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UNDERSTANDING SUPPLY CHAIN MANAGEMENT AND ITS APPLICABILITY IN THE PHILIPPINES

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This is an exploratory study to determine the critical elements of supply chain management (referred to as SCM constructs) and the specific strategies associated with each SCM construct (SCM components). The study also aims to validate the extent of adoption of these SCM components by selected companies in the Philippines. The SCM construct development and validation process involved the following steps: (a) generating the SCM constructs from literature, (b) assessing their reliability and validity, and (c) validating the adoption of SCM constructs. The assessment of the instrument's reliability was done through the Internal Consistency Method with Cronbach coefficient alpha as the relevant coefficient while content and construct validity were done through expert reviews and exploratory factor analyses, respectively. Results show that out of the twenty-five originally developed SCM components, eighteen were retained. The SCM-related strategies were categorized into three: supply chain collaboration, supply chain operations, and coordination mechanisms. The study was able to validate the claims in the literature that SCM is not just about process orientation but about the relationship of the stakeholders in the supply chain.

Keywords: Supply chain management, supply chain collaboration, supply chain operations, SCM constructs, construct development, construct validation, reliability, validity

I. INTRODUCTION

Supply chain management (SCM) as a field of discipline may be considered to be still in its early stages of development (Gibson, 2005). Some practitioners view SCM as a relatively new field of discipline, while some authors consider it as a subset of the field of operations management, a collection of tools and techniques, a business philosophy, and a business process. In 1991, the Council of Logistics Management defined SCM as a business process involving the planning, implementation, and control of the efficient and effective flow and storage of goods, services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. This definition highlights the process and relationship orientations of SCM.

This study aimed to describe the various definitions associated with SCM and to categorize them accordingly. The study involved the following: a) identification and consolidation of the various strategies and programs associated with SCM, b) classification of these strategies and programs into specific SCM program components, c) validation of these SCM program components, and d) determination of the extent of adoption by Philippine companies of these validated SCM components.

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II. LITERATURE REVIEW

The literature below describes SCM from various perspectives and orientations. Anderson et al. (1997) described SCM as a collection of seven principles of SCM: customer segmentation, customized logistics, demand planning, customization, strategic sourcing, supply chain strategy, and supply chain performance measurement. They noted that the strength of SCM as a discipline and practice is its customer orientation. Customers need to be segmented based on their specific service needs. As such, supply chain operations (demand planning, logistics, and supply management) must address specific customer requirements. SCM also needs a supply-chain-wide technology strategy to support it. Lastly, Anderson et al. (1997) emphasized the need to have a common report card consisting of specific performance measures that will determine the effectiveness of SCM strategies.

Besides being a process-oriented system, SCM is also a discipline founded on the management of relationships both between corporate functions and across companies (Cooper & Ellram, 1993). In 1998, the Massachusetts Institute of Technology (MIT) introduced a new dimension of SCM by looking at SCM from a holistic and integrated approach (Metz, 1998). In 2008, the Council of Supply Chain Management Professionals described SCM as the integration of supply chain operations within and across companies. This concept is broader than the term SCM as this includes other stakeholders in a firm's value chain—the sub-suppliers, suppliers, internal operations, trade customers, retail customers, and end users. This definition also highlights the flow of various resources in the system such as material, information, and finances.

Blackwell and Blackwell (1999) also emphasized to look at SCM not only from the supply chain point of view but also from the demand chain point of view; after all, customers play a critical role in the whole value chain. Demand chain orientation involves considering the supply chain entities that may be involved in the process, such as process manufacturers, distributors, retailers, and others. In this regard, an understanding of consumer behavior and consumer analysis is critical. However, Blackwell and Blackwell (1999) also emphasized that sharing strategic information among supply chain partners is difficult to do. Trust in one another and common values are needed to achieve partnership. In 2005, Lambert et al. also emphasized the supply and demand orientations of SCM by viewing SCM as the integration of key business processes from the end user through the original suppliers, for the customers and other stakeholders.

Given that SCM needs collaboration with suppliers and customers, SCM, therefore, does not only include exchanging and integrating information between the supply chain entities but also involves linking together critical supply chain operations such as planning, forecasting, distribution, and product design (Kumar, 2001). Internal integration involves coordinating purchasing, production, information systems and logistics whereas external integration involves coordinating with suppliers and customers (Waller, 1999).

