Effect of Inter-Organizational Systems Use on Supply Chain Capabilities and Performance

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Abstract. Inter-Organizational Systems (IOS), which are information systems that extend beyond organizational borders, have seen growing use in linking companies to their supply chain partners. This paper empirically explores the relationship between IOS use, Supply Chain Capabilities, and Supply Chain Performance. The research model proposes that IOS use directly enhances Supply Chain Performance, and indirectly enhances Supply Chain Performance through Supply Chain Capabilities. To test the model, a survey of 200 firms operating in Ghana that use IOS was conducted. Analysis of the model was conducted using Partial Least Squares Structural Equation Modeling techniques. The results of the study confirmed that IOS use positively impacted Supply Chain Capabilities and Supply Chain Performance. Supply Chain Capabilities also positively impacted Supply Chain Performance. Additionally, Supply Chain Capabilities was found to partially mediate the effect of IOS use on Supply Chain Performance. Implications of the study for research and practice are discussed.

Keywords: Inter-organizational systems, Supply Chain Capabilities, Supply Chain Performance.

1 Introduction

Inter-Organizational Systems (IOS) generally refer to information systems that extend beyond organizational borders. IOS is believed to have been coined by Kaufman (1966) who encouraged business executives to view their companies beyond their organizational boundaries and consider linking their companies to their supply chain partners and enterprises undertaking related functions. These systems are essential to augment the effectiveness of business activities and promote coordination among partners through timely exchange of information. IOS facilitate the electronic integration of business dealings and processes undertaken by more than one business entity (Chatterjee and Ravichandran, 2004). IOS have been important in the rise of Supply Chain Management, a concept which deals with the design of seamless value-added processes across organizational boundaries to meet the real needs of the end customer (Fawcett et al., 2013). Supply chain management seeks to help organizations create a

systemic and holistic view of their organization, having the consumer as the focus in the value chain, with the focal firm looking at improving interactions within and without in order to enhance the lot of the consumer. Thus, IOS can be seen as information systems that facilitate effective management of the supply chain (Agbenyo et al., 2018). In supply chain management, IOS use is seen in the use of electronic data interchange (EDI) systems, vendor managed inventory (VMI) systems, and collaborative planning, forecasting and replenishment (CPFR) systems, all of which enable firms to communicate in real time with supply chain partners (Steinfield, 2014). Various IOS are also used to support just-in-time inventory practices in supply chains.

IOS have significantly transformed the way business is carried out in many industries. In today's information age, large volumes of data are created by and exchanged between supply chain partners, and IOS have been widely adopted to help manage this information exchange (Premkumar et al. 1994). IOS use is perceived to be more prevalent in developed countries than in developing countries (Agbenyo et al., 2018). Research into the effects of IOS use in developed countries is also more matured, relative to those studies in the developing countries context (Agbenyo et al., 2018; Bakunzibake et al., 2016; Ali and Kurnia, 2011). The literature on IOS in Sub-Saharan Africa is particularly underdeveloped with very few studies exploring how IOS use enhances performance. Given that environmental and contextual influences are perceived to influence outcomes of information systems use (Asamoah et al., 2015; Agbenyo et al., 2018; Agyei-Owusu et al., 2018), it is important to explore the effects of IOS use in Sub-Saharan Africa. Thus, this study seeks to answer the following research question: *how does IOS use influence supply chain capabilities and performance?* Our study proposes that IOS use enhances supply chain performance directly and indirectly through supply chain capabilities.

This study has some practical and theoretical contributions. First, the study explains how IOS may enhance supply chain performance. The study presents insights into the effects of IOS use in Sub-Saharan Africa, a context which has not been properly explored previously. The study also helps to bridge the IOS research gap between developed and developing countries. The rest of the paper is structured as follows. The theoretical background and conceptual framework is presented next, followed by a discussion of the methodology. The results of the study are then presented. The paper concludes with a discussion of the implications, recommendations and limitations of the study.

