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VERTICAL COLLABORATION AND PHYSICAL DISTRIBUTION SERVICE QUALITY IN UGANDA'S SOFT DRINKS DEMAND CHAINS

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ABSTRACT

The purpose of this study was to explain physical distribution service quality in the soft drinks' demand chain using the collaboration dimensions of information sharing, incentive alignment and decision synchronization. The study was motivated by the desire to explore an area that has been understudied in Uganda and also make a contribution by providing knowledge on the factors affecting the performance of soft drinks' distribution chains. Data was collected from manufacturers and distributors in Kampala District. The findings revealed that the collaboration dimensions were significant predictors of physical distribution service quality. Incentive alignment was found to be a significant predictor of physical distribution service quality while decision synchronization and information sharing were insignificant predictors. This study makes numerous contributions that have been highlighted and also provides implications for theory and practice.

Keywords: *Vertical Collaboration, Physical Distribution Service Quality, Uganda, Soft Drinks.*

1. INTRODUCTION

The beverage industry producing; carbonated, non carbonated and non alcoholic soft drinks, relies on retail businesses to provide end distribution points for customers, (Kyamutetera, April 2009; Ohairwe, 2008). These retailers, constituting over 80% of Uganda's businesses, practice arms length vertical collaboration without optimizing information sharing, decision synchronization and incentive alignment, (Simatupang and Sridharan, 2004). This could explain their lucking performance in the Physical Distribution Service Quality (PDSQ) of their demand chains. Considering the necessity of soft drinks to the healthcare sector, the general community and the industry's contribution to the economy as a source of revenue and employment, the manufacturers and distributors have failed to take advantage of their collaborations to ensure timely delivery, availability of products and development of a reliable physical distribution system. The demand chains are characterized with long delivery cycle times, non availability of products in certain parts of the country and increased customer complaints, (Durgavich, Nabirumbi and Ochaka, 2008; Rabinovich and Bailey, 2004; Ntayi. et al, 2009). These indicators of inefficiency in the distribution system were also confirmed by the CEO – Century Bottling Ltd, Mr. Basil Gadios during an interview with the CEO Magazine, (Kyamutetera, April 2009) where he revealed that there was an actual need to improve the PDSQ of soft drinks to the far corners of the country.

Physical Distribution Service Quality forms part of a broader logistics that ranges from marketing, customer services, to the delivery of soft drinks to end consumers. According to Rabinovich and Bailey, (2004), a

physical distribution system is of quality if it's reliable and ensures availability and timely delivery of products to end users. Uganda's physical distribution functions; transport, warehousing, packaging, information management, order processing and handling, have created more of challenges than support in improving PDSQ due to the poor road network, Bimbona (2008), inadequate cooling/storage facilities, Masiga (January 27, 2009), unreliable power grid and poor communication technologies following an internet penetration rate of just 4% (African E-Index), (Heloise, 2006). These challenges are worsened by the wrong demand forecasts based on inadequate customer information shared among the manufacturers and distributors, inability to align incentives and synchronisation of process decisions in the collaboration arrangements, (simatupang and sridharan, 2004; Okello, 2007).

Current studies show that PDSQ inefficiencies can be eliminated if not minimized through vertical collaboration; that is collaboration between the soft drinks manufacturers and the distributors downstream, (Shan and Norm, 2007; Stephen, 1997). These collaborations however require a high level of information sharing, decision synchronization and alignment of incentives, (Simatupang and Sridharan, 2004), which aspects have not been fully exploited by the soft drinks demand chain members to improve their physical distribution processes, (Heloise, 2006 and Okello, et al. 2007). The information shared is inadequate, both manufacturers and distributors do not involve each other in decision making, and Incentive alignment is majorly evidenced in manufacturers setting lower prices for retail distributors to make a profit by selling above UGsh.600 for a 300milliter bottle of soda. Other logistical incentives like proper packaging and labeling are also aligned in the demand chain, Sandberg, (2007) but cannot be specifically apportioned to the different stakeholders downstream.