Cavinato (2002) described the various influences in the field of SCM over the past several decades. He emphasized the need to look at SCM from a strategic point of view, consistent with the holistic orientation of SCM. This orientation has been emphasized as well by Peter Metz as early as 1998 with the rise of the systems thinking and business process orientation associated with total quality management (TQM) and business process reengineering (BPR) initiatives. Kopczak and Johnson (2003) cited other trends that have affected the development of SCM, such as advancement in information

technology, decreasing product life cycles, increasing product variety, outsourcing, globalization, and emergence of new accounting and financial measures.

A number of studies have been conducted to understand and describe the strategies associated with effective SCM. The study of Mentzer et al. (2001) was an important research material in this field as he was able to identify the three important dimensions of SCM: a) systems orientation, b) cross-functional coordination, and c) customer focus. These dimensions highlight the strategic as well as the integrative nature of SCM as a field of discipline. In 2004, Min and Mentzer developed the measurement scales of two variables—Supply Chain Operation (SCO) and Supply Chain Management (SCM)—and noted other dimensions to SCM as originally identified by Mentzer et al. (2001). These other dimensions include leadership, goal setting, risk and reward sharing, and process integration, among others.

Given the various perspectives and orientations of SCM, there is a need to operationalize the definitions of the SCM constructs, especially as they are applied in the Philippine context. This study identified the critical business processes associated with SCM, focusing on two important pillars of SCM: a) demand management, and b) supply management functions. The study did not focus on logistics management as this is a function that can be outsourced to competent service providers. This study then identified the strategies associated with each supply chain operation, which could indicate whether the company is adopting SCM or not. Inherent in these definitions is the need to look at these strategies from the point of view of the suppliers, the customers, and the firm's stakeholders.

III. CONCEPTUAL FRAMEWORK

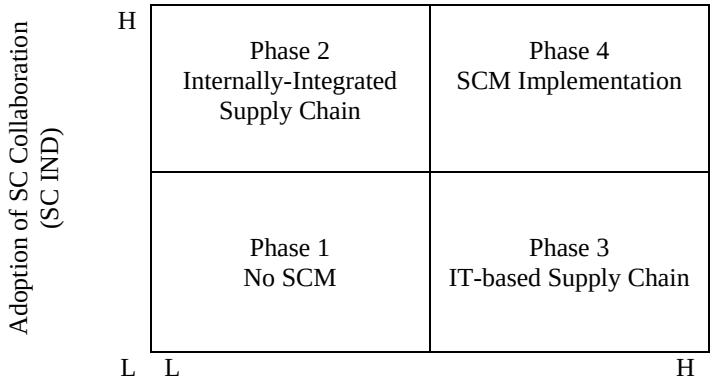
From the literature, eight SCM constructs were generated. The SCM constructs refer to the supply chain operations associated with supply chain management. The eight SCM constructs consisted of 25 components (refer to Table 1).

It is the main hypothesis of the study that the SCM program components adopted in the Philippines will be consistent with the theoretically derived SCM constructs. The items were also categorized into two: a) the extent of collaboration with suppliers and customers, and b) the extent of adoption of information technology in the management of the supply chains. Depending on the firm's assessment of the extent of its adoption of the twenty-five SCM components, a firm's phase of SCM development can be positioned in the proposed SCM grid (refer to Figure 1).

Table 1
Original SCM Constructs

Supply Chain Operation	Code		Component
1. Demand forecasting	DF1	1.	Demand forecasting done by marketing department only
	DF2	2.	Collaborative demand forecasting using multifunctional team
	DF3	3.	Demand forecast done in collaboration with customers
	DF4	4.	Demand forecast done in collaboration with suppliers
2. Materials and production planning	MP1	5.	Materials and production planning done by production department only
	MP2	6.	Collaborative materials and production planning using multifunctional team
	MP3	7.	Materials and production planning done in collaboration with customers
	MP4	8.	Materials and production planning done in collaboration with suppliers
3. Supplier coordination	SC1	9.	Coordination with suppliers through regular communication systems (telephone calls, letters)
	SC2	10.	Coordination with suppliers through Web-based tools (electronic data interchange and mail-enabled transactions)
	SC3	11.	Shared databases with suppliers
4. Customer coordination	CC1	12.	Coordination with customers through regular communication systems (telephone calls, letters)
	CC2	13.	Coordination with customers through Web-based tools (electronic data interchange and mail-enabled transactions)
	CC3	14.	Shared databases with customers
5. Procurement	PR1	15.	Procurement through traditional and paper-based systems
	PR2	16.	Online purchasing (e-procurement)
6. Customer order taking	COT1	17.	Ordering through traditional ordering systems (paper-based)
	COT2	18.	Online ordering
	COT3	19.	Efficient customer response through point-of-sale system
7. Materials requirements planning	MRP1	20.	Managing materials requirements through manual system
	MRP2	21.	Managing materials requirements using partial computerization
	MRP3	22.	Managing materials requirements through computer software
8. Customer demand monitoring	CDM1	23.	Monitoring and capturing demand through manual system
	CDM2	24.	Monitoring and capturing demand through partial computerization
	CDM3	25.	Monitoring and capturing demand through computer software

