

# IMPACT OF SUPPLY CHAIN MANAGEMENT PRACTICES ON CONTROL OF BULLWHIP EFFECT IN FAST MOVING CONSUMER GOODS INDUSTRY IN KENYA: A CASE STUDY OF UNILEVER, EAST AFRICA LIMITED

<sup>1</sup>Wairimu Mwangi, <sup>2</sup>Prof. Henry Bwisa

---

**Abstract:** In spite of the enormous theoretical contributions to knowledge about the BWE, supply chains still hemorrhage from BWE. The nature of FMCG industry predisposes companies in this industry to the BWE which is cancerous to any SC. Unilever, a multinational company in FMCG industry felt the BWE, negatively, and to nurse herself from the injuries caused by this undesirable phenomenon, the management implemented an array of supply chain practices, with an ultimate goal of controlling the BWE. Since the adoption of these SC practices, no published research has been carried out to assess the impact of the adoption of the aforementioned SC practices. It is upon this backdrop that this study aimed at conducting a qualitative-cum-quantitative exploratory study to establish the impact of these SC practices on the control of BWE. In a bid to achieve this overriding objective, working hypotheses were formulated. A quasi-experimental research design was adopted. This research employed snowball sampling technique. Primary data collection instruments were an in-depth interview and a questionnaire. The questionnaires were administered twice in near equivalent conditions. This data was triangulated by an in-depth interview. Data collection was done in tandem with data analysis using the grounded theory approach. The findings of this study are presented using the mystery story approach supported by excerpts from the interviews and discussions of the findings in relation to existing literature. The central category that emerged is technological adoption. This was as a result of interdependence of this category with other categories. The study proposes areas for further research that; a similar study be conducted using Delphi method. Finally, the researcher gives his autobiographical reflections on qualitative study.

---

## 1. INTRODUCTION

### 1.1 Background of the Study

The *Bullwhip effect* refers to a scenario where the orders to the suppliers tend to have larger fluctuations than sales to the buyer, and the distortion propagates upstream in an amplified form (Lee *et al.*, 2007). These tendencies of order variability as one moves up the supply chain is also known as *whip splash effect* and sometimes also referred to as *Forrester effect* or *Whip-saw effect*. To demonstrate how the *bullwhip effect* develops and gathers momentum in a simple supply chain, the beer game which is a simulation board game that is modeled in a simple supply chain containing a retailer, a distributor, and a manufacturer was developed by the Systems dynamic Group of Sloan School of Management at the Massachusetts Institute of Technology is applied.

The objective of the game is to fill all the customer orders without carrying excessive inventories or having excess backlogs (Badar, Sammidi, & Gardner, 2013). The beer game starts with retailers experiencing a sudden but a small increase in customer demand for a certain brand of beer called Lover's Beer (Serman, 2009). Orders are batched up by

retailers and passed on to the distributor who delivers the beer. Initially, these orders exceed the inventories the distributors have on hand, so they ration out their supplies of Lover's beer to the retailers and place even larger orders for the beer with the brewery that makes Lover's beer. The brewery cannot instantly increase production of beer, so it rations out the beer it can distribute to the distributors and begins building additional production capacity Serman (2009). At first, the scarcity of beer prompts panic buying and hoarding behavior. Then, as the brewery ramps up its production rate and begins shipping the product in bulk, the orders that had been steadily due to panic buying suddenly decline. The glut of product fills up the distributor's warehouses fills all the retailers' unfilled back orders and exceeds the customer's actual demand Serman (2009). The brewery is left with excess production capacity, the distributors are stuck with excess inventory, and the retailers either cancel their beer orders or discount promotions to move the product.

The costs of bullwhip effect are felt by all members of the supply chain; manufacturers add extra production capacity to satisfy an order stream that is much more volatile than actual demand. Distributors carry out extra inventory to cover the variability in order levels. Transportation costs increase because excess transportation capacity has to be added to cover the periods of the high demand. Along with transportation costs, labor costs also go up to respond to the high demand periods. Retailers experience problems with product availability and extended replenishment cycles and lost sales due to lack of inventory (Serman, 2009). The game runs for 50 periods or until the players become frustrated with excessive backlogs and inventories and the point about bullwhip effect has been made.