2 Theoretical Background

Chatterjee and Ravichandran (2004) note that despite the increasing interest and volume of research into IOS, not much theoretical generalization has emerged. The study of the outcomes of IOS have been explored from different perspectives such as, the

transactions cost (Malone et al., 1994; Gurbaxani and Whang, 1991; Choudhury et al., 1998), agency cost (Gurbaxani and Whang, 1991), power and interest (Boonstra and de Vries, 2005), incomplete contracts (Bakos and Brynjolfsson 1993; Banker et al., 2000), diffusion of innovation (Gurbaxani and Whang, 1991; Premkumar et al., 1994; Mukhopadhay et al., 1995; Chwelos et al., 2001), theory of constraints (Geri and Ahituv, 2008), resource-based view (McClaren et al., 2004), and coordination theory (Saeed et al., 2011).

This study is grounded on the resource-based view (McClaren et al., 2004). The resource-based view suggests that the resources and capabilities that firms possess are the basis of superior performance. The focus is on the resources and capabilities controlled by a firm, which is seen as the basis for persistent differences in performance among competing firms (Barney, 1991; Peteraf and Barney, 2003). The resource-based view of the firm conceptualizes firms as a bundle of resources and suggests that the type and quality of resources a firm controls is the basis for competitive advantage. Firms achieve competitive advantage by possessing resources which are valuable, rare, imperfectly imitable, and unique, and these enable companies to pursue opportunities and avoid threats (Barney, 1991). McClaren et al. (2004) explored IOS from the resource-based view perspective and argued that supply chain management information systems resulted in the creation of supply chain management information systems capabilities.

Information systems and IT infrastructure are critical organizational resources that can generate capabilities, which can be leveraged to enhance enterprise wide performance (Kayworth and Sambamurthy, 2000; Kumar, 2001). IOS serve a similar purpose, but instead are used between two firms rather than departments or business units within a firm. This study thus views IOS as an important inter-organizational resource that can serve as the basis for gaining supply chain capabilities and achieving superior supply chain performance.

3 Theoretical Framework and Hypotheses

The study proposes that using IOS results in superior supply chain capabilities and higher supply chain performance. We argue IOS Use can directly enhance the supply chain performance of firms, and indirectly enhance supply chain performance through enhanced supply chain capabilities.

IOS Use in this study refers to the extent to which firms have adopted and are using IOS in their operations. Extant literature identifies three broad uses of IOS, namely for communication, integration, and intelligence (Agbenyo et al., 2018; Cao and Zhang, 2013). These are explored as dimensions of IOS Use. *Supply Chain Capabilities* refer to the ability of an organization to identify, utilize, and assimilate both internal and external resources/information to facilitate the entire supply chain activities (Wu et al., 2006). Four primary Supply Chain Capabilities are identified in the literature – Integration, Coordination, Information Exchange, and Responsiveness (Wu et al., 2006). We explore these dimensions of Supply Chain Capabilities in this study. Finally, *Supply Chain Performance* is a measure of how well the supply chain can

meet its functional objectives (Agbenyo et al., 2018; Sezen, 2008). Three dimensions of Supply Chain Performance which have been identified in the literature – Reliability, Efficiency (cost containment) and Flexibility (Lee et al., 2007; Sezen, 2008) – are explored in this study. The theoretical framework for the study is presented in Figure 1.