Figure 1
SCM Positioning Grid



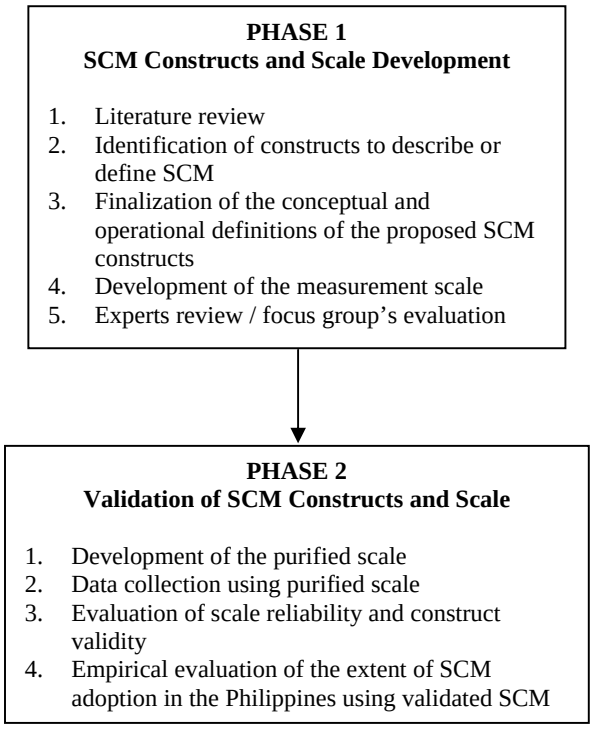
Phase 1: No SCM (low supply chain collaboration, low adoption of IT-based tools)
Phase 2: Internally-Integrated Supply Chain (high adoption of supply chain collaboration, low adoption of IT-based tools)
Phase 3: IT-based Supply Chain (low adoption of supply chain collaboration, high adoption of IT-based tools)
Phase 4: SCM Implementation (high adoption of supply chain collaboration, high adoption of IT-based tools)

IV. METHODOLOGY

The study has two phases. Phase 1 involved the construct and scale development while Phase 2 dealt with the validation. The first activity for Phase 1 is the conduct of a literature review to determine the extent of work done on defining SCM. The supply chain operations associated with SCM adoption were referred to as the "SCM constructs" while the specific strategies associated with each construct were referred to as "SCM components." This part was conducted to ensure that the definition of each SCM variable is brought down to its operational level so that respondents would have the same level of understanding of such variable (refer to Figure 2).

The instrument generated from this part was then subjected to an "Experts Review" to determine the face or content validity of the instrument. The content validity specifies the degree to which the scale items represent the domain or universe of the concept under investigation. Specifically, this panel review was done to determine how comprehensive and relevant these SCM constructs are in the Philippine context. The expert panel included some operations managers from the UP Manufacturing Linkage Program and the Production Management Association of the Philippines (PROMAP). After gathering the experts' opinions and comments, the instrument was then revised accordingly and was then subjected to empirical testing. The output of this phase was the identification of the validated SCM constructs.