According to (Lee *et al.*, 2007), there are five fundamental causes of Bullwhip effect namely, order batching, rationing and short gaming, price fluctuation, and demand forecasting. `Order Batching refers to the process whereby downstream supply chain players place orders upstream with manufacturers/ producers in batches in an endeavor to gain economies of scale. This economic order batching is also known as *Burbidge Effect*. (Bhattacharya, & Bandyopadhyay, 2011) Rationing and gaming, also known as *Houlihan Effect* refers to the occurrence of shortages and missed deliveries in supply chain causing customers to overload their schedules or orders. This, in turn, leads to placement of more demands on the production systems that inevitably lead to more unreliable deliveries. (Bhattacharya, & Bandyopadhyay, 2011). This further leads to customers increase their buffer stock target that further distorts the demand signal, giving rise to the bullwhip effect. Price variations, sometimes referred to as promotion effect is another fundamental cause of bullwhip effect relates to the practice of offering products at reduced prices to stimulate demand (Bhattacharya, & Bandyopadhyay, 2011). Demand forecasting is a scenario where manufacturing firms lose touch with actual market demand and instead of acting and fulfilling the end user demand data; they act on orders received by their immediate customers which are inaccurate. When such inaccurate orders are used to do demand forecasts, further distortions to demand are made (Hugos, 2011).

According to (Koh, *et al.*, 2007) supply chain practices refer to a set of activities that an organization undertakes to promote efficient management of its supply chain. The objectives of the supply chain practices are twofold; short-term goals to enhance productivity, reduced inventory and lead time (Koh *et al.*, 2007). The long term objectives of supply chain practices are to increase market share and integration of supply chain. (Li, Ragu & Rao 2016), describes the evolution of supply chain practices which include supplier partnership, outsourcing and cycle time compression, continuous process flow and information technology sharing. Alvarado and Kotzab (2011) argues that supply chain practices also encompasses concentration on core competencies, technology adoption through the use of inter-organizational systems such as Electronic Data Interchange (EDI) and elimination of excess inventory levels by postponing customization towards the end of the supply chain. Research by (Bayraktars *et al.*, 2009) identifies 12 supply chain management practices which are; sub-contracting, close partnership with suppliers, close collaboration with customers, outsourcing, just in time, strategic planning, e-procurement, 3<sup>rd</sup> Party Logistics (3PL) and many suppliers. Min and Mentzer (2011) identifies supply chain management practices as agreed vision and goals, information sharing, risks and award sharing, cooperation, integration of processes, long term relationships and agreed supply chain leadership. Through factor analysis, Li *et al.*, (2016) identify five aspects of supply chain practices which include strategic partnership, postponement, customer relationship, quality of information sharing, and level of exchange of information. Burgess, Singh, and Koroglu (2016) argues that supply chain practices should include leadership, intra-organizational relationships, logistics, process improvement orientation, business results and outcomes and information systems.

Fast Moving Consumer Goods (FMCG) industry is a quick and agile industry that possesses a unique set of characteristics such as constraints and interfaces among its internal business function and products in this industry have a short product life cycle, low-profit margin, and high competition and demand fluctuations (Confederation of Indian Industry, CII, 2015). The goal of FMCG supply chains is to deliver more for less using lean strategy through improving process

efficiencies within buying, distribution and selling functions (Stadtler & Kilger (eds), 2008). According to Kumar and Bala, (2011) there are some pertinent issues faced by players in FMCG. First, supply chains possess production plants, including co-manufacturers and co-packers which increase supply chain complexities. Secondly, distribution is handled by specialized firms which increase the pressure on relationships and the distribution in FMCG involves haulers, logistics companies, and warehouse service providers. Thirdly, the retail sector is pressurizing the industry to manufacture and supply at the lowest possible price and to decrease the response time. Ultimately the fourth issue is a progressive demand forecasting errors that amplify in each supply chain node upstream from the customer, retailer distributor up to the manufacturer known as the *Bullwhip effect* (Confederation of Indian Industry, CII, 2015). More succinctly, one of the dominant players in FMCG industry is Unilever, which has negatively felt the bullwhip effect. And in an endeavor to control the *Bullwhip effect* phenomenon, the supply chain executives have adopted an array of supply chain practices. They include; collaborative SC practices, technological adoption, risk sharing and contract management which up to now, no empirical research has been undertaken to evaluate the impact of these supply chain practices to manage the *Bullwhip effect*.