While literature provides empirical evidence on the effect of vertical collaboration on PDSQ, 60% of collaboration studies undertaken focused on manufacturing firms and suppliers as compared to 56% between the manufacturers and distributors, (Sandberg, 2007). This study therefore seeks to increase on the collaboration studies between manufacturers and distributors given that the retailers involved in the distribution of the drinks constitute 80% of businesses in Uganda, (Kyamutetera, April 2009; Ohairwe, 2008). More to that, this study is based on the conceptualization of collaboration by Simatupang and Sridharan, (2002, 2004, 2005) and Physical Distribution Service Quality by Rabinovich and Bailey, (2004), all done in more developed countries. While; Eyaa, et al. (2010); Muhwezi, (2008); Ntayi, et al. (2009); Ntayi and Eyaa, (2010) have done studies on collaboration in Uganda, none addresses Vertical collaboration and PDSQ with specific emphasis on the logistical aspects in the beverage industry. And, although other scholars reveal the need for communication technologies, trust and commitment to increase the effect of vertical collaboration on PDSQ, (Danese, 2007; Goran, 2005; Janjaap and Ghijsen, 2005; Simatupang and Sridharan, 2005; Soonhong. et al, 2005; Zineldin and Jonsson, 2000), these aspects have not been addressed in this study and therefore provide an opportunity for further study to improve PDSQ in Uganda's beverage industry.

From the introduction, some variables proposed by other scholars on how best to increase the effect of vertical collaboration on PDSQ were excluded but taken note of for the upcoming studies. This paper is meant to provide empirical evidence on the direct influence of vertical collaboration on PDSQ by critically analyzing the role of information sharing, decision synchronization and incentive alignment on achieving timely delivery and availability of soft drinks to end consumers using a reliable distribution system. Other parts of the paper include; the literature review, methodology, presentation and discussion of findings, research limitations and the related implications of the study.

2. LITERATURE REVIEW

This section focuses on reviewing and summarizing previous studies in line with vertical collaborations and physical distribution service quality (PDSQ) in demand chains and is specifically built around Rabinovich and Bailey, (2004) and Simatupang and Sridharan, (2002, 2004, 2005) conceptualizations in consideration with the current global trends.

Global competition, a key aspect in today's business boardrooms, has forced organizations to compete as demand chains as opposed to individual entities in order to outdo their rivals by improving the PDSQ of their products through provision of high customer service levels while minimizing the logistical related costs. One among the other strategies undertaken by manufacturers and distributors is the development of vertical collaborations between themselves and with shipping and other transportation firms (Venus, et al. 2009) to allow quick exchange of information, decision synchronization and incentive alignment in order to improve the PDSQ and therefore consolidate their competitive strength in the global markets. Vertical collaboration according to Simatupang, (2004); Wang and Archer, (2007), is an effort by two or more organizations to achieve results that they cannot achieve by working in isolation. The sharing of information, decision

synchronization and incentive alignment aid the members maximize their market share, minimize running costs and ensure reliable and timely delivery of products to customers, (Gunasekarana, et al. 2004; Sandberg, 2007).

Physical distribution service quality on the other hand is concerned with timely and reliable flow of goods from the receipt of an order until the goods are made available to the customer, (Rabinovich and Bailey, 2004; Rabinovich, et al. 2006). It requires optimization of logistics elements; production planning and demand forecasting, information management, routing and tracking, transportation, order processing, material control and warehousing (Aguezzoul, 2007; Krauth, et al. 2003) to ensure availability of products in a timely and reliable manner, (Rabinovich and Bailey, 2004; Simatupang and Sridharan, 2005; Soonhong. et al, 2005).

2.1 Information Sharing and Physical Distribution Service Quality

According to Simatupang (2004), Information sharing forms the starting point for collaboration arrangements in demand chains. It involves the capturing and dissemination of timely, accurate and relevant information such as the points of sale (POS) data, demand forecasts, inventory levels, delivery schedules, inventory costs and order fulfillment and any other relevant information among demand chain members to enable decision makers save time and other related costs in the different logistical practices to improve the PDSQ to customers.

