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Abstract

Purpose – The primary purpose of this study is to understand the antecedents that influence supply chain coordination in the pharmaceutical supply chain using the transaction cost analysis framework.

Design/methodology/approach – Data from 156 retail pharmacies on their relationship with the pharmaceutical wholesalers are used to test the hypotheses.

Findings – The findings of this paper show the importance of antecedents that are based on the transactional cost theory, such as asset specificity and environmental uncertainty. These antecedents impact the supply chain process coordination at different levels—transactional, operational and strategic.

Research limitations/implications – Future research may investigate additional antecedents using other theoretical lenses.

Practical implications – Pharmaceutical wholesalers are dependent on pharmaceutical manufacturers for the supply of products and face intense competition that results in lower profit margins. They also face a constant threat from the manufacturers, who could potentially bypass the wholesalers (disintermediation) and go direct to the pharmacies. To counterbalance the dependence, the wholesalers strive to achieve loyalty with the retail pharmacies. Through supply chain coordination, the wholesalers achieve efficiency in procurement for the pharmacies, thus reducing cost and improving their competitive advantage.

Originality/value – This paper contributes to the supply chain coordination stream of literature. The three levels of process coordination are developed in this pharmaceutical supply chain context for the first time. The paper shows how process coordination can be achieved between the dyad without vertical integration.

Keywords: *Pharmaceuticals*, *Supply Chain*, *Process*, *Coordination*.

Introduction

Effective management of pharmaceutical supply chain systems is becoming important in the current regulatory and business healthcare environment. In the past, production and distribution of products and information through the marketplace was considered of secondary importance in comparison to the much more critical strategies of managing revenue and profitability. Supply chain issues are becoming popular in the current literature as they directly address the fundamental concerns of today's pharmaceutical companies—the problems of drug safety, security, visibility, risk management, cost control, profitability and growth. In today's environment as firms experience competitive pressures to reduce product and operating costs, to deliver them faster, be more responsive to customer needs and to develop business processes to respond to the radical shifts in the marketplace requirements, they have been increasingly turning to the strengths to be found in their supply chain partners to enrich their competitive capabilities (Prajogo, Oke and Olhager 2016).

In contemporary competitive and turbulent environment, the key to managing the supply chain is not managing different functions or products but managing the supply chain processes (Davenport 1993, Croxton et.al. 2001). Firms are aligning with their supply chain partners and creating business processes that are coordinated to gain competitive advantage in the marketplace. Supply chain coordination (a.k.a. integration) is defined as the extent to which the *processes* performed by the members of a distribution channel for a product or service are synchronized or matched. To be responsive to the market place, firms should coordinate well laid-out processes to improve performance. Lack of quick response to the needs of the customers or environmental changes can create inefficiency that can prove to be extremely costly for firms. As a source of

competitive advantage, supply chain coordination may determine who will succeed or fail in the 21st century.

Traditionally, the grocery industry, like most other industries, organized their people and managed their activities around business functions. The industry increasingly recognized that functional excellence did not translate to business excellence, which is achieved through superior business coordination. To achieve business excellence, firms should manage business processes and not the functions. Thus "Efficient Consumer Response" was an initiative in the grocery industry to improve firms' competitive advantages. They strove for process integration to make the supply chain efficient, then automated the processes at much lower costs to further reduce wasted time and costs (Reyes and Bhutta 2005).

In response to the emerging importance of process coordination between firms, we investigated the extent to which buyers (retail pharmacies) view themselves as integrated with their suppliers (i.e., wholesalers). Distribution of prescription drugs plays an important role in the delivery of healthcare. One of the goals of this distribution channel is to assure a continual flow of drugs to the patient, at optimal price, with minimal delays, few shortages, and with little room for error. The distribution system for prescription drugs is a dynamic, highly regulated, high performance system. Pharmaceutical supply chain must accommodate the infusion of an increasing number of new and expensive drugs to the marketplace while maintaining stringent security requirements, storage conditions and transportation requirements, especially the biotechnology products. Over the years, several regulations have been passed that have elevated the importance of the supply chain. For example, the Pharmaceutical Marketing Act of 1987 requires the supply chain members to be licensed and to account for the drugs that are distributed through the system. In 1970, enactment of Control Substance Act required stringent monitoring of

the supply chain for scheduled drugs. In 2013, the United States Congress enacted the Drug Quality and Security Act to build a system to identify and track prescription drugs that are distributed in the United States so as to prevent counterfeit drugs in the supply chain and protect the consumers. Tracking and tracing the prescription drug all through the supply chain can also help to identify and remove drugs that are recalled by the manufacturer. Process coordination in the drug distribution system would ensure quick response, reduce costs, increase security and improve quality of the healthcare delivery system.