### 1.2 Statement of the Problem

According to (Kumar, 2012) it is the desire of every player in the Fast Moving Consumer Goods (FMCG) industry to have a resilient and agile supply chain with an end to end supply chain visibility and product flows with close interactions with other industries in pursuit of creating and sustaining competitive advantage whilst delivering goods using the right procedure, in the right quantities, to the right places at the right time, using the right mode of transport and right contract in a cost effective manner (Slack, 2010). However, this is not the case in the most supply chain due to the undesirable phenomenon of the *Bullwhip effect* (Whang, 2009). Since Forrester pioneering contributions, a couple of researchers have also researched this phenomenon (Chen *et al.*, 2010, Cachon & Fisher, 2010, Classen *et al.*, 2008, & Lee *et al.*, 2007). Interestingly, despite the enormous theoretical contributions to knowledge about the *Bullwhip effect*, over the last fifty years, supply chains still face the *bullwhip effect* as these suggested solutions are hard to realize in practice. There seems to be no sole or universal solution from both researchers and practitioners on the control of bullwhip effect. Unilever, one of the leading companies in Fast Moving Consumer Goods industry felt the *bullwhip effect* phenomenon which put the firm on the verge of diluting its competitive position due to inaccurate demand forecasting that brought about inefficiencies in production, scheduling, sourcing, distribution and revenue generation that were characterized by excess unwanted inventories and reduced service levels at the operational level (Oxfam, 2008). To manage this *bullwhip effect* phenomenon, the firm adopted an array of supply chain practices. Since the adoption of these practices, there is no empirical study that has been done evaluating the impact of the supply chain practices on the control of bullwhip effect. To this end, the researcher carried out an empirical research to assess the impact of supply chain practices on the management of bullwhip effect in Fast Moving Consumer Goods Industry, a case study of Unilever Kenya Limited. The study involved long serving employees in Unilever, Kenya in the industrial area.

### 1.3 General Objective

The general objective of the study was to evaluate the impact of supply chain management practices on the control of *Bullwhip Effect* in Fast Moving Consumer Goods Industry, a Case Study of Unilever East Africa, Kenya.

## 2. RESEARCH DESIGN

According to Krishnaswami and Satyaprasad (2010), a research design is a logical and systematic plan that specifies the objectives of the study, the methodology and techniques to be adopted in achieving the objectives. This study adopted a quasi-experimental research design since the researcher had no baseline, a control group and randomization. Yount (2006), assert that a quasi-experimental research design has all components of an experimental design except for randomization. Further, (Wogu, 2014), notes that quasi-experimental research design brings about superior external validity and it is more feasible owing to time and other logistical constraints.

## 3. IMPACT OF CONTRACT MANAGEMENT ON THE CONTROL OF BWE

The study sought to determine the impact of contract management on the control of BWE in Unilever, this study established that contract management enables smooth running of Unilever supply chain. It is through contract management that the level of supply chain collaboration, technological adoption and supply chain risk sharing are regulated; *“Contract management has enabled the establishment long-term relationships and risk sharing with suppliers and customers of Unilever. This long-term relationship makes the supply chain vested at the heart of our success and*

helps align the goals of all partners” .However, the researcher did not appraise this category to be the core theme. This is because the participants’ responses alluded that this category played a secondary role in control of BWE after technological adoption. Participants indicated that through contract management, supply chain risks are reduced. They also indicated that there is need to constantly review the terms and conditions of the contract due to the dynamic nature of the environment that businesses operate in. More so, they noted that contract management ensures legal compliance of supply chain activities across all members of the supply chain. Respondents also indicated that contract management has a positive impact to the control of bullwhip effect as it sets performance indicators for members of the supply chain which establishes if all partners are meeting their obligations as stipulated in their respective contracts as this excerpt suggests “Unilever has developed a supplier performance criteria that measures the performance of the supplier. Also contract management strategies have been established to determine if both buyer and supplier are meeting their obligations as in the contract. This has ensured that there is less demand and supply variations along the supply chain”