Logistical aspects like demand forecasting, delivery scheduling and inventory management can be improved through collaborative planning, forecasting and replenishment (CPFR) between manufacturers and distributors to allow for the development of a timely and reliable physical distribution system of soft drinks to customers. CPFR requires sharing of accurate information to advance the integration of logistical activities with the aid of communication technologies where appropriate and top management support to increase the overall performance of the physical distribution system downstream, (Rabinovich and Bailey, 2004; Sandberg, 2007). Though scholars reveal that effective collaborative planning sometimes depends on the level of trust, commitment and the information communication technologies, to increase PDSQ, (Danese, 2007; Goran, 2005; Janjaap and Ghijsen, 2005; Zineldin and Jonsson, 2000), this study specifically defers these aspects for consideration in the next study.

Further revelations confirm that sharing of inventory data precludes information asymmetry, thus minimizing the bull whip effect whose influence in physical distribution includes: excess inventory related costs, slow response and lost profit by the parties in the demand chain, (Ntayi, et al. 2009; Vereercke and Muylle, 2006; Zhenx, et al. 2001). Pre-empting the bullwhip effect by sharing real time information will create certainty in production scheduling and distribution, more accurate demand forecasting, order batching and rationing of inventory leading to an increase the PDSQ, (Zhenxin, et al. 2001). From the literature reviewed, the following hypothesis is developed; ***Hypothesis 1*** *–Information sharing improves the level of physical distribution service quality.*

2.2 Decision Synchronization and Physical Distribution Service Quality

Simatupang (2004) defines decision synchronization as a joint decision making process in planning and other operational contexts or levels. Though other aspects are important, the operational level is more significant for this study given its influence on the day to day logistical activities like order generation, order and delivery processes, shipping schedules and inventory replenishment among others, responsible for reducing the total delivery time to improve PDSQ in the beverage industry, (Eyaa, et al. 2010).

According to Blomqvist, (2010), design processes for the different logistical activities in the demand chain should be inter – related to foster joint decision making in order to increase efficiency in production scheduling, order picking and processing, transportation and distribution of products. He further suggests such strategies like; First Come First Serve, Earliest Due Date and Shortest Processing Time as the decision sequencing rules that can be adopted by manufacturers and distributors during joint decision making in the beverage industry to improve PDSQ.

Decision synchronization can also be derived from Kim, et al. (2006)'s approach of sequencing production schedules, procurement and delivery lot sizes by one supplier and manufacturer to determine a common cycle length for the many retailer's orders. From their study, synchronizing of logistical activities like production scheduling, inventory management and procurement leads to achieving common delivery cycle times for the different retailers. On the other hand, manufactures and distributors can identify group technologies to help select product families that require similar processing requirements for manufacturing reconfiguration and layout design. The approach also known as cellular manufacturing requires synchronization of decisions to integrate the flexibility of process layout with the order tracking flow to waste free and high throughput processes that reduce on the lead time and therefore increase PDSQ, (Bhat 2008; Kunpeng and Sivakumar)

Kim and Burns, (2011) though in agreement with Blomqvist, (2010) introduce 3 aspects of inter – dependence: Common Model Interdependency, Concurrent Interdependency and Prerequisite Interdependency to allow demand chains make systematic decisions and therefore reduce on the total distribution time. From the 3 decision models, prerequisite interdependence is what helps synchronize the outputs of one logistical function to inputs of another. However, there is need for the manufacturers and distributors to share information using electronic coordination to develop an effective joint decision making process and also limit on the attraction of non value adding activities like memo writing, data entry, long response times in production scheduling, procurements and order processes that can negatively affect the PDSQ. Fortunately, information systems such as the Distributed Decision Support System (DDSS), have been developed and can now be incorporated into entity intra-nets Information Technology infrastructure to process information and provide results in milliseconds for decision makers in the demand chain. From the reviewed literature, the following can be hypothesized: ***Hypothesis 2 –*** *Decision synchronization increases the level of physical distribution service quality*.