The primary purpose of this study is to understand the factors that influence supply chain coordination in creating superior value in the supplier-pharmacy context. To identify influential determinants of supply chain coordination, we used the transaction cost analysis (TCA) framework. The major objectives of the study are to: (1) develop a model of supply chain coordination in a dyadic relationship and build the study hypotheses, (2) empirically test the study hypotheses, and (3) draw theoretical implications for future theory development and practical implications for pharmaceutical firms. In the next two sections below, we develop and present our model and hypotheses grounded in the literature from multiple disciplines—marketing, operations, and logistics. Specifically, we use the Transaction Cost Theory to develop the hypotheses. We then present the empirical methodology used to collect and analyze data from a random sample of pharmacies in the U.S. Next, we present the results and finally draw implications for managers and researchers. Identifying the influential factors in the model should enable the channel members to manage the channel better, thus improving the quality of distribution and eventually quality of care to the patients.

Supply Chain Process Coordination

Is supply chain process coordination the same as supply chain management? Supply chain management is defined as a continuously evolving management philosophy. It encompasses the management of upstream and downstream relationships with suppliers and buyers to deliver superior customer value at a lesser cost to the supply chain (Ledlow et.al. 2017). It seeks to unify the collective productive competencies and resources of the business processes found both within the firm and outside in the firm's allied business partners. It pools various supply chain partners located along intersecting supply channels into a highly competitive, customer-enriching supply system. Such a system is focused on developing innovative solutions and synchronizing the flow of marketplace products, services, and information to create unique, individualized sources of customer value (Siyu et.al. 2018). Supply chain process coordination, on the other hand, is a comprehensive, strategic, objective-oriented, process-based approach of coordinating various interorganizational processes. Process coordination is done to more efficiently and effectively meet customer requirements and to create a competitive advantage in the market place by competing as a total system (Prajogo, Oke and Olhager 2016).

In definitional terms, a process is simply a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within or between organizations, in contrast to a product focus—emphasis on what the focal product processes are (Davenport 1993). A process is thus a specified ordering of work activities across time and place, with a structure for action. In the supply chain context, processes within or between organizations should be coordinated such that superior business performance can be achieved (Mehralian et al. 2015, Lambert 2008). In a recent study published on top 10 issues in the healthcare supply chain, the number one issue is "coordination" in the

supply chain (Privett and Gonsalvez 2014). This underscores the importance of supply chain coordination, the focus of our paper.

There have been many literature reviews published on the topic of supply chain coordination and some recent ones in chronological order include Dixit et al. 2019; Srivastava 2017; Narayana et al. 2014; Leushner et al. 2013; Chen, Daugherty & Roath 2009; Fabbe-Costes & Jahre 2008; Van der Vaart & van Donk 2008). Unlike extant literature, we conceptualized supply chain coordination as a process matching mechanism that can occur at three levels (See Figure 1). First, the buyers and suppliers can coordinate their transaction processes to reduce or mitigate errors, improve cycle time, and avoid duplication of efforts. The product ordering process, fulfillment process, billing and payment processes, and the returned goods processing are examples of transaction processes. Invariably, transactional coordination is considered a basic requirement in supply chain relationships.

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Insert Figure 1 Here
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At the next level, supply chain coordination of the operational processes between a buyer and a supplier takes place. Examples of such processes are the employee training process, financial management process, inventory management process, and information systems management process. The coordination of operational level processes eliminates duplication of inventory stockpiles and improves future planning due to enhanced transparency. Since the needs of the customers vary and the levels of resources available to different suppliers vary, homogenous implementation of operational coordination is highly inefficient. Therefore, most firms first will focus on their most important partners or will respond to the ones that show inclination for process coordination. This can lead to variability in the performance of the supply chain.