#### 4. CONCLUSION

It emerged that contract management had an impact in the control of BWE. Contract administration/management has facilitated supply chain collaboration and risk sharing by setting rules and regulations which supply chain members abide by. Additionally, contract management sets boundaries within which partners in SC collaborate in one extreme and share risks in the other extreme of the supply chain spectrum. Contract management and administration is core to ensure seamless end to end collaboration and risk sharing in the supply chain. To address the bottleneck of BWE, firms operating in FMCG industry needs to come up with robust and dynamic contracts to manage the resultant aspects of collaboration and risk sharing across the supply chain. This way firms will have controlled the BWE to a manageable level and the performance of the firms will surge upwards to record higher profit margins with optimum inventory and accurate information sharing across the supply chain.

#### REFERENCES

- [1] Al-Fawaeer, M., Alhunity, S., & Al-Onizat, H. (2013). The impact of information technology in enhancing supply chain performance: An Applied Study on the Textile Companies in Jordan. *Research Journal of Finance and Accounting*, 4(8).
- [2] Ambulkar, S., Blackhurst, J. V., & Cantor, D. E. (2016). Supply chain risk mitigation competency: an individual-level knowledge-based perspective. *International Journal of Production Research*, 54(5), 1398-1411.
- [3] Aydin, G., & Porteus, E. L. (2008). Joint inventory and pricing decisions for an assortment. *Operations Research*, 56(5), 1247-1255.
- [4] Badar, M. A., Sammidi, S., & Gardner, L. (2013). Reducing the bullwhip effect in the supply chain: A study of different ordering Strategies. *The Journal of Technology Studies*, 52-63.
- [5] Bala, M., & Kumar, D. (2011). Supply chain performance attributes for the fast moving consumer goods industry. *Journal of transport and supply chain management*, 5(1), 23-38.
- [6] Bhattacharya, R., & Bandyopadhyay, S. (2011). A review of the causes of bullwhip effect in a supply chain. *The International Journal of Advanced Manufacturing Technology*, 54(9-12), 1245-1261.
- [7] Bayraktar, E., Demirbag, M., Koh, S. L., Tatoglu, E., & Zaim, H. (2009). A causal analysis of the impact of information systems and supply chain management practices on operational performance: evidence from manufacturing SMEs in Turkey. *International Journal of Production Economics*, 122(1), 133-149.
- [8] Bottani, E., Montanari, R., & Volpi, A. (2010). The impact of RFID and EPC network on the bullwhip effect in the Italian FMCG supply chain. *International journal of production economics*, 124(2), 426-432.
- [9] Bray, R. L., & Mendelson, H. (2012). Information transmission and the bullwhip effect: An empirical investigation. *Management Science*, 58(5), 860-875.
- [10] Blumberg, B. F., Cooper, D. R., & Schindler, P. S. (2014). *Business research methods*. McGraw-Hill education.
- [11] Burgess, K., Singh, P. J., & Koroglu, R. (2016). Supply chain management: a structured literature review and implications for future research. *International Journal of Operations & Production Management*, 26(7), 703-729.