2.3 Incentive Alignment and Physical Distribution Service Quality

Simatupang (2004) defines incentive alignment as the extent to which demand chain members share costs, risks and benefits realized from collaborative arrangements. For this study, the benefits include any logistical incentives that lead to a reduction in the lead time, minimize inventory costs, increase the speed and accuracy in order processing, increase efficiency in transportation, handling, storage and distribution of products between manufacturers and distributors.

Alignment of benefits in the demand chain has proven difficult due to individual entity interests that cannot be satisfied by the demand chain because, the chain members start as individual entities with personal objectives and then form demand chains. It is therefore common that these entities will hide sensitive information relating to inventory levels, production costs and demand forecasts in order to achieve their selfish interests. This information asymmetry can lead to demand chain members making wrong decisions leading to negative consequences such as the bullwhip effect and poor performance of the distribution system that could have been avoided. Simatupang, et al. (2000), suggests that there is need for a high level of interdependence among the demand chain members to reduce the level of information asymmetry and aid in alignment of incentives for all parties to achieve the overall objective of improving the timeliness and reliability of the physical distribution system. They further suggest a thorough scrutiny of the conflicting interests and information to avoid misalignment of incentives and therefore build motivation towards achieving the common objective of increasing the PDSQ.

Though in agreement with Simatupang, et al. (2004) and Suthathip, et al. (2009) on the contribution of incentive alignment to PDSQ, Bhat (2008) introduces a another aspect known as cellular manufacturing where manufactures in the demand chain identify components with similar processing requirements that can be produced in a flow line manner by manufacturing cells to reduce; material handling related costs, transport costs, set up times, work in progress inventory, through put times, lead times and improvement in scheduling and overall efficiency in physical distribution. Cell factories benefit by sharing group technologies and relevant information that allows integration of the logistical processes and reduction of inefficiencies such as slow response of the distribution function to customer orders due to inadequate information.

From the above review, manufacturers in the beverage industry need to consider other incentives to be shared besides setting lower prices for distributors to sell at a higher price for a profit. There are indirect incentives that can be shared among the members besides profit to increase the efficiency of the distribution system, for example; the provision of proper packaging materials; Bottles and crates, transportation and promotional materials, Suthathip, et al. (2009), will reduce on the product handling related costs, transportation costs and the overall lead time, and therefore improve the PDSQ. From the literature review, the following can be hypothesized: ***Hypothesis 3 –*** Incentive Alignment increases physical distribution service quality

2.4 Conclusion

Simatupang (2004) reveals that vertical collaboration if focused on specific logistical practices like; inventory management, production and scheduling, order processing among others, can reduce the levels of demand uncertainty and enable improvement in the delivery cycle time and overall performance of the physical distribution system. However, the physical distribution system of any given demand chain should highly center on customer service than total logistics costs as evidenced from the literature reviewed, an indicator that vertical collaborations under physical distribution alliances should aim at customer satisfaction than cost reduction.

In a demand chain set up, embracing multiple decision making authorities and aligning of their interests, Simatupang, (2000) by sharing information will lead to an increase in PDSQ. Chain members have to choose a coordination structure based on synchronized decision and an efficient information structure. Alignment of incentives can only motivate the chain members to work together but will not meet the different individual needs of the entities as a whole, because firms have different goals during incorporation and can only align the later to a given extent. It's therefore recommendable to use contractual relationships to determine the terms and conditions that will either constrain or enable chain members to share information, synchronize decisions and align incentives to achieve an overall improvement in the PDSQ.

3. METHDOLOGY

The study was cross – sectional, adopted the quantitative research design. The research was limited to Kampala because, according to the Uganda Business Register of 2006/2007, 61.4% of the beverage manufacturing firms are located in Kampala. According to the Uganda Bureau of Statistics Business Register (2008), there are 31 manufacturers and 664 distributors of soft drinks in Kampala, giving a population size of 695. From each category of respondents, a sample was selected. The sample size was determined using the Krejice and Morgan (1970) sample size table and the sample was randomly selected from the population by picking indiscriminately without replacement until the required number was obtained. The details of the population and sample size are shown in table 1 below:

Refer to Table 3.1, Population and Sample Size, page 10.