When two firms link higher level processes that are crucial for the strategic success of both firms, then it is termed as strategic coordination. Such firms take a comprehensive view of their supply chain and focus on jointly producing superior value for their end-customer. Invariably, higher level decision-makers from both organizations are involved to spur such coordination efforts. It primarily has a long-term focus with an ongoing planning effort. In a pharmaceutical setting, it spans various processes such as advertising and promotions planning, back-to-school sale planning, marketing, prime vendor programs, retail employee training programs, technology needs assessment, etc. Strategic coordination can form the core of winning supply chains (Kearney 1995).

This study addresses the following research question: What factors lead to supply chain process coordination? These factors are also called the antecedents to supply chain process coordination.

Key Drivers of Supply Chain Process Coordination

What motivates our buyer-supplier dyad to coordinate its supply chain processes? In general, we contend that it is the motivation of the dyad to limit or minimize the transaction costs of their exchange. Transaction costs are essentially the costs associated with performing tasks such as gathering information, negotiating, monitoring performance, etc. We identify below the factors that mark these exchange conditions and, in turn, drive the dyad to engage in supply chain process coordination at all levels of the organization—transactional, operational and strategic (See Figure 1).

Transaction Cost Theory

The transaction cost theory proposes that when a transaction is more efficiently performed within a firm (i.e., vertical integration) or outside it, as opposed to autonomous contractors (i.e., market governance). The theory assumes that humans as transactors have "bounded rationality" (limited foresight into the future), and they are "opportunistic" and "risk neutral." As per the transaction cost theory, transactions are more efficient under "market governance" where competition drives the market, and price becomes the determining factor for efficiency. When certain dimensions of transactions raise the transaction costs, thus creating market failure, then there can be alternative forms of governance that can create efficiency in the transactions and safeguard the investment in the transactions. Such forms of governance may be hierarchical (vertical integration), where the ownership provides explicit contractual safeguards to protect against transaction hazards (Poppo & Zenger 2002), or relational, where collaborative exchanges (alliance) take place via coordination (Dyer 1997). The latter may be a viable alternative to hierarchy when the market fails. The dimensions that raise the transaction costs are asset specificity, uncertainty and transaction frequency (Williamson 1985). In this study, hypotheses are developed to test how the transaction cost dimensions (asset specificity and uncertainty) influence relational governance by supply chain coordination (alliance).

Asset Specificity

Asset specificity implies assets that are unique and tailored to a particular transaction and cannot be easily redeployed to another relationship apart from the parties involved in the transaction. These idiosyncratic assets raise a safeguarding problem because of the possibility of opportunistic exploitation of one-party demanding concessions, when the market governance of competition does not work. The solution provided by the transaction cost theory is vertical integration or hierarchical governance of a single ownership. Vertical integration via ownership

can increase control and safeguard the investment, but it increases the cost to the buyer significantly and does not completely protect against transaction hazards (Poppo & Zenger 2002). Also, the cost to dissolve the integration is very high. In order to safeguard the investment, firms can utilize relational governance via coordination of processes without significant cost of ownership.

Thus:

H1a: Asset specificity is positively related to transactional process coordination.

H1b: Asset specificity is positively related to operational process coordination.

H1c: Asset specificity is positively related to strategic process coordination.

Environmental Uncertainty

The second dimension, uncertainty, arises either when the relevant contingencies surrounding an exchange are too unpredictable to be specified ex ante in a contract (environmental uncertainty) or performance cannot be easily verified ex post (behavioral uncertainty). Environmental uncertainty refers to "unanticipated changes in circumstances surrounding an exchange" (Noordewier, John and Nevin 1990, p. 82). The primary consequence of environmental uncertainty is an adaption problem, that is adjusting agreements raises transaction costs, problem that can be addressed through vertical integration. One can, however, argue that high environmental uncertainty also encourages firms to maintain flexibility, which would go against vertical integration.