- [12] Bwisa, H.M., (2015) Research Methodology: How to choose an effective research topic and construct a title for your research proposal, <https://www.youtube.com/watch?v=mvMKeSIHjPU>
- [13] Bwisa, H.M., (2015) *How to write a statement of problem: A Bwisa tutorial (part 1)* <https://www.youtube.com/watch?v=LvWgBsoWT6Y&t=471s>
- [14] Cachon, G. P., & Lariviere, M. A. (2005). Supply chain coordination with revenue-sharing contracts: strengths and limitations. *Management science*, 51(1), 30-44.
- [15] Cachon, G. P., Randall, T., & Schmidt, G. M. (2007). In search of the bullwhip effect. *Manufacturing & Service Operations Management*, 9(4), 457-479.
- [16] Cannella, S., & Ciancimino, E. (2010). On the bullwhip avoidance phase: supply chain collaboration and order smoothing. *International Journal of Production Research*, 48(22), 6739-6776.
- [17] Chen, F., Drezner, Z., Ryan, J. K., & Simchi-Levi, D. (2010). Quantifying the bullwhip effect in a simple supply chain: The impact of forecasting, lead times, and information. *Management science*, 46(3), 436-443.
- [18] Chen, J., Sohal, A. S., & Prajogo, D. I. (2013). Supply chain operational risk mitigation: a collaborative approach. *International Journal of Production Research*, 51(7), 2186-2199.
- [19] Chopra, S., & Sodhi, M. S. (20014). Managing risk to avoid supply-chain breakdown. *MIT Sloan management review*, 46(1), 53.
- [20] Christopher, M., & Peck, H. (2014). Building the resilient supply chain. *The international journal of logistics management*, 15(2), 1-14.
- [21] Clifford Defee, C., Williams, B., Randall, W. S., & Thomas, R. (2010). An inventory of theory in logistics and SCM research. *The International Journal of Logistics Management*, 21(3), 404-489.
- [22] Cooper, D.R & Schindler, P.S. (2014) *Business Research Methods* (12<sup>th</sup> Ed.). New York: McGraw- Hill Irwin
- [23] Corbin, J., & Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory. *Thousand Oaks*.
- [24] De Almeida, M. M. K., Marins, F. A. S., Salgado, A. M. P., Santos, F. C. A., & da Silva, S. L. (2015). Mitigation of the bullwhip effect considering trust and collaboration in supply chain management: a literature review. *The International Journal of Advanced Manufacturing Technology*, 77(1-4), 495-513.
- [25] Giannoccaro, I., & Pontrandolfo, P. (2004). Supply chain coordination by revenue sharing contracts. *International journal of production economics*, 89(2), 131-139.
- [26] Grean, M., & Shaw, M. (2012). Supply-chain partnership between P&G and Wal-Mart. *E-Business Management*, 155-171.
- [27] Hofmann, E. (2017). Big data and supply chain decisions: the impact of volume, variety and velocity properties on the bullwhip effect. *International Journal of Production Research*, 55(17), 5108-5126.
- [28] Holweg, M., Disney, S., Holmström, J., & Småros, J. (2005). Supply chain collaboration: Making sense of the strategy continuum. *European management journal*, 23(2), 170-181.
- [29] Hsu, C. C., Kannan, V. R., Tan, K. C., & Keong Leong, G. (2008). Information sharing, buyer-supplier relationships, and firm performance: a multi-region analysis. *International Journal of Physical Distribution & Logistics Management*, 38(4), 296-310.
- [30] Hugos, Michael H. *Essentials of supply chain management* (5th Ed.). West Sussex, UK: John Wiley & Sons.
- [31] Hou, Y., Wei, F., Li, S. X., Huang, Z., & Ashley, A. (2017). Coordination and performance analysis for a three-echelon supply chain with a revenue sharing contract. *International Journal of Production Research*, 55(1), 202-227.
- [32] Jüttner, Uta, Helen Peck, and Martin Christopher. "Supply chain risk management: outlining an agenda for future research." *International Journal of Logistics: Research and Applications* 6, no. 4 (2003): 197-210.