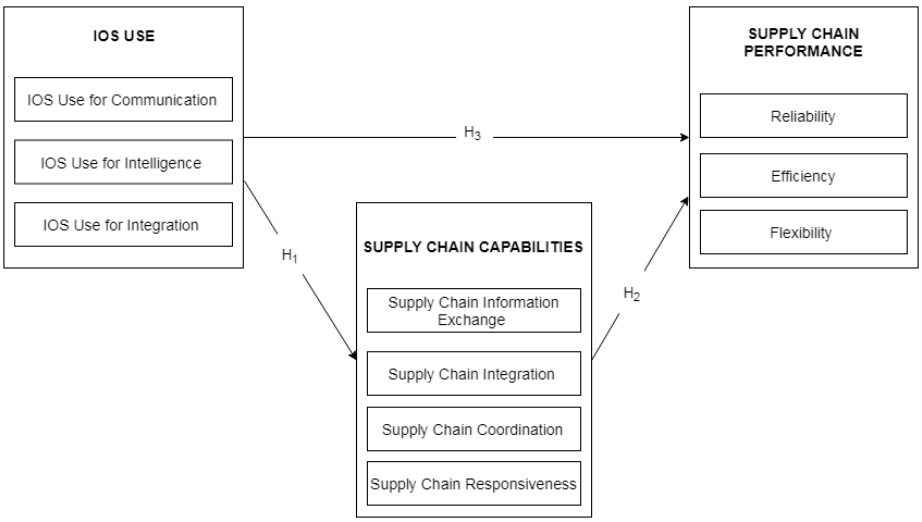

Figure 1: Conceptual model

Several studies have noted that the benefits achievable from an information system are often dependent on the extent to which they are implemented and utilized (Dwivedi et al. 2011; 2015; Karimi et al., 2007; Asamoah et al., 2015; Agbenyo et al., 2018). Some researchers have argued that IOS can directly enhance the performance of the firms in the supply chain in terms of higher efficiency and service levels (Bakos and Tracey, 1986; Charterjee and Ravichandran, 2004). McClaren et al. (2004) observed that the broad use of IOS in supply chains creates important capabilities for firms. The study of Wang et al. (2006) further lends credence to this view, by showing that using IOS leads to higher supply chain collaboration and integration. Previous studies show that the supply chain capabilities developed from IOS are important in driving performance of firms in the supply chain. Wang et al. (2006) survey study of Taiwanese manufacturing firms found that IOS, by integrating a set of suppliers for tighter supply chain collaboration, enables manufacturers to achieve greater manufacturing flexibility in addition to comparative cost advantages in supply-chain operations (Wang et al., 2006). Premkumar et al. (2005) study also revealed that IOS, by increasing information-processing capabilities, reduces supply-chain uncertainties, and that designing IOS to fit the information-processing needs for coping with supply chain uncertainties has a large positive impact on firm performance. Knowledge sharing and shared decision making which arises from IOS use leads to collaborative advantages in terms of productivity, agility, innovation and reputation (Chi and Holsap-

ple, 2005). Again, Hartono et al. (2010) noted that using IOS enabled higher quality data sharing, which positively impacted firms' operational supply chain performance. Based on these arguments, it is hypothesized that:

H_1: The broader use of IOS lead to higher levels of Supply Chain Capabilities
H_2: Higher levels of Supply Chain Capabilities lead to higher levels of Supply Chain Performance
H_3: The broader use of IOS lead to higher levels of Supply Chain Performance

4 Methodology

Measurement instruments for the constructs were obtained from previous studies and adapted to suit the context of this study. IOS Use was adopted from Zhang and Cao (2018), Supply Chain Capabilities was adopted from Wu et al. (2006), and Supply Chain Performance was adopted from Kocoglu et al. (2011) and Lee et al. (2007). The research items were positively framed using five-point Likert scales. The selected research items were then critically reviewed by three experts in the subject area whose input helped refine the measures. Finally, a pilot test involving 30 organizations that use IOS was performed to help further refine the research items. We conducted exploratory factor analysis on the pilot data, which confirmed the good factor loadings and multi-dimensionality of the research items. This helped to ensure valid measurement items were used in our survey. The measurement items used in this study are presented in the Appendix.

A survey of 200 randomly selected firms in Ghana that use IOS systems in their operations was conducted to obtain data to test the proposed model. Our data collection targeted manufacturers and key distributors of fast moving consumer goods. In Ghana, the big manufacturers of fast moving consumer goods and their key distributors typically use IOS to share inventory and sales information, as well as to plan and execute restocking decisions. Questionnaires were delivered to each selected firm with a cover letter detailing the purpose of the study. In all, eighty-six (86) responses were successfully retrieved, representing a reasonably high response rate of 43%. Power tests revealed that given a total of ten predictors of the dependent variable, a medium effect size of 0.15, and observed R^2 of 0.410, a sample size of 86 gives a statistical power of 0.99, which sufficiently exceeds the recommended threshold of 0.80 (Cohen, 1998).