Environmental uncertainty can be operationalized as 'unpredictable nature of the external environment.' Klein suggested that 'uncertainty is too broad a concept and that different facets of it led to both desire for flexibility and a motivation to reduce transaction costs' (1989; 256). We have adopted the dimensions of environmental uncertainty of "volatility (dynamism) and

diversity (complexity)" in the environment as proposed by Klein and his colleagues (Klein 1989; Klein, Frazier and Roth 1990). The constructs of dynamism and complexity might have opposite effect on the extent of coordination between the parties. Klein and his colleagues posit that while dynamism encourages firms to form higher levels of integration (requiring higher coordination), complexity has just the opposite effect. Under conditions of complex environments in alliances, adaptations cannot be made unilaterally because they require mutual consent from both parties. Building such consent may take time and may be in a short supply in uncertain environments. Thus, the dynamism aspect of environmental uncertainty is defined as the rate of change in the environment and the complexity aspect as the degree to which the environment is heterogenous due to multiple sources of uncertainty in the environment ().

Thus,

H2a: Environmental dynamism is positively related to transactional process coordination

H2b: Environmental dynamism is positively related to operational process coordination

H2c: Environmental dynamism is positively related to strategic process coordination

H3a: Environmental complexity is negatively related to transactional process coordination

H3b: Environmental complexity is negatively related to operational process coordination

H3c: Environmental complexity is negatively related to strategic process coordination

Behavioral Uncertainty

Behavioral uncertainty is a performance evaluation problem, that is difficulty of observing and measuring compliance of the transacting parties to the contractual agreement. According to the transaction cost theory, the general response to the performance evaluation problem is vertical integration and Anderson (1985). In channel conditions, where vertical integration does not exist,

does difficulty in performance assessment increase the likelihood of supply chain process integration? The transaction cost theory suggests under conditions of higher behavioral uncertainty, higher levels of process coordination may be able to reduce the evaluation problems of the supplier. Thus:

H4a: Behavioral Uncertainty is positively related to transactional process coordination

H4b: Behavioral Uncertainty is positively related to operational process coordination

H4c: Behavioral Uncertainty is positively related to strategic process coordination

Data Collection and Analysis

This study is based on a cross-sectional survey of pharmacies in USA. We chose the survey methodology over conducting case studies of some dyads because we wanted a greater generalizability of the results. Given the nature of the study variables, we could not conceive of a field or lab experiment.

The list of pharmacies was obtained from each state department of licensing and regulation. Six hundred potential respondents were solicited through phone calls first. The mail survey was filled out by a pharmacy representative who was involved in the purchasing activities and had knowledge about the nature of the relationship with their wholesaler. The benefits of this study were enumerated in the cover letter to motivate the respondents and included a report of the study to those who provided their address. We followed up with a post card reminder. The respondents were asked to evaluate one of their suppliers.

To operationalize constructs of the study, we used both reflective and formative scales. Supply chain process coordination is measured using a formative scale and all other constructs with reflective scales. The convergent validity and discriminant validity were assessed by examining the correlations between constructs. Convergent validity was supported as the factors

facilitating supply chain process coordination and other control measures correlated appreciably with the outcome measures. There is evidence for discriminant validity as the three antecedents do not correlate significantly with one another and other measures that are not hypothesized to correlate. The nonresponse bias was ruled out as the T-tests between early and late respondents indicated no significant differences on the measures of interest.

The scale reliability was checked using the Cronbach's alpha for reflective scales, which were all above 0.70 as shown in Table 1. The factor analyses, presented in Table 2, also validated the composition of the scales as the items loaded on the desired factor. Similarly, a Cohen index was calculated for the formative scales. The Cohen Index is similar to Cronbach's Alpha, which is used for reflective scales. Before conducting the regression analyses to test the hypotheses, multicollinearity problems were checked. The correlations of each of the independent variable in the regressions with all the other independent variables was used to assess multicollinearity. The means, standard deviations of the scales, and the correlations were created and evaluated.

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Insert Table 1 and Table 2 Here
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The Ordinary Least Square Regressions were conducted to test the study hypotheses about relationships between the antecedents and supply chain process coordination index. Age of the relationship, channel volume and whether the contract was written or not were used as control variables. The regression equations are shown below:

Each type of process coordination = f (asset specificity, environmental dynamism, environmental complexity, behavioral uncertainty, written contract, channel volume and age of relationship)

For all the multi-item constructs, the summated scores were used in the regression analyses. Adjusted R-square was used to estimate the explained variance of the model.