Figure 2
Phases of the Research Methodology



Measurement for reliability was conducted to determine whether the measurement scale that had been developed would have consistent results if measurements were done repeatedly. This needs to be established to ensure the consistency and stability of a score from a measurement scale. The study used the Internal Consistency Method to determine the instrument's reliability with the Cronbach coefficient alpha as the relevant coefficient to evaluate. Measurement for construct validity, on the other hand, is important to determine the extent to which the developed instrument measures what it was designed to measure (Emory & Cooper, 1993). The construct validity of the instrument was determined through Exploratory factor analysis (through Principal components analysis) using SPSS software. A series of factor analysis runs were conducted. The analysis started with original twenty-five (25) SCM components (refer back to Table 1). After several runs, three SCM constructs (factors) were generated, each one consisting of six items. It should be noted that the original items did not load with their original grouping.

In assessing the extent of adoption of the validated SCM constructs, the SCM adoption index was computed. The reported scores of the respondent firms for the validated SCM components were added and then divided by the maximum score for the validated components for all respondents.

The researcher coordinated with the member firms of the UP Manufacturing Linkage Program (UP-MLP) and the Production Management Association of the

Philippines (PMDP) for the participation of their member firms. A survey method was then conducted. A total of 100 firms were targeted, with 79 firms participating in the study.

V. FINDINGS

Profile of Respondent Firms

Table 2 shows that sixty-three percent of the respondent firms were from the manufacturing industry while 37 percent were from the service sector. About 77 percent of the respondent firms have firm size of < 500, and 71 percent were fully owned by Filipinos.

Table 2
Profile of Respondent Firms

Description	Categories	Frequency	% to Total
Industry	Food Processing	10	12.6
	Pharmaceutical	13	16.5
	Garments / Accessories	14	17.7
	Semiconductor/Electronics	4	5.1
	Publishing	6	7.6
	Food Service / Restaurant	20	25.3
	Other Companies	12	15.2
	Total	**79**	**100.0**
Employee Size	< 500	61	77.2
	500-1000	6	7.6
	1001-1500	6	7.6
	1501-2000	1	1.3
	>2000	5	6.3
	Total	**79**	**100.0**
Extent of Foreign Ownership	100% Filipino-owned	56	70.9
	100% Foreign-owned	10	12.7
	With foreign ownership	13	16.5
	Total	**79**	**100.0**

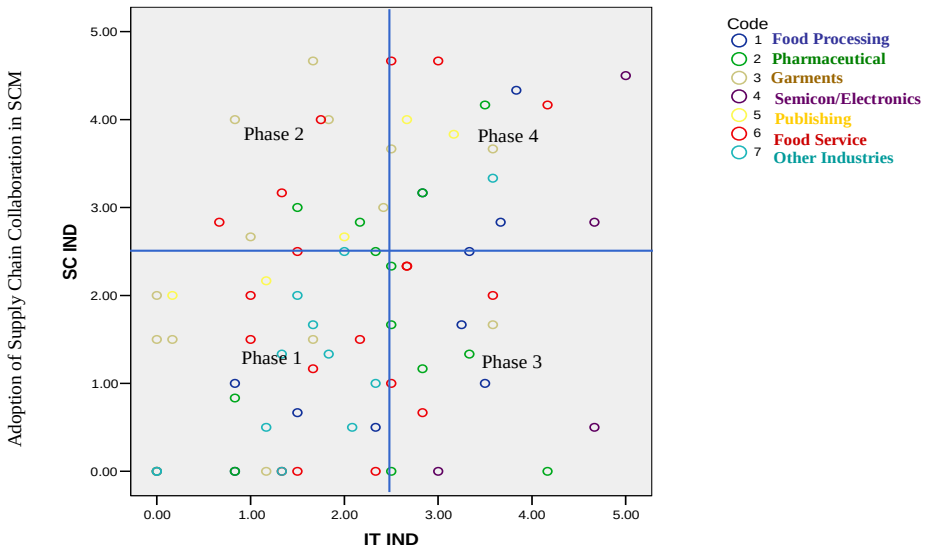
Notes:
1. Other manufacturing industries include manufacturers of toys, aluminum, food container, etc.
2. Service companies involve elevator repair and maintenance, restaurants, retail shops, etc.

SCM Positioning Grid

Figure 3 shows a scatter plot diagram describing the extent of adoption of information technology (X-axis) and supply chain collaboration (Y-axis) by the respondent firms. Using Figure 1 as the basis for analysis, results show that majority of the respondent firms can be found in Quadrant 1 (Phase 1), indicating the limited adoption of supply chain collaboration and information technology in SCM in selected

Philippine companies. This is related to the earlier findings of Talavera (2007, 2008) about the limited adoption of supply chain collaboration and supply chain operations in the Philippines.