5 Results

5.1 Demographic results

Analysis of the demographic data collected revealed that 15.1% of the respondents were manufacturers of fast moving consumer goods, with the remaining 84.9% being

distributors. There was a fairly even distribution in terms of maturity of the organizations surveyed, with about 36% of the firms being in existence for up to 10 years, 32.5% of firms operating for 11 to 20 years, and about 31.4% of the firms operating for more than 20 years. Finally, majority of firms (57%) had revenue levels of one million Ghana Cedis or less (approximately US$186,219). The full demographic results are presented in Table 1.

Table 1: Demographic data

Firm Type	**Frequency**	**Percent**	**Cumulative Percent**
Manufacturers	13	15.1	15.1
Distributors	73	84.9	100.0
Total	86	100.0	
Years of Operation	**Frequency**	**Percent**	**Cumulative Percent**
Up to 10 years	31	36.0	17.4
11 to 20years	28	32.5	68.5
More than 20 years	27	31.4	100.0
Total	86	100.0	
Annual Revenue (in US$)	**Frequency**	**Percent**	**Cumulative Percent**
Less than 9,310	11	12.8	12.8
9,310 to 18,621	8	9.3	22.1
18,622 to 93,109	20	23.3	45.3
93,110 to 186,219	10	11.6	57.0
186,220 to 931,098	4	4.7	61.6
931,098 to 1,862,197	11	12.8	74.4
1,862,198 to 9,310,986	14	16.3	90.7
9,310,987 and above	8	9.3	100.0
Total	86	100.0	

5.2 Measurement model results

The measurement model was analysed by assessing the convergent validity and discriminant validity of the model. Convergent validity can be assessed by measuring the reliability of survey items, that is, assessing the composite reliability of constructs, average variance extracted (AVE), Cronbach's Alpha, and factor analysis (Hair et al., 2014). We tested the attributes of the constructs by measuring the psychometric properties of the constructs and comparing them against recommended benchmarks. The AVEs of all the constructs were higher than 0.5 as required (Barclay et al. 1995). Composite Reliabilities values were high (least value was 0.825) and comfortably exceeded the suggested threshold of 0.7 (Chin, 1998). Cronbach Alpha values also

exceeded the 0.7 threshold as recommended (Hair et al., 2014). The summary of the psychometric properties of the constructs are presented in Table 2.

Table 2. Attributes of Constructs

Constructs	**Cronbach's Alpha**	**rho_A**	**Composite Reliability**	**AVE**
IOS Use for Communication	0.905	0.907	0.933	0.777
Efficiency	0.917	0.920	0.942	0.801
Flexibility	0.918	0.921	0.938	0.753
Supply Chain Information Exchange	0.895	0.897	0.927	0.761
IOS Use for Intelligence	0.722	0.724	0.844	0.644
IOS Use for Integration	0.772	0.781	0.853	0.594
Reliability	0.867	0.872	0.904	0.654
Supply Chain Coordination	0.881	0.885	0.913	0.678
Supply Chain Integration	0.871	0.894	0.911	0.720
Supply Chain Responsiveness	0.849	0.855	0.892	0.624

We examined item loadings to ensure that all items loaded highly on their constructs (0.7 or higher) (Hair et al., 2014). Items with poor loadings were dropped as recommended (Hair et al., 2014). The loadings of the remaining items were adequate as can be seen in appendix II.

The items were tested for sufficient discriminant validity. Discriminant validity examines the extent to which a measure correlates with measures of constructs that are different from the construct they are intended to assess (Barclay et al. 1995). The factor loadings and cross loadings table indicates good discriminant validity because the loading of each measurement item on its latent variable is larger than its loading on any other construct (see appendix II). Further, discriminant validity can be assessed by comparing the square root of the AVE for each factor against the correlation of constructs against each other, with the former required to be higher than the latter (Fornell and Larcker, 1981). In Table 3, the bold diagonal figures represent square roots of AVEs whilst the off-diagonal figures represent correlation among constructs. It can be seen that the bold diagonal values are all greater than the off-diagonal ones, confirming adequate discriminant validity.