Results

All three regression models, one for each type of process coordination, were significant at $p<0.05$. The R-squared for the three regressions range between 0.31-0.45, which means the control variables and study variables combined explain a significant amount of variance in each of the three dependent variables—the three types of process coordination. Of the three control variables, two—length of the relationship between a buyer and supplier and the presence of a written contract—are statistically significant in each of the three models. The third control variable, channel volume, is non-significant in all three models, which means that the extent of coordination, no matter what type, is not influenced by the volume of transactions in a dyadic relationship. This was an unexpected finding and needs to be explored further.

Hypotheses H1a-H1c are supported as asset specificity is significantly and positively (p-values ranging between 0.01 and 0.012) related to the three types of process coordination—transactional, operational and strategic coordination—as shown in Tables 3 through 5. Hypotheses H2b and H2c are also supported as environmental dynamism is negatively and significantly related to the operational ($p=0.058$) and strategic process integration ($p=0.035$). H2a is, however, not supported. Environmental complexity and behavioral uncertainty are positively related to only transactional process integration at $p=0.04$ and $p=0.01$ respectively, but not to either the operational or strategic process integration. Hence H3a and H4a are supported, but H3b-H3c and H4b-H4c are not supported. The results are discussed below.

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Insert Tables 3, 4 and 5 Here
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Discussion

The results of the study support the transaction cost theory's predication that asset specificity motivates supply chain process coordination significantly across all three levels—transactional, operational and strategic. This is a significant finding of the study. With higher levels of supply chain coordination, the wholesaler and the pharmacy might be able to safeguard their idiosyncratic investments and potentially reduce transaction costs. In the past, transaction cost theory was applied to vertical integration (common ownership). It is important to note that the transaction cost theory can be applied even in cases of "virtual coordination" based on processes. Aligning supply chain processes can create efficient supply chain system and it can be as successful as vertical integration.

Based on the extant literature, environmental dynamism was proposed to be positively related to supply chain coordination at transaction, operational and strategic levels. On the contrary, the results indicate that the impact is not-significant at the transaction level, but significant at the operational and strategic level though in the opposite direction of what was predicted. The results show that environmental dynamism is negatively related to coordination at the operational and strategic level. This indicates that the environmental dynamism does not have an impact on the day to day dealings that are routine and transactional, but it does impact negatively the coordination at the operational and strategic levels. In a rapidly changing environment, it might be challenging to coordinate activities given the pace of change because it takes time to plan and act in those situations.

Environmental complexity, on the other hand was predicted to be negatively related to supply chain coordination at all the three levels. We, however, found that environmental complexity was significant and positively correlated at the transaction level and not-significant at the operational and strategic levels. This finding illustrates that firms do coordinate when the environment is complex to reduce uncertainty and make adaptations to reduce transaction costs. Both environmental dynamism and complexity have different effects on supply chain coordination which is an intriguing finding. This study to some extent proves that these two environmental uncertainty constructs are unique and different dimensions of the environment and have opposing effects on coordination. Further work is necessary for theoretical development of the environmental uncertainty construct in the pharmaceutical supply chain context.

Finally, behavioral uncertainty had a positive and significant impact on transactional coordination, but no significant effect on operational and strategic coordination. Behavioral uncertainty is a performance evaluation problem and it increases the transaction cost because of difficulty in ascertaining ex post contractual compliance between the wholesaler and the pharmacy. In this case, based on the transaction cost theory, the performance evaluation problem could be addressed by coordination. Also, performance evaluation is easier at the transaction level as opposed to the operational and strategic levels. In the pharmaceutical supply chain context, the transactions are highly automated using information technology and it is easy to monitor the day-to-day transactions, both of which enhance coordination.

In summary, the results in general support the transaction cost theory predications for asset specificity at all three levels (transactional, operational and strategic coordination). Environmental uncertainty (dynamism and complexity) are complicated findings and require further investigation. Behavioral uncertainty is found to impact the transactional level coordination. Even though the

transaction cost theory is utilized in supply chain research in other industries, this is seminal research for the pharmaceutical supply chain context.