- [33] Kimechwa, V. K. (2015). *Impact of Supply Chain Management Practices on The Performance of Banks In Kenya: A Case of Postbank* (Doctoral Dissertation, Department Of Business And Social Science In The School of Human Resource Development, Jomo Kenyatta University Of Agriculture And Technology).
- [34] Kiser, J., & Cantrell, G. (2016). 6 steps to managing risk. *Supply Chain Management Review*, 10(3).
- [35] Kothari, Chakravanti Rajagopalachari. *Research methodology: Methods and techniques*. New Age International, 2004.
- [36] Kleindorfer, P. R., & Saad, G. H. (2005). Managing disruption risks in supply chains. *Production and operations management*, 14(1), 53-68.
- [37] Krause, D. R., Handfield, R. B., & Tyler, B. B. (2007). The relationships between supplier development, commitment, social capital accumulation and performance improvement. *Journal of operations management*, 25(2), 528-545.
- [38] Krishnaswami O.R & Satyaprasad B.G (2010) *Business Research Methods*. Mumbai: Himalaya Publishing House
- [39] Kouvelis, P., Chambers, C., & Wang, H. (2006). Supply chain management research and production and operations management: Review, trends, and opportunities. *Production and Operations Management*, 15(3), 449-469.
- [40] Kunter, M. (2012). Coordination via cost and revenue sharing in manufacturer–retailer channels. *European Journal of Operational Research*, 216(2), 477-486.
- [41] Lackes, R., Schlüter, P., & Siepermann, M. (2016). The impact of contract parameters on the supply chain performance under different power constellations. *International Journal of Production Research*, 54(1), 251-264.
- [42] Lavastre, O., Gunasekaran, A., & Spalanzani, A. (2014). Effect of firm characteristics, supplier
- [43] Lee, H. L., Padmanabhan, V., & Whang, S. (2007). The bullwhip effect in supply chains. *Sloan management review*, 38(3), 93.
- [44] Lenny Koh, S. C., Demirbag, M., Bayraktar, E., Tatoglu, E., & Zaim, S. (2007). The impact of supply chain management practices on performance of SMEs. *Industrial Management & Data Systems*, 107(1), 103-124.
- [45] Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega*, 34(2), 107-124.
- [46] Machuca, J. A., & Barajas, R. P. (2004). The impact of electronic data interchange on reducing bullwhip effect and supply chain inventory costs. *Transportation Research Part E: Logistics and Transportation Review*, 40(3), 209-228.
- [47] Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2011). Defining supply chain management. *Journal of Business logistics*, 22(2), 1-25.
- [48] Moon, I., Feng, X. H., & Ryu, K. Y. (2015). Channel coordination for multi-stage supply chains with revenue-sharing contracts under budget constraints. *International Journal of Production Research*, 53(16), 4819-4836.
- [49] Niranjana, T. T., Wagner, S. M., & Aggarwal, V. (2011). Measuring information distortion in real-world supply chains. *International Journal of Production Research*, 49(11), 3343-3362.
- [50] Oettmeier, K., Oettmeier, K., Hofmann, E., & Hofmann, E. (2016). Impact of additive manufacturing technology adoption on supply chain management processes and components. *Journal of Manufacturing Technology Management*, 27(7), 944-968.
- [51] Padmanabhan, V., & Png, I. P. (2004). Reply to “Do returns policies intensify retail competition?” *Marketing Science*, 23(4), 614-618.
- [52] Panda, T. K., & Mohanty, P. K. (2012). Supply Chain Management Practices and Scope for Bullwhip Effect in Indian Dry Grocery Business. *IUP Journal of Supply Chain Management*, 9(3), 63.
- [53] Pasternack, B. A. (1985). Optimal pricing and return policies for perishable commodities. *Marketing science*, 4(2), 166-176.