Figure 3
Scatter Plot Diagram (Adoption of Supply Chain Collaboration and Information Technology in SCM)



Adoption of Information Technology in SCM

Validated SCM Constructs

The three validated SCM constructs (refer to Table 3) presented a new dimension in looking at SCM. The study started out with a functional view of the various strategies, arranging them according to supply chain operations. While the components in the three validated SCM constructs may have deviated from the original eight groupings, results of the factor analysis in Table 3 show that the components which loaded or form part of an SCM construct exhibited commonality in orientation and process.

The validated SCM constructs include: 1) supply chain collaboration, 2) supply chain operations, and 3) coordination mechanisms. The findings show that regardless of industry affiliation, SCM strategies are about process orientation and relationships. The pillars of SCM, therefore, are not just focused on specific supply chain operations such as demand management, supply management, and logistics management. An SCM program should involve the cooperation and collaboration of the stakeholders in the supply chain—namely, the customers and suppliers—and the various coordination and communication mechanisms to ensure the smooth relationship of these stakeholders. The findings support the new orientation of SCM as defined by the Council of Supply Chain Management Professionals (2008). Of

the original twenty-five SCM components, only eighteen (18) components were retained. The low item loading of some SCM components may be attributed to the high correlation among the components with some components loading in one or more constructs.

Table 3
Validated SCM Constructs

Factor	Items		Description	Item Loading	New SCM Factor Name
1	MP3	1.	Materials and production planning done in collaboration with customers	.858	**Supply Chain Collaboration (SCC)**
	DF4	2.	Demand forecast done in collaboration with suppliers	.829	
	DF3	3.	Demand forecast done in collaboration with customers	.706	
	SC3	4.	Shared databases with suppliers	.691	
	CC3	5.	Shared databases with customers	.656	
	MP4	6.	Materials and production planning done in collaboration with suppliers	.641	
2	CDM1	7.	Monitoring and capturing demand through manual system	.787	**Supply Chain Operations (SCO)**
	MRP1	8.	Managing materials requirements through manual system	.721	
	PR1	9.	Procurement through traditional and paper-based systems	.701	
	COT1	10.	Ordering through traditional ordering systems (paper-based)	.596	
	CC1	11.	Coordination with customers through regular communication systems (telephone calls, letters)	.552	
	SC1	12.	Coordination with suppliers through regular communication systems (telephone calls, letters)	.550	
3	DF2	13.	Collaborative demand forecasting using multifunctional team	.778	**Coordination Mechanisms (CM)**
	MP2	14.	Collaborative materials and production planning using multifunctional team	.615	
	SC2	15.	Coordination with suppliers through Web-based tools (electronic data interchange and mail-enabled transactions)	.554	
	CC2	16.	Coordination with customers through Web-based tools (electronic data interchange and mail-enabled transactions)	.552	
	CDM2	17.	Monitoring and capturing demand through partial computerization	.551	
	COT2	18.	Online ordering	.496	

Notes:
1. Extraction method: Principal components analysis
2. Rotation method: Varimax with Kaiser Normalization
3. The item loading refers to the loading in the rotated component matrix. The values were suppressed at 0.40.
4. Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.715 (indicates that the variables were able to be grouped satisfactorily into a smaller set of underlying factors).
5. Cumulative percentage of variation = 50.143 (50.14% of the variation is accounted for by the three validated SCM constructs)
6. The three SCM factors (constructs) have the following characteristics:

SCM Factor	No. of items	Eigenvalue	Cumulative Variation	Cronbach Alpha
1	6	5.089	26.782	0.86
2	6	2.676	40.869	0.75
3	6	1.762	50.143	0.72

An instrument that has internal consistency or reliability would have consistent responses even if questions are replaced with other similar questions. The Cronbach alpha was used to measure the internal consistency of the instrument to determine the degree by which the items in the instrument are homogenous and measure the same construct (Cooper & Schindler, 2006). Table 4 shows that the Cronbach alphas of the three SCM construct categories range from 0.7 to 0.86. According to DeVellis (1991) cronbach alphas that are between 0.70 to 0.80 and 0.80 to 0.90 are respectable and very good measures of internal consistency, respectively.