Managerial Implications

In a recent study (Singh et al. 2016), the number one issue identified in the pharmaceutical supply chain is supply chain coordination, the topic of this paper. We studied the key transaction cost theory factors that influence coordination between the wholesalers and the pharmacies at the transactional, operational and strategic levels. The management at the wholesaler and pharmacies can improve coordination that will reduce transaction costs and improve performance. The wholesalers invest significantly in the relationship with the pharmacies by providing customized IT and other services to enable the pharmacies to succeed in their business. The pharmacies also buy most of their product requirements from one wholesaler and participate in the loyalty program offered by the wholesaler. With high levels of idiosyncratic investments, high levels of coordination and sharing information would safeguard investments and reduce transaction costs to both parties.

The results of this study show that environmental dynamism is negatively related to coordination at the operational and strategic levels. Rapidly changing (dynamic) environment creates a speculation about the future and coupled with bounded rationality of managers it may lead to guarded approach to coordination. On the other hand, a complex environment facilitates coordination leading to better adaptation at the transaction level. These constructs require further exploration and testing to understand their opposite impact on coordination. Researchers in the past have had significant challenges with these constructs and more studies need to be conducted to understand their role in the supply chain. Finally, behavioral uncertainty has a positive impact

on coordination at the transaction level. Coordination will enable better monitoring of the day to day operations, evaluate the performance of the other party, and improve the performance of the supply chain.

The findings will help the wholesaler-pharmacy dyad in the pharmaceutical supply chain on the importance of supply chain coordination. The study clearly illustrates that coordination occurs at different levels (transactional, operational and strategic) and different transaction cost drivers have varied impact on coordination. Supply chain efficiency is very important in the pharmaceutical supply chain and this study shows that coordination across the supply chain can achieve those efficiencies. Supply chain coordination can achieve product availability to the patients at the right quality, right quantity, right time, right location and right price. Unlike other industries, the consequences of supply chain failure due to counterfeit drug infiltration, drug shortage, etc., can have dire impact on the healthcare system. In addition, the healthcare industry is highly regulated and so coordination among the supply chain members is critical for the safe and secure supply chain. To the best of our knowledge, this is the first empirical study to show the importance of supply chain coordination in the pharmaceutical supply chain with significant implications for wholesalers and pharmacies.

Limitations and Directions for Future Research

There are several limitations to this study, which should serve as a fertile ground for future research. First, this is a cross sectional study and thus precluded measurement of the dynamic nature of some of the constructs. Second, the perception of the relationship is observed only from the pharmacy's point of view and not from the drug supplier's perspective. Third, this study used a single informant, which is appropriate for half of our sample as for pharmacies that are smaller

in operation, such as the independents, these informants make the key purchasing decisions. Chain pharmacies in contrast might have multiple decision-makers in purchasing activities. Even though efforts were made to identify the key informant through a phone call, still it is possible that the survey respondents might not be fully aware of the decision-making situations and their pharmacy's preferences in all situations.

Fourth, the generalizability of study results may also be limited due to the following factors. The theory is tested in a pharmaceutical channel, which is somewhat unique due to the product, directed nature of the demand, and stringent regulation by the government. Further, the changes in technology and third-party payer influences are important factors that may limit the generalizability of the findings over time. Additionally, our sample is comprised of 50% independent pharmacies which may sway the findings a little. The pharmacists who manage independent pharmacies often have limited management training. Thus, their perceptions and responses could be different from those who are more highly trained in management, thus confounding the results of the study. Fifth, this study tried to address all the key transaction cost theory-based constructs and their relationships in this context. However, there may be other constructs that are based on other theories, such as the resource dependence theory, social exchange theory and social network theory that could contribute to understanding this issue further but were not included inadvertently (Gligor et. al. 2019). Sixth, the coordination was conceptualized at three levels (transactional, operational and strategic). We did not investigate if one has to achieve coordination in a linear fashion, that is transactional coordination before operational and strategic. Also, we didn't explore if one can achieve strategic coordination without transactional or operational coordination. Further studies are needed to examine these questions. Finally, one can study the consequences of supply chain coordination on responsiveness,

flexibility, risk management, compliance to regulations, etc. Despite the aforesaid limitations, this study provides valuable information from the practical standpoint of pharmacy professionals, contributes to the theory development by examining antecedents to process coordination based on the transaction cost analysis, and raises many questions for future research.

