	Inte6	
		- Our firm has reduced production rework	Per1	
		- Our firm has reduced production cost per unit of finished product	Per2	
		- Our firm has improved the quality of product	Per3	
5	Functional performance	- Our firm has reduced manufacturing cycle time	Per4	Narasimhan and Das (2000)
		- Our firm has reduced work-in-progress inventories	Per5	

Appendix B: EFA findings

Rotated Component Matrix^a

	Component				
	1	2	3	4	5
Leasup1				.899	
Leasup2				.853	
Leasup3				.896	
Conf1					.831
Conf2					.816
Conf3					
Conf4					.667
Com1	.855				
Com2	.825				
Com3	.681				
Inte1					
Inte2			.571		
Inte3			.818		
Inte4			.608		
Inte5			.538		
Inte6					
Per1		.730			
Per2		.678			
Per3		.740			
Per4		.582			
Per5		.677			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

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