Table 3. Intercorrelation among constructs

	COMM	EFF	FLEX	INFEX	INTEL	INTG	REL	SCCOR	SCINT	SCRES
COMM	**0.882**									
EFF	0.611	**0.895**								
FLEX	0.411	0.571	**0.868**							
INFEX	0.497	0.536	0.486	**0.872**						

INTEL	0.490	0.343	0.295	0.443	**0.802**					
INTG	0.440	0.384	0.182	0.526	0.636	**0.771**				
REL	0.420	0.567	0.412	0.479	0.515	0.612	**0.809**			
SCCOR	0.559	0.449	0.378	0.620	0.303	0.452	0.328	**0.823**		
SCINT	0.470	0.308	0.250	0.462	0.565	0.475	0.541	0.557	**0.848**	
SCRES	0.488	0.433	0.467	0.757	0.528	0.625	0.615	0.592	0.625	**0.790**

Finally, discriminant validity was tested using the HTMT test. HTMT is the average of the heterotrait-heteromethod correlations (i.e., the correlations of indicators across constructs measuring different phenomena), relative to the average of the monotrait-heteromethod correlations (i.e., the correlations of indicators within the same construct) (Henseler et al, 2015). HTMT test approach indicates that HTMT values must be significantly less than 1, with a value of less than 0.85 ideal (Henseler et al, 2015). Table 4 indicates that the highest HTMT value is 0.791, confirming the model possesses adequate discriminant validity.

Table 4. HTMT results

	COMM	EFF	FLEX	INFEX	INTEL	INTG	REL	SCCOR	SCINT	SCRES
COM										
EFF	0.665									
FLEX	0.443	0.617								
INFX	0.546	0.586	0.526							
INTEL	0.598	0.420	0.382	0.552						
INTG	0.505	0.451	0.225	0.625	0.858					
REL	0.466	0.627	0.456	0.539	0.646	0.744				
SCCOR	0.621	0.496	0.415	0.687	0.380	0.533	0.368			
SCINT	0.515	0.342	0.282	0.502	0.723	0.586	0.607	0.607		
SCRES	0.544	0.484	0.519	0.860	0.678	0.774	0.712	0.667	0.724	

Structural model results

After confirming that the measurement model was sound, we proceeded to analyze the structural model and hypothesized relationships. PLS-SEM provides the magnitude and significance of the hypothesized causal relationships as standardized path coefficients. The parameter estimate of the hypothesized structural path should be statistically significant in the hypothesized direction of the effect. A path is considered to be statistically significant if its *p* value is less than the 0.05 significance level.

The R^2 values represent the variance explained by the latent variables. The results of the structural model analysis are presented in Figure 2 and Table 5 below.

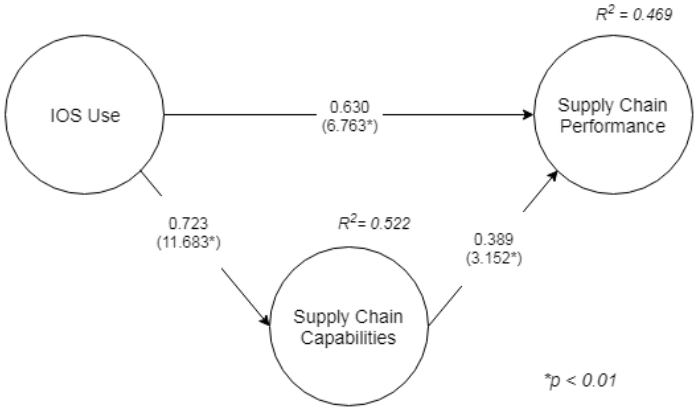

Figure 2. Research Model

Table 5. Hypotheses results

Hs	Hypothesis	Path Co-efficient	T Statis-tics	P values	Decision
H1	IOS use → Supply Chain Capabilities	0.723	11.683	0.000	Supported
H2	Supply Chain Capa-bilities → Supply Chain Performance	0.389	3.152	0.002	Supported
H3	IOS use → Supply Chain Performance	0.630	6.763	0.000	Supported