Appendix

Asset Specificity (5) α =0.85
(1=Strongly Disagree to 7=Strongly Agree)
1. We have significant investments in equipment dedicated to our relationship with this wholesaler.
2. A lot of the tasks we perform in the procurement process require closely working with the wholesaler.
3. Our procurement systems has been tailored to meet the transactions with this wholesaler.
4. Most of the training our pharmacy staff has gone through is to learn the wholesalers' procedures and routines.
5. We have made extensive adjustments in our pharmacy in order to deal effectively with this wholesaler.

Environmental Dynamism (5) α =0.88
(Anchored 1=stable to 7=unstable)
1. Stability of prescription sales volume
2. Stability of local market trends
3. Stability of market shares
4. Stability of Pharmaceutical prices
5. Stability of overall conditions of the local market

Environmental Complexity (5) α =0.62
(anchored 1=easy to 7=difficult)
1. Monitoring market trends
2. Number of competitors in our market
3. Assessing marketplace competition
4. Managing third party contracts
5. Market in which we buy pharmaceuticals

Behavioral Uncertainty (4) α =0.70
(1=Strongly Disagree to 7=Strongly Agree)

1. Assessing performance of the supplier is a complicated matter
2. It is inadequate to evaluate this supplier based only on based on price
3. Evaluating the performance of this supplier requires extensive inspection
4. Conducting performance evaluations of this supplier requires making sure they follow agreed upon procedures.

Please circle the extent of coordination between you and the wholesaler in the following processes. Circle the response that best represent the level of coordination between you and your wholesaler (1= minimal, 5 = extensive)

Transactional (4)
a. Product ordering process
b. Product fulfillment process
c. Billing and payment process
d. Return goods process

Operational (6)

e. Inventory management process
f. Store financial management process
g. Employee training process
h. Information system management support
i. Store layout/design support
j. New service development process

Strategic (7)

k. Pricing process
l. Promotional process
m. Market research process
n. Planning process to reduce costs
o. Planning process to improve responsive to patients
p. Information sharing process
q. Contract administration process

Channel Volume in percentage

1. What percentage of your total annual dollar purchases of prescription drugs do you obtain from this particular supplier ? _____%

Length of Relationship in years

2. How long have you been doing business with this supplier ? _____Years

Written Contract (Yes/No)

3. Does your company have a written contract with the supplier (yes or no)

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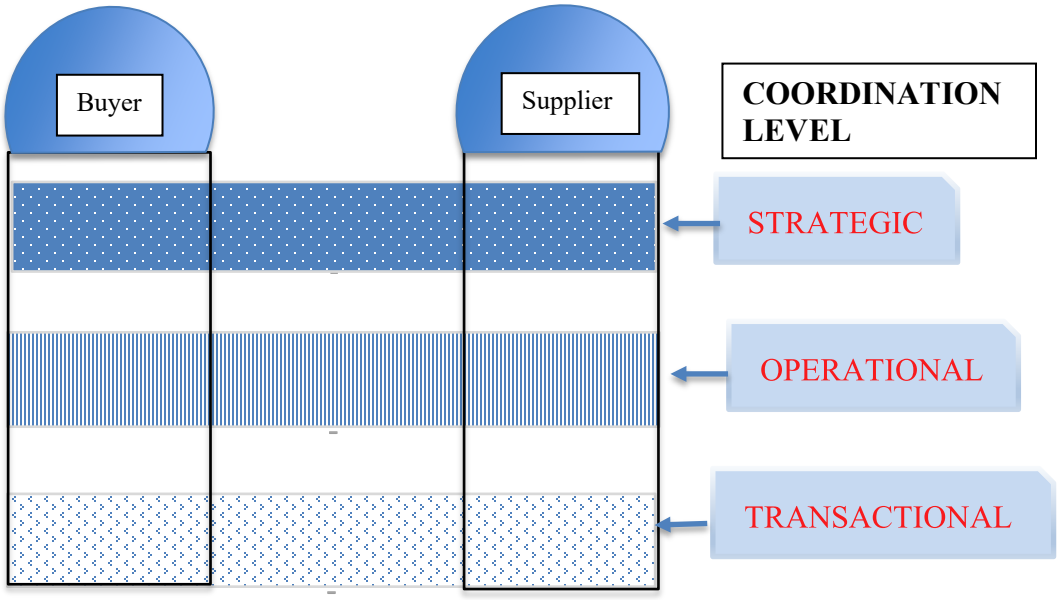