The unit of analysis in this study was the vertical collaborative relationship between manufacturers and distributors. We examined the perceptions of the manufacturers and distributions on the physical distribution service quality of the soft drink demand chains.

Measurement scales for the variables were obtained and adapted from previous studies. Scales for information sharing, decision synchronization and incentive alignment were acquired from Simatupang and Sridharan (2005), Simatupang and Sridharan (2004), Soonhong et al., (2005) and Vereercke and Muylle (2006). Physical distribution service quality was measured using scales of availability, timeliness, reliability obtained from Rabinovich and Bailey (2004). Measurement scales were tested for reliability using the Cronbach Alpha coefficient and all coefficients were above the acceptable cut – off point of 0.5 by Cronbach (1951).

We were conscious of research ethics and ensured that the findings were not collected with the intention of harming anyone and that the entire research process was ethical. We also ensured that matters that were indicated by the respondents as confidential were kept confidential. During dissemination of the findings, the researchers will also take care to ensure that they (findings) are presented in such a way that no one is intentionally harmed.

The required data was collected from the respondents using a structured questionnaire in which the responses to the statements were on a five (5) point Likert scale. (1 – Strongly disagree, 2 – disagree, 3 – neither agree not disagree, 4 – agree, 5 – strongly agree). The questionnaire was pre – tested and edited before embarking on the data collection process. During the data collection process, the introduction letters for the research assistants were obtained from the university in order to make it easy for the respondents to identify them. Phone calls were made to respondent firms and appointments for administering the questionnaire were set. Appointments were made to determine the convenient time when the questionnaire could be administered. At each company, permission was sort from the administrators in charge before the questionnaire was administered.

Once collected, the questionnaires were analyzed to ensure that they were all correctly filled in. The responses in the questionnaires were coded and entered into the SPSS (Statistical Package for Social Scientists) software (version 17) for analysis.

4. DISCUSSION OF RESEARCH FINDINGS

In this section, we present and discuss the findings of our study. In the first part of this section, we present the characteristics of the respondent firms. In the second part, we present the results of the correlation and regression analysis. In the third and last part, we discuss the findings of the study.

4.1Characteristics of Respondent Firms

Category of Firms **-** Majority of the respondent firms (95.4%) were distributors while manufacturers accounted for 4.6% of the firms.

Number of Employees in the Respondent Firms **-** 1% of the firms had less than 4 employees, 89% employed between 5 – 50 people and 10% had more than 50 employed as shown in the pie chart below:

4.2 Correlation Analysis

A correlation analysis was done to determine the strength and direction of the relationships between the independent variables and physical distribution service quality. The results of the correlation analysis are represented in table 2 below.

Refer to Table 4.1, Correlation Analysis Results page 10.

Results in the table above support the hypotheses presented in the literature review. The correlation coefficients are positive and significant. (Information sharing and physical distribution service quality – $r = 0.164$, $p<0.01$; decision synchronization and physical distribution service quality – $r = 0.269$, $p<0.01$; incentive alignment and physical distribution service quality – $r = 0.333$, $p<0.01$). Important to note, is the fact that the correlations between the independent variables and the dependent one are weak, with none of the correlations above 0.5.

4.3Regression Analysis

A hierarchical regression analysis was run to determine the impact of each independent variable on physical distribution service quality. The regression analysis also indicates the variation in the dependent variable that is explained by the independent variables. In the hierarchical regression analysis, we run four (4) models. In the first model, we control for the effect on the firm category and organization status because we believe that these can impact on the physical distribution service quality. In the second model, we add information sharing while in the third model, we add decision synchronization. In the final model, we add incentive alignment. The results of the regression analysis are shown in table 3 below:

Refer to Table 4.2: Hierarchical Regression Analysis Results, page 11.

In model 1, firm category and organization status were entered in order to control for them to ensure consistency of results across the different firm categories and organization status. Both firm category (sig = 0.781) and organization status (sig = 0.918) were found to be non – significant predictors of physical distribution service quality. These two variables did not account for any variation in physical distribution service quality (R Square = 0%) and model 1 is not significant in explaining physical distribution service quality at all (sig = 0.955).