The co-efficient of determination (R^2) values of Supply Chain Capabilities and Supply Chain Performance were 0.522 and 0.469 respectively. This means that about 52.2% of the variation in Supply Chain Capabilities was predicted by IOS Use, and about 46.9% of the changes in Supply Chain Performance were predicted by IOS Use and Supply Chain Capabilities. These represent moderate levels of explanatory power (Hair et al., 2017). The results of the structural model analysis revealed that all three hypothesized paths were supported. The effect of IOS use on supply chain capabilities was positive and significant, supporting hypothesis 1. This confirms that firms that use IOS to a high level are better able to achieve higher levels of supply chain information exchange, supply chain integration, supply chain coordination, and supply chain responsiveness. The results further indicated that firms with higher supply chain capabilities are able to achieve higher levels of supply chain performance. This indicates that the supply chain capabilities developed through IOS use are useful building blocks that aid firms achieve greater reliability, efficiency and flexibility in their supply chains. Finally, the findings of the study indicated that IOS use can directly en-

hance the supply chain performance of firms, supporting hypothesis 3. Thus, it can be said that IOS use both directly and indirectly enhances the supply chain performance of firms.

Conclusion

The study explored the effects of IOS use in a developing country and observed that IOS use directly enhances supply chain performance and supply chain capabilities. The study also observed that supply chain capabilities directly enhance supply chain performance. There are a number of implications of the study for research and practice.

By way of implication for research, the study conceptualizes and empirically confirms that IOS use enables the development of supply chain capabilities for firms and as well enhances the performance of the supply chain. The relationship between IOS Use, Supply Chain Capabilities, and Supply Chain Performance has not been explored in this way in previous research and as such the findings of the study provide new insights on the outcomes of IOS use. Previous studies that explore IOS have largely done so from an information systems perspective, where the focus is on the characteristics of the IOS, or from a supply chain management perspective, where the focus is on how the IOS enhances collaboration. The study provides an integrative look at IOS and their outcomes from the resource-based view perspective, enriching both IOS use and supply chain management theories and providing new insights.

The study also provides context-specific insights into the outcomes of IOS use in Sub-Saharan Africa, a context which has not been empirically explored previously (Andoh-Baidoo, 2017). Research suggests that environmental and contextual influences are perceived to influence outcomes of information systems use and supply chain management initiatives (Asamoah et al., 2015; Asamoah et al., 2016), providing the need to properly explore information systems and supply chain management initiatives within the Sub-Saharan African context. The results of the study also point to a mediating effect of supply chain capabilities in the effect of IOS use on supply chain performance. Thus, using IOS enhances the ability of firms to manage their supply chains, which subsequently enhances the performance of their supply chains. By way of implications for practice, the study provides insights that can guide IOS use in Sub-Saharan Africa.

There were some limitations to the work. Even though IOS Use, Supply Chain Capabilities, and Supply Chain Performance were conceptualized as second-order constructs having first order dimensions, structural model analysis was conducted at the second-order level to prevent the model becoming overly complex. This however means the relationship between dimensions of these constructs could not be explored into greater detail. Also, as the study focused on the Sub-Saharan African context, the findings of the study may not be supported in other developing regions of the world. We call for more empirical studies to explore effects of IOS use in other developing countries. Future research should also be directed at exploring the mediating role of supply chain capabilities into more detail.

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Appendix I: Measurement scales of constructs

IOS Use for Communication

Our firm and supply chain partners use IOS for workflow coordination
Our firm and supply chain partners use IOS for conferencing
Our firm and supply chain partners use IOS for message services
Our firm and supply chain partners use IOS for frequent contacts

Our firm and supply chain partners use IOS for multiple channel communication

IOS Use for Integration
Our firm and supply chain partners use IOS for integrating business functions across firms
Our firm and supply chain partners use IOS for joint forecasting, planning, and execution
Our firm and supply chain partners use IOS for order processing, invoicing and settling accounts
Our firm and supply chain partners use IOS for exchange of shipment and delivery information
Our firm and supply chain partners use IOS for managing warehouse stock and inventories