Table 4
Results of Reliability Analysis of the Three SCM Factor Categories

Item		Description	Item Statistics	
			Mean	**SD**
Supply chain collaboration				
1.	MP3	Materials and production planning is done in collaboration with customers.	2.23	1.915
2.	DF4	Demand forecast is done in collaboration with suppliers.	2.09	1.869
3.	DF3	Demand forecast is done in collaboration with customers.	2.48	1.907
4.	SC3	The firm has shared databases with its suppliers.	1.18	1.678
5.	CC3	The firm has shared databases with its customers.	1.30	1.778
6.	MP4	Materials and production planning is done in collaboration with suppliers.	2.42	1.932
		Cronbach alpha (6 items) = 0.864		
Supply chain operations				
1.	CDM1	Monitoring and capturing demand through manual system	3.06	2.084
2.	MRP1	Managing materials requirements through manual system	3.41	1.990
3.	PR1	Procurement through traditional and paper-based systems	4.13	1.556
4.	COT1	Ordering through traditional ordering systems (paper-based)	3.89	1.790
5.	CC1	Coordination with customers through regular communication systems (telephone calls, letters)	4.32	1.256
6.	SC1	Coordination with suppliers through regular communication systems (telephone calls, letters)	4.30	1.390
		Cronbach alpha (6 items) = 0.752		
Coordination Mechanisms				
1.	DF2	Collaborative demand forecasting using multifunctional team	3.34	2.018
2.	MP2	Collaborative materials and production planning using multifunctional team	2.95	2.050
3.	SC2	Coordination with suppliers through Web-based tools (electronic data interchange and mail-enabled transactions)	2.91	1.943
4.	CC2	Coordination with customers through Web-based tools (electronic data interchange and mail-enabled transactions)	2.57	2.049
5.	CDM2	Monitoring and capturing demand through partial computerization	2.59	1.905
6.	COT2	Online ordering	1.47	1.738
		Cronbach alpha (6 items) = 0.717		

Table 5 shows the extent of adoption of the eighteen validated SCM components. Talavera (2007, 2008) noted that supply chain cooperation, as well as adoption of demand management and supply management functions, was not adopted to a large extent in the Philippines mainly because of trust issues among the players in the supply chain. Supply chain operations were adopted relatively to a larger extent (77 percent) as compared to coordination mechanisms (53 percent) and supply chain collaboration (39 percent). Details are shown in Appendix A.

Talavera (2008) observed that respondent firms from different industries also adopted to a limited extent supply chain operations that require full information sharing with stakeholders like suppliers and customers. The same results were observed in this study with the low adoption of the three validated SCM factor categories.

Table 5
Extent of Adoption of Validated SCM Constructs

SCM Construct	Code		SCM Strategies	PHILS. (n=79)	Overall SCM Adoption Index (In %)
Supply Chain Collaboration	MP3	1.	Materials and production planning done in collaboration with customers	2.23	
	DF4	2.	Demand forecast done in collaboration with suppliers	2.09	
	DF3	3.	Demand forecast done in collaboration with customers	2.48	39%
	SC3	4.	Shared databases with suppliers	1.18	
	CC3	5.	Shared databases with customers	1.30	
	MP4	6.	Materials and production planning done in collaboration with suppliers	2.42	
Supply Chain Operations	CDM1	7.	Monitoring and capturing demand through manual system	3.06	
	MRP1	8.	Managing materials requirements through manual system	3.41	
	PR1	9.	Procurement through traditional and paper-based systems	4.13	
	COT1	10.	Ordering through traditional ordering systems (paper-based)	3.89	77%
	CC1	11.	Coordination with customers through regular communication systems (telephone calls, letters)	4.32	
	SC1	12.	Coordination with suppliers through regular communication systems (telephone calls, letters)	4.30	
Coordination Mechanisms	DF2	13.	Collaborative demand forecasting using multifunctional team	3.34	
	MP2	14.	Collaborative materials and production planning using multifunctional team	2.95	
	SC2	15.	Coordination with suppliers through Web-based tools (electronic data interchange and mail-enabled transactions)	2.21	
	CC2	16.	Coordination with customers through Web-based tools (electronic data interchange and mail-enabled transactions)	2.57	53%
	CDM2	17.	Monitoring and capturing demand through partial computerization	2.58	
	COT2	18.	Online ordering	1.47	

VI. CONCLUSION

Results show that out of the twenty-five originally developed SCM components, eighteen were retained. These eighteen SCM-related strategies were then categorized into three: supply chain collaboration, supply chain operations, and coordination mechanisms. The findings support the three dimensions of SCM presented in the study of Mentzer et al. (2001): systems orientation, cross-functional coordination, and customer focus. However, Min and Mentzer (2004) identified supply chain operations that are important components of SCM: agreement on vision and goals, information sharing, risk and reward sharing, cooperation, process integration, long-term relationship, agreement on supply chain, and leadership. This study only focused on information sharing, cooperation, and long-term relationship. The other dimensions identified by Min and Mentzer (2004) could be subject of further study.