In model 2, information sharing was added and the model is not significant in explaining physical distribution service quality (sig = 0.061). The model accounts for 2.7% of the variation in physical distribution service quality implying that the addition of information sharing increases the prediction power of the model by 2.7%. Of the three variables in model 2, only one variable, which is information sharing (sig = 0.007) is a significant predictor of physical distribution service quality.

In model 3, decision synchronization was added and the model becomes significant (sig = 0.000) accounting for 7.7% of the variation in physical distribution service quality. The inclusion of decision synchronization of the model increases the R Squared by 5%. Once decision synchronization is added to the model, information sharing ceases to be a significant predictor of physical distribution service quality and decision synchronization instead becomes the significant predictor.

In model 4, incentive alignment was added. The model now accounts for 13% of the variation in physical distribution service quality and is significant (sig = 0.000). The R Square increases by 6.2% when incentive alignment is added to the model. In this model, the only significant predictor of physical distribution service quality is incentive alignment.

Information sharing, decision synchronization and incentive alignment account for 13% of the variation in physical distribution service quality. The model is significant in explaining physical distribution service quality (sig = 0.000; F=8.555). Only incentive alignment is a significant predictor of physical distribution service quality.

4.4 Discussion of the Findings

The findings of this study confirm that the collaborative practices of information sharing, incentive alignment and decision synchronization are significant in predicting physical distribution service quality. Incentive alignment was found to be a significant predictor of physical distribution service quality while information sharing and decision synchronization were not significant predictors. This finding is in agreement with

Wiengarten et al., (2010) who in their study of collaborative supply chain practices and performance of the automotive industry in Germany concluded that "collaborative practices of information sharing, incentive alignment and joint – decision making do not equally improve performance (page 469)". In recent studies, scholars like Sanders (2007), Stank et al., (2001), Vereecke and Muylle (2006) have also found conflicting results on the impact of collaboration on performance. Wiengarten et al., (2010) argue that the collaboration dimensions of information sharing, incentive alignment and joint – decision making only have a strong impact on operational performance in environments where information is of high quality.

Our finding on the significance of incentive alignment is in agreement with scholars like Simatupang, et al. (2004), Suthathip, et al. (2009), Bhat (2008) and Sridharan's (2002; 2005) have found incentive alignment to be a significant predictor of performance. According to Ha et al., (2011), fair distribution of benefits and risks across the demand chain improves performance because members are committed to working so that they will benefit from the good results that will be realized. In the soft drinks demand chains in Uganda, distributors are usually aware of the benefits that will accrue to them from making sales and meeting set targets at the time they sign distribution agreements. Distributors therefore work hard to realize the targets and increase sales figures in order to benefit from the terms and conditions of the agreement.

Though authors like Sanberg (2007) and Whipple and Russel (2007) argue that information sharing is known to improve performance, others like Lee et al., (2007) and Wiengarten et al., (2010) argue that information sharing only improves performance if information shared is of high quality, is strategic in nature and information systems are in place to support the process of sharing information. Information sharing is not a significant predictor of physical distribution service quality in the soft drinks' demand chains in Uganda because the information shared is not strategic in nature but routine. Information shared by manufacturers and distributors relates to price changes, order quantities, re – order levels and distribution matters. Information sharing support systems do not also exist with low level technology like mobile phones and internet being used to exchange the routine information.