IOS Use for Intelligence
Our firm and supply chain partners use IOS for understanding trends in sales and customer preferences
Our firm and supply chain partners use IOS for storing, searching, and retrieving business information
Our firm and supply chain partners use IOS for deriving inferences from past events (e.g., process exceptions, patterns of demand shifts, what worked and what did not work)
Our firm and supply chain partners use IOS for combining information from different sources to uncover trends and patterns
Our firm and supply chain partners use IOS for interpreting information from different sources in multiple ways depending upon various requirements

Supply Chain Information Exchange
Our Firm exchanges more information with our supply chain partners
Our Firm benefits more from information exchange with our supply chain partners
Information flows more freely between our firm and supply chain partners
Information exchange with our supply chain partners is accurate and timely

Supply Chain Coordination
Our Firm is more efficient in coordination activities with our supply chain partners
Our Firm conducts transaction follow-up activities more efficiently with our supply chain partners
Our Firm spends less time coordinating transactions with our supply chain partners than our competitors
Our firm has reduced coordinating costs more than our competitors
Our firm can conduct the coordination activities at less cost than our competitors

Supply Chain Integration
Our Firm develops strategic plans in collaboration with our supply chain partners

Our Firm collaborates actively in forecasting and planning with our supply chain partners
Our Firm projects and plans future demand collaboratively with our supply chain partners
Our Firm always forecasts and plans activities collaboratively with our supply chain partners

Supply Chain Responsiveness
Our firm and supply chain partners understand trends in sales and customer preferences
Our firm and supply chain partners promote storing, searching, and retrieving business information (share common database)
Our firm and supply chain partners derive inferences from past events (e.g., process expectations, patterns of demand shifts, what worked and what did not work)
Our firm and supply chain partners use information from different partners in multiple ways depending upon various requirements

Reliability
Our firm with supply chain partners offers products that are highly reliable
Our firm with supply chain partners offers high quality products to our customers
Our firm and supply chain partners have helped each other to improve product quality
Our firm with supply chain partners increases the rate at which we fulfill customer orders
Our firm with supply chain partners increases our inventory turns

Efficiency
Our firm with supply chain partners reduces inbound and outbound cost of transport
Our firm with supply chain partners reduces warehousing and inventory holding costs
Our firm with supply chain partners meets on-time delivery requirements for all product
Our firm with supply chain partners reach agreed costs per unit as compared with industry

Flexibility
Our firm with supply chain partners offers a variety of products and services efficiently
Our firm with supply chain partners offers customized products and services with different features
Our firm with supply chain partners meets different customer volume requirements efficiently
Our firm with supply chain partners has short customer response time as comparison to industry
Our firm with supply chain partners responds to and accommodate demand variations

