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By

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Abstract

Understanding the role activities and cost have on managing logistics has become essential for businesses as they respond to changes in the marketplace and shift to using logisitcs as an element of competitive strategies. Theoretical principles and values from Michael E. Porter's Value Chain Analysis (VCA) and Robert Kaplan's Activity Based Costing (ABC) system provide the foundational framework for mapping out activites and cost of logistic processes. This essay reviews case studies pertaining to logistics and argues that these principles are applicable for use as businesses adapt, respond, and build strategy into the 21st century.

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The Role of Activity and Cost Analysis When Managing Logistics

Lauren Ann Swanson

Under the Supervision of Professor Xiaotong Liu

Introduction

Globalization advanced tremendously in the 20th century creating growth, diversity, and development in supplier channels, technology, and industries. Alongside that growth business activities, cost, and customer expectations have evolved. Responding to market changes and being able to capitalize on growing resources is not a process with a finite start and end; it requires planning effective activities with adaptable value and defined costs associated. Supply chain management is a critical component for business planning where-as logisitc activities within a supply chain are the drivers of implementing those strategies. Unfortunately, as Holcomb demonstrates, “The evolution of logistics from a cost center to one of strategic component is not occurring fast enough to accommodate the rapid changes that are transforming both transportation and other supply chain links” (Holcolmb, 2000).

Purpose of this Study

Logistics is the vessel of implementation for planned strategic activities.This purpose of this study is to focuses on the role of logistics within a supply chain and investigates whether operations in today’s marketplaces are successfully defining their logistic activities in order to find opportunities to create value and a competitive edge when implementing business strategies into marketplaces. To define logistics activites in a way that enables mangers to make competitive and strategic decisions two theoretic frameworks should be used: Value Chain (VC) Analysis and an Activity Based Cost (ABC) systems. VCs focus on defining activites, their types, and values whereas an ABC analysis groups activites and allocates a cost to them. Using

these methods together provides management with a more detailed understanding of activites within their value chains and associated cost.When used together managers and leadership then have the understanding of their activites, the value they have, and the cost they require. How this knowledge is used is where businesses can overcome the issues that their business activities face, and use logistics as a tactical instrument that drives them towards and even executes the strategies they have set for their companies to be competive in their markets.

Significance of this Study

To have an effective logisitic system that is no longer just a cost against the bottom line but a strategic element to supply chain management; planning, decision making, and effective implementation are all required. Directives are based on strategies scoped by leadership planning of markets to serve, level of competitiveness to focus on, and what value is to be provided. Based on inventory, diversify supplier portfolios, market share growth by alternative shipping modes these decisions need to support goals and expectations of leadership. Significance of this study is that is explains by looking at changes in supply chains, how value and cost changes management can decide how to use logistics to construct a competitive position amoungst changes in the supply and demand of the 21st century.

Literature Review

This literary review and analysis pulls sources from 1985 – Present. Two foundational theories of today's supply chain management business practices are used to provide foundational reasoning as to why they are significant in planning and executing strategic and competive logistic activities . Subsequent sources rely on these foundational theories. Case studies and industry expert publications regarding supply chain management were also used. The scope and definition of supply chain has changed significantly since the 1980s. Using sources from the past forty years provides a broad understanding of how these theories have been used and implemented, how they currently shape our understanding of logistics' impact on a supply chain.

Value Chain

In 1985 Michael E. Porter's book, *Competitive Advantage*, was published. Based on ten years of practice and research conducted by Porter personally as well as research and resources provided from the Harvard Business School. It, "introduces the concept of the value chain, a general framework for thinking strategically about the activites involved in any business and assessing their relative cost and role in differentiantion (Value) and provides principles, scope, corporate strategies, and what implactions are had for having offensive and defensive competitive strategy. (Porter,1985)

Within Porter's section regarding principles there are two which are important to use based on their ability to provide structure and impact decision making that can lead to a competitive advantage. These concepts are Value Chains and Cost Analysis. "…a value chain is a representation of activities that are performed to design products, market, deliver, and support its product" (Porter,1985). The term representation implies a chart or map is constructed in which isolated activites are placed in sequence to which they occur and categorized based on

their value as being primary or support functions. Creating a value chain allows managers to visually see where there logisitcs activites fall, if they have a primary or support purpose and make structural decions that will create value in their networks.