Our finding on decision synchronization not being a significant predictor of physical distribution service quality is in agreement with Wiengarten (2010) who asserts that improved performance may not automatically result from joint decision making. Eyaa et al., (2010) in their study on collaborative relationships and SME supply chain performance also established that decision synchronization was not a significant predictor of SME supply chain performance. This finding is in disagreement with the works of authors like Simatupang and Sridharan's (2002; 2004; 2005), Simatupang, et al. (2000), Suthathip, et al. (2009) and Bhat (2008) who have identified decision synchronization as a vital factor in improving performance in demand chains. A number of reasons exist to explain this finding that is unique to Uganda's beverage demand chains. First and foremost, undertaking joint decision making implies that the distributors become part of the decision making process in the manufacture's firms and vice versa. This means that vital information, which may even be confidential, will be shared between the two parties, which is highly risky, given the high levels of unprofessional business behavior in Uganda where people share confidential information with competitors in order to get paid. Secondly, many distributors in the soft drinks sector are not exclusive distributors, meaning that they carry brands produced by more than one firm and engaging in joint decision making with all the firms whose products they carry is not feasible. Manufacturers therefore hesitate to make joint decisions with their distributors because they are conscious of the fact that they carry competitor brands and may be tempted to share vital information with competitors in exchange for better business terms and favors. Thirdly, decision synchronization is not significant because in the soft drinks sector, distributors are simply informed of decisions that have been taken for purposes of implementation. For example, for one brand of soda, distributors are informed of the recommended retail price and they are expected to adhere to it. Products cannot be sold below that price but a price higher than the recommended retail price can be charged at the prerogative to the distributor. When market place changes take place and manufacturers make changes, distributors are tasked with having to explain to customers changes resulting from decisions that they are not a part of.

4.6 Theoretical Implications

The findings of this study have confirmed that the collaborative practices of information sharing, decision synchronization and incentive alignment improve performance in terms of physical distribution service quality in soft drinks' demand chains, thereby providing support for the works of Simatupang and Sridharan's (2002; 2004; 2005).

When collaboration is studied in demand chains, many authors do not specify whether they are considering vertical or horizontal collaboration. In this study, we specifically considered vertical collaboration between

manufacturers and distributors and its impact on physical distribution service quality, which is an understudied area in the developing world.

Scholars cited in the literature review generally agree and argue that information sharing, incentive alignment and decision synchronization improve physical distribution service quality in demand chains. The findings of this study are not in agreement with this position and we join other scholars who have found contradictory results on the impact of collaboration and performance. This, we believe is one of the contributions of our study. Wiengarten (2010) acknowledges that the impact level of the dimensions of collaboration varies and future studies in collaboration can focus on examining why the impacts of the dimensions vary in different settings. Future studies should consider examining why the factors that affect the impact of the dimensions of collaboration.

Another contribution we make is the addition of knowledge on the aspects explaining the variance in physical distribution service quality in the demand chain of soft drinks in the context of a developing country, specifically, Uganda. Physical distribution service quality has been widely studied in developed countries, with little focus on vertical collaboration. Though our model of information sharing, incentive alignment and decision synchronization only accounted for only 13.5% of the variance in physical distribution service quality, this contribution is noteworthy and is a spring board for future studies in physical distribution service quality or vertical collaboration in Uganda and other developing countries.

Finally, incentive alignment has been identified as the only dimension of collaboration that is a significant predictor of physical distribution service quality. Its identification provides an opportunity for managers and demand chain members in the beverage industry to determine improvement strategies for incentive alignment that can be designed and implemented.

4.7 Practice Implications

The first managerial and practice implication is the identification of vertical collaboration as a significant variable in explaining physical distribution service quality and the second implication arises from the fact that incentive alignment is the only dimension of collaboration which is significant in explaining physical distribution service quality. Though the model was significant in explaining physical distribution service quality, the contribution of incentive alignment clearly stands out. In the managerial and practice arenas, we make our contribution by presenting evidence to show that vertical collaboration has an impact on physical distribution service quality in the soft drinks demand chains in Uganda. The implication here is that managers and soft drinks' demand chain members should take into account the fact that vertical collaboration improves physical distribution service quality and should be embraced, but emphasis should be placed on enhancing incentive alignment. As long as the expected benefits are clear to members in the demand chain, they will embrace the collaborative arrangements geared towards achieving the common objective of improving PDSQ.