Appendix II: Item Loadings

	COMM	EFF	FLEX	INFEX	INTEL	INTG	REL	SCCOR	SCINT	SCRES
APCOM2	**0.865**	0.452	0.348	0.335	0.370	0.357	0.299	0.509	0.388	0.383
APCOM3	**0.887**	0.403	0.279	0.362	0.440	0.338	0.287	0.405	0.393	0.296
APCOM4	**0.897**	0.625	0.340	0.479	0.362	0.400	0.459	0.529	0.455	0.551
APCOM5	**0.877**	0.657	0.471	0.558	0.543	0.447	0.427	0.525	0.422	0.480
APINTG1	0.119	0.211	0.027	0.272	0.517	**0.735**	0.492	0.202	0.395	0.418
APINTG2	0.377	0.359	0.185	0.443	0.444	**0.701**	0.452	0.357	0.315	0.422
APINTG3	0.360	0.314	0.097	0.439	0.531	**0.830**	0.511	0.373	0.375	0.542
APINTG4	0.452	0.289	0.228	0.443	0.478	**0.809**	0.440	0.429	0.383	0.527
APINTL1	0.398	0.273	0.132	0.235	**0.750**	0.543	0.393	0.180	0.551	0.351
APINTL2	0.469	0.292	0.223	0.398	**0.838**	0.465	0.434	0.271	0.421	0.395
APINTL3	0.305	0.258	0.360	0.434	**0.817**	0.526	0.410	0.279	0.387	0.530
SCCOD1	0.464	0.376	0.431	0.581	0.244	0.396	0.322	**0.763**	0.423	0.478
SCCOD2	0.404	0.297	0.262	0.523	0.276	0.434	0.171	**0.836**	0.475	0.494
SCCOD3	0.581	0.459	0.353	0.536	0.169	0.409	0.303	**0.891**	0.475	0.512
SCCOD4	0.383	0.321	0.216	0.344	0.237	0.306	0.175	**0.804**	0.348	0.369
SCCOD5	0.452	0.384	0.282	0.537	0.321	0.306	0.357	**0.818**	0.547	0.558
SCINFX1	0.560	0.621	0.367	**0.867**	0.349	0.560	0.512	0.521	0.413	0.591
SCINFX2	0.311	0.282	0.300	**0.863**	0.394	0.406	0.300	0.461	0.350	0.642
SCINFX3	0.380	0.452	0.427	**0.908**	0.421	0.447	0.449	0.574	0.369	0.719
SCINFX4	0.478	0.507	0.585	**0.850**	0.381	0.426	0.405	0.596	0.476	0.683
SCINTG1	0.483	0.267	0.193	0.447	0.482	0.416	0.487	0.583	**0.890**	0.578
SCINTG2	0.478	0.287	0.248	0.523	0.436	0.385	0.532	0.575	**0.896**	0.584
SCINTG3	0.271	0.280	0.209	0.296	0.560	0.458	0.435	0.389	**0.851**	0.454
SCINTG4	0.324	0.205	0.198	0.244	0.469	0.364	0.353	0.276	**0.749**	0.487
SCRESP1	0.174	0.194	0.319	0.463	0.444	0.475	0.463	0.339	0.604	**0.756**
SCRESP2	0.453	0.350	0.414	0.649	0.444	0.463	0.459	0.563	0.515	**0.790**
SCRESP3	0.507	0.378	0.471	0.671	0.413	0.455	0.412	0.601	0.480	**0.830**
SCRESP4	0.475	0.366	0.355	0.642	0.423	0.512	0.577	0.429	0.462	**0.843**
SCRESP5	0.269	0.418	0.261	0.541	0.360	0.585	0.537	0.368	0.414	**0.725**
SPEFF1	0.512	**0.849**	0.460	0.412	0.329	0.313	0.449	0.403	0.262	0.303
SPEFF2	0.548	**0.913**	0.511	0.480	0.304	0.377	0.481	0.426	0.266	0.347
SPEFF3	0.570	**0.920**	0.531	0.446	0.243	0.280	0.463	0.332	0.260	0.329

SPEFF4	0.556	**0.897**	0.537	0.570	0.351	0.399	0.625	0.445	0.312	0.553
SPFLX1	0.231	0.544	**0.823**	0.388	0.078	0.141	0.366	0.209	0.084	0.398
SPFLX2	0.269	0.376	**0.838**	0.315	0.319	0.168	0.257	0.280	0.219	0.335
SPFLX3	0.401	0.471	**0.884**	0.438	0.356	0.220	0.389	0.427	0.276	0.387
SPFLX4	0.425	0.535	**0.910**	0.402	0.231	0.089	0.367	0.317	0.239	0.415
SPFLX5	0.439	0.535	**0.882**	0.548	0.304	0.174	0.392	0.400	0.264	0.480
SPREL1	0.436	0.550	0.393	0.448	0.470	0.568	**0.846**	0.306	0.570	0.667
SPREL2	0.380	0.506	0.336	0.429	0.475	0.600	**0.849**	0.268	0.423	0.580
SPREL3	0.270	0.363	0.344	0.349	0.474	0.537	**0.824**	0.275	0.442	0.439
SPREL4	0.263	0.326	0.325	0.375	0.411	0.373	**0.793**	0.219	0.429	0.428
SPREL5	0.327	0.525	0.258	0.321	0.237	0.366	**0.725**	0.249	0.302	0.32