- [54] Revilla, E., Revilla, E., Saenz, M. J., & Saenz, M. J. (2017). The impact of risk management on the frequency of supply chain disruptions: A configurational approach. *International Journal of Operations & Production Management*, 37(5), 557-576.
- [55] Richey, R. G., Tokman, M., & Dalela, V. (2010). Examining collaborative supply chain service technologies: a study of intensity, relationships, and resources. *Journal of the Academy of Marketing Science*, 38(1), 71-89.
- [56] Rogers, P. J. (2000). Causal models in program theory evaluation. *New directions for evaluation*, 2000(87), 47-55.
- [57] Salama, I. E. E. The Impact of Knowledge Management Capability, Organizational Learning, and Supply Chain Management Practices on Organizational Performance.
- [58] Saunders, M. N., & Lewis, P. (2014). *Doing research in business & management: An essential guide to planning your project*. Pearson.
- [59] Seifert, D. (2003). *Collaborative planning, forecasting, and replenishment: How to create a supply chain advantage*. AMACOM Div American Mgmt Assn.
- [60] Shang, K. C., Lu, C. S., & Li, S. (2010). A taxonomy of green supply chain management capability among electronics-related manufacturing firms in Taiwan. *Journal of environmental management*, 91(5), 1218-1226.
- [61] Shields, P. Rangarjan (2013) *A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management*. Stillwater. OK: New Forums Press p, 24.
- [62] Shin, H., & Benton, W. C. (2014). Quantity Discount-Based Inventory Coordination: Effectiveness and Critical Environmental Factors. *Production and Operations Management*, 13(1), 63-76.
- [63] Sidani, S., & Sechrest, L. (1999). Putting program theory into operation. *American Journal of Evaluation*, 20(2), 227-238.
- [64] Slack, N., Chambers, S., & Johnston, R. (2010). *Operations management*. Pearson education.
- [65] Stadler, H., & Kilger, C. (2008). Supply chain management and advanced planning. *Concepts, Models, Software and Case Studies*, 4.
- [66] Serman, J. D. (2009). The beer game. *The Fifth Discipline, MIT*, 27-54.
- [67] Thongchattu, C., & Buranajakorn, P. (2007). The Utilisation of e-Tools of Information Technology towards Thorough Supply Chain Management. In *Naresuan University Research Conference, Thailand*.
- [68] Tsay, A. A. (2011). Managing retail channel overstock: Markdown money and return policies. *Journal of retailing*, 77(4), 457-492.
- [69] Towill, D. R. (2005). The impact of business policy on bullwhip induced risk in supply chain management. *International Journal of Physical Distribution & Logistics Management*, 35(8), 555-575.
- [70] Wagner, S. M., & Bode, C. (2008). An empirical examination of supply chain performance along several dimensions of risk. *Journal of business logistics*, 29(1), 307-325.
- [71] Wang, Y., Chang, C. W., & Heng, M. S. (2009). *The levels of information technology adoption, business network, and a strategic position model for evaluating supply chain integration* (Doctoral dissertation, California State University, Long Beach, College of Business).
- [72] Wan, X., & Evers, P. T. (2011). Supply chain networks with multiple retailers: a test of the emerging theory on inventories, stockouts, and bullwhips. *Journal of Business Logistics*, 32(1), 27-39.
- [73] Wang, N., Ma, Y., He, Z., Che, A., Huang, Y., & Xu, J. (2014). The impact of consumer price forecasting behaviour on the bullwhip effect. *International Journal of Production Research*, 52(22), 6642-6663.
- [74] Weiss, C. H. (1995). Nothing as practical as good theory: Exploring theory-based evaluation for comprehensive community initiatives for children and families. *New approaches to evaluating community initiatives: Concepts, methods, and contexts*, 1, 65-92.
- [75] Wogu, O. E., & Wogu, M. D. (2014). Relevance of Experimental Design.

- [76] Wook Kim, S. (2016). Effects of supply chain management practices, integration and competition capability on performance. *Supply Chain Management: An International Journal*, 11(3), 241-248.
- [77] Wu, T., Huang, S., Blackhurst, J., Zhang, X., & Wang, S. (2013). Supply chain risk management: An agent-based simulation to study the impact of retail stockouts. *IEEE Transactions on Engineering Management*, 60(4), 676-686.
- [78] Xia, W., & Wu, Z. (2007). Supplier selection with multiple criteria in volume discount environments. *Omega*, 35(5), 494-504.
- [79] Zhang, C., & Dhaliwal, J. (2009). An investigation of resource-based and institutional theoretic factors in technology adoption for operations and supply chain management. *International Journal of Production Economics*, 120(1), 252-269.