In general, the study was able to validate the claims in the literature that SCM is not just about process orientation but is really more about relationship of the stakeholders in the supply chain. The low adoption of the validated SCM constructs in the Philippines shows that Philippine industries still need to know more about the critical components of supply chain management and how SCM could be of value to the firm's competitive advantage.

Future studies should identify the other SCM-related strategies that could define SCM focusing in detail on demand planning, supply planning and logistics strategies. The relationship of SCM adoption and firm performance should be investigated. The role and importance of trust and relationships in supply chain management should also be looked into. Lastly, future studies should determine the barriers for effective supply chain management.

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Appendix A
Extent of Adoption of Validated SCM Components

SCM Construct	Code		SCM Components	FP (n=10)	PHAR (n=13)	GAR (n=14)	SEM (n=4)	PUBL (n=6)	FS (n=20)	MISC (n=12)	PHIL S. (n=79)	Overall SCM Adoption Index (In %)
Supply Chain Collaboration	MP3	1.	Materials and production planning done in collaboration with customers	1.80	1.92	3.07	1.75	3.17	2.30	1.50	2.23	
	DF4	2.	Demand forecast done in collaboration with suppliers	1.60	1.62	3.07	1.75	2.33	2.15	1.75	2.09	
	DF3	3.	Demand forecast done in collaboration with customers	2.50	2.15	3.50	2.00	3.17	2.35	1.67	2.48	39%
	SC3	4.	Shared databases with suppliers	1.00	1.31	1.07	2.00	1.50	1.35	0.58	1.18	
	CC3	5.	Shared databases with customers	1.10	1.00	1.71	2.50	2.00	1.35	0.50	1.30	
	MP4	6.	Materials and production planning done in collaboration with suppliers	2.60	2.62	3.07	1.75	2.50	2.65	1.08	2.42	
Supply Chain Operations	CDM1	7.	Monitoring and capturing demand through manual system	1.80	2.38	3.64	2.25	4.67	3.55	2.83	3.06	
	MRP1	8.	Managing materials requirements through manual system	2.40	2.31	3.86	1.50	4.67	4.20	3.58	3.41	
	PR1	9.	Procurement through traditional and paper-based systems	2.90	4.23	4.43	2.75	4.83	4.50	4.17	4.13	
	COT1	10.	Ordering through traditional ordering systems (paper-based)	3.70	3.69	4.07	2.25	4.83	3.85	4.17	3.89	77%
	CC1	11.	Coordination with customers through regular communication systems (telephone calls, letters)	3.80	4.62	4.07	5.00	4.83	4.00	4.75	4.32	
	SC1	12.	Coordination with suppliers through regular communication systems (telephone calls, letters)	4.60	4.31	4.00	4.50	4.67	4.45	3.92	4.30	
Coordination Mechanisms	DF2	13.	Collaborative demand forecasting using multifunctional team	4.80	4.31	2.50	3.50	3.33	3.40	1.92	3.34	
	MP2	14.	Collaborative materials and production planning using multifunctional team	3.70	2.62	2.79	3.50	2.67	3.20	2.42	2.95	
	SC2	15.	Coordination with suppliers through Web-based tools (electronic data interchange and mail-enabled transactions)	3.00	3.46	2.93	4.75	2.67	2.80	1.92	2.21	
	CC2	16.	Coordination with customers through Web-based tools (electronic data interchange and mail-enabled transactions)	2.30	2.62	2.86	4.50	2.33	2.55	1.92	2.57	53%
	CDM2	17.	Monitoring and capturing demand through partial computerization	2.50	2.46	1.93	3.33	3.17	2.75	2.75	2.58	
	COT2	18.	Online ordering	2.20	1.62	0.57	3.75	1.67	0.95	1.75	1.47	