Managers and owners of firms in the soft drinks' demand chains should therefore implement systems that enhance collaboration, with emphasis on incentive alignment. Incentive alignment mechanisms should ensure that "benefits realized and burdens incurred are re – aligned" according to Simatupang and Sridharan (2002). Once incentives are aligned, commitment will come almost naturally. The members in the soft drinks' demand chain especially the manufacturers and distributors who supply other chain members can consider a range of incentive alignments that can prompt demand chain members to work towards improving physical service distribution quality. The options for improving physical distribution service quality through incentive alignment include; rewarding distributors in the demand chain who meet sales targets, recognizing efforts towards improving physical distribution service quality, rewarding good performance, ensuring that benefits are distributed equally across the supply chain (Simatupang and Sridharan, 2002; Narus and Anderson, 1996). Other strategies may include training of channel members who perform well in order to equip them with better skills.

Members of the beverage chains should take into account the fact that in order for the incentive alignment enhancement strategies to be effective, they have to be implemented across the demand chain. More to that, strategies should be evaluated against acceptability, suitability and feasibility before they are implemented.

5. STUDY LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

There are some limitations of this study and they help us to determine directions for future research.

Our model, that is information sharing, incentive alignment and decision synchronization accounted for only 13% of the variance in physical distribution service quality. Though our study had made the contribution of indicating the variance in physical distribution service quality that is explained by vertical collaboration, we did

not account for the 87% variance. We therefore recommend that studies carried out in this area in future take into consideration other variables like information technology, supplier opportunism, quality of transport infrastructure, demand chain uncertainties and trust which may impact on physical distribution service quality so that the extent to which they determine the variation can be determined.

In our study, we considered only registered manufacturers and distributors of soft drinks in Kampala. Our findings may therefore not apply to other sectors or even soft drinks manufacturers and distributors outside Kampala. We would like to recommend that the study be replicated in other sectors and districts.

In this study, we considered the perception of the manufacturers and distributions towards physical distribution service quality and did not consider the perception of ultimate consumers in the soft drink chain. Future studies should take into account the ultimate consumer's perception of physical distribution service quality.

We also recommend that a longitudinal study be carried out in future in the area of vertical collaboration because collaborations emerge over a period of time and assessment of their true nature may require observing them over time.

Information quality is an important aspect of collaboration that we did not take into consideration in this study. We recommend that future demand chain studies in Uganda, consider information quality as one of the areas to be addressed.

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TABLES

Table 3.1: Population and Sample Size

Category	Kampala	Sample Size
Manufacturers	31	28
Distributors	664	242
TOTAL	**695**	**270**

Source: Uganda Business Register of 2006/2007

Table 4.1: Correlation Analysis Results

	(a)	(b)	(c)	(d)
Information Sharing (a)	1			
Decision Synchronization (b)	0.536**	1		
Incentive Alignment (c)	0.336**	0.517**	1	
Physical Distribution Service Quality (d)	0.164**	0.269**	0.333**	1

** Correlation significant at the 0.01 level (2 tailed)

Table 4.2: Hierarchical Regression Analysis Results

	Model 1		Model 2		Model 3		Model 4	
	Standardized Beta	Sig.	Standardized Beta	Sig.	Standardized Beta	Sig.	Standardized Beta	Sig.
Firm category	0.017	0.781	-0.007	0.911	-0.005	0.928	-0.048	0.416
Organization status	0.006	0.918	0.032	0.596	0.049	0.413	0.088	0.134
Information sharing			0.167	0.007	0.032	0.648	0.013	0.853
Decision synchronization					0.263	0.000	0.125	0.094
Incentive alignment							0.300	0.000

	Model 1	Model 2	Model 3	Model 4
F	0.046	2.483	5.541	8.550
Sig.	0.955	0.061	0.000	0.000
R Square	0.000	0.027	0.077	0.130
R Square Change	0.000	0.027	0.050	0.062
Adjusted R Square	0.007	0.016	0.063	0.123

Model 1: predictors – organization status, firm category
Model 2: predictors – organization status, firm category, information sharing
Model 3: predictors – organization status, firm category, information sharing, decision synchronization
Model 4: predictors - organization status, firm category, information sharing, decision synchronization, incentive alignment
Dependent: physical distribution service quality