Figure 1: Levels of Supply Chain Coordination

TABLE 1. DESCRIPTIVE STATISTICS OF MEASURES

Measure (Number of items)	Mean	Std. Dev.	Reliability
Asset Specificity (5)	19.38	7.16	0.85
Environmental Dynamism (5)	15.60	5.82	0.88
Environmental Complexity (5)	21.99	4.75	0.62
Behavioral Uncertainty (4)	19.45	4.19	0.70
Transactional Process Coordination (4)	13.19	4.52	Formative Scale
Operational Process integration (6)	10.88	4.64	Formative Scale
Strategic Process integration (7)	11.46	5.08	Formative Scale
Channel Volume in percentage (1)	84.47	25.43	Single Item
Length of Relationship in years (1)	9.46	9.75	Single Item
Written Contract (Yes/No)	---	---	Single Item
Pharmacy Type			
Independent	50 (32.1%)		
Small Pharmacy Chain (2-9 units)	24 (15.4%)		
Large Pharmacy Chain (>10 units)	36 (23.1%)		
Food-Drug Combination Chain	30 (19.2%)		
Mass Merchandise Chain	16 (10.3%)		

TABLE 2. FACTOR ANALYSIS

	1	2	3	4
Asset Specificity1		.750		
Asset Specificity2		.840		
Asset Specificity3		.760		
Asset Specificity4		.796		
Asset Specificity5		.774		
Enviro Complexity1			.594	
Enviro Complexity2			.413	
Enviro Complexity3			.809	
Enviro Complexity4			.494	
Enviro Complexity5			.772	
Enviro Dynamism1	.906			
Enviro Dynamism2	.900			
Enviro Dynamism3	.878			
Enviro Dynamism4	.602			
Enviro Dynamism5	.701			
Behavioral Uncertainty1				.676
Behavioral Uncertainty2				.658
Behavioral Uncertainty3				.843
Behavioral Uncertainty4				.627

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

TABLE 3. REGRESSION RESULTS FOR TRANSACTIONAL PROCESS COORDINATION

Independent Variable	***Beta***	**T-Statistic**	***p*-value**
Asset Specificity	0.39	3.86	<0.01***
Environmental Dynamism	-0.14	-1.26	0.21
Environmental Complexity	0.22	2.02	0.04**
Behavioral Uncertainty	0.27	2.60	0.01***
Length of Relationship	0.36	2.98	0.01***
Channel Volume	0.15	1.43	0.16
Written Contract	0.20	1.85	0.07*

Model: Adjusted $R^2 = 0.38$ F value = 5.86 ($p < 0.001$)

TABLE 4. REGRESSION RESULTS FOR OPERATIONAL PROCESS COORDINATION

Independent Variable	***Beta***	**T-Statistic**	***p*-value**
Asset Specificity	0.34	3.60	<0.01***
Environmental Dynamism	-0.20	-1.93	0.058*
Environmental Complexity	0.03	0.25	0.802
Behavioral Uncertainty	-0.07	-0.69	0.492
Length of Relationship	0.50	4.87	<0.01***
Channel Volume	0.15	1.61	0.112
Written Contract	0.20	1.75	0.076*

Model: Adjusted $R^2 = 0.45$ F value = 7.70 ($p < 0.01$)

TABLE 5. REGRESSION RESULTS FOR STRATEGIC PROCESS COORDINATION

Independent Variable	***Beta***	**T-Statistic**	***p*-value**
Asset Specificity	0.28	2.59	0.012**
Environmental Dynamism	-0.25	-2.16	0.035**
Environmental Complexity	0.15	1.29	0.201
Behavioral Uncertainty	-0.10	-0.89	0.376
Length of Relationship	0.39	3.40	0.001***
Channel Volume	0.16	1.47	0.145
Written Contract	0.21	1.79	0.078*

Model: Adjusted $R^2 = 0.31$ F value = 4.27 ($p < 0.05$)