Xingjian Zhou expands on the concept of value chain and outlines activities that will assist an express delivery enterprise with adding value from their logistics processes. These activities are termed as “characteristics of logistics competitiveness.” Zhou argues that in a traditional VC the primary and support activites of logisitcs should be identified as Porter instructs but then inserted into a new value chain, the logistic value chain (LVC). Although a LVC follows Porter’s rules of activity segregation based on function, a LVC is unique because it can be used “to design and plan the value-added activites in the logisitcs process.”(Zhou, 2013) Through the LVC excersize four core activities of logistic are recognized by Zhou: strategic positioning, network optimization, value-added services, and performance evaluation. It is these activites that create competitveness and if planned efficiently can become areas of strategy execution. This article is of great value as it demonstrates how foundational principles of value chains can be expanded on in ways which result in planning and implementation of logisitcs that can be used to execute strategy.

Activity-Based Cost (ABC) System

Robert S. Kaplan introduced the concept of an Activity Based Cost (ABC) system in 1997. The ABC theory was provided as an alternative to standard cost principles and to become a principle method used to create a cost system that provides traceability to all direct and indirect activites that a standard cost system can not provide. Standard cost systems divide total expense by total production volume to get a cost per unit. It is an easy concept to understand and works well for business that produce one model type. Businesses however that have various unit types

being produced out of a single facility would not be able to use a standard cost structure and have an estimate of total expense for each model type. Each model would have different requirements for equipment, raw materials, labor, quality assurance etc. To control this variation and distortion in cost an “ABC systems focus on organizational activites as the key element for analyzing cost behavior in organizations by linking organizational spending on resources to the activites and business processes performed by these resources.” (Kaplan, 1997).

An ABC system is another theory that when implemented provides a resource for managers to use in order to effectively make decisions and strategize activities. “An activity-based cost sytem provides companies with an economic map of their operations by revealing to the cost of activities and business processes, leading to knowledge of the cost and profitability of indivual products, services, customers, and operating units.” (Kapplan, 1997) Specific to this essay, without this map there is a limited capacity for companies to understand what impact operation changes have on their processes and their cost.

Putting Kapplan’s theoretical structure to test, Michael D. Shields presents findings based on survey results from businesses that had implemented an ABC system into their operations. The importance of this study was the finding that the objective of ABC is, “to provide both product cost and process cost information.” (Shields, 1995) . Although this study discusses the issues with implementation of this system and how success is dependent, “on how well it matches the preferences, goals, strategies, agendas, skills and resources of dominant or powerful coalitions of employees, particularly top management. (Shields, 1995). When implemented, ABCsystem, can aide in the management of logistic activities in a supply chain by providing a cost for each process and support Porter’s statement on cost analysis principles that “each value activity has its own cost structure and the behavior of its cost may be affected by linkages and

interrelationships with other activities both within and outside the firm." (Porter, 1985) To understand and have a map of cost by process, it allows logisitic managers to see a fiscal impact that their decisions making and changes will have on their activities and other value activites, a behavior to cost. It is a tool and point of reference needed to properly plan, design, strategize, and manage logistic networks that are based on competitive objectives for a supply chain.

This study focuses on costs that are based on activities otherwise known as ABC. Primary activities are what Xiao refers to as explicit. These are the cost for shipments, and inventory. They are easy to qualify as they have a direct relationship with operations. Xiao proposes the concept of logistics management cost inorder to account for costs in the recessive category. "Management cost is the most difficult to control and calculate, which appears particularly obvious in our country." (Xiao, 2019). This article is significant as it stresses that the cost of managing logistics is not considered often enough. Direct costs are easiest to calculate and focus on; it is the unseen that is challenging. "The cost of logistics management is closely related to the information degree of business which has an effect on various links of the enterprise's normal production." (Xiao, 2019) This cost is argued to be development of information systems that support logistics activities. "to sum up operating costs, a couple of methods are optional, such as the decomposition of activities methods, process mapping, value chain analysis, and the operation flow chart. "(Xiao, 2019) are these all comparable methods I should consider when presenting methods for calculating operation costs?

Managing Logistic Networks

In the first chapter in their book *Logistic Systems: Design and Optimization,* Andre Langevin, Diane Riopel, and James F. Campbell identify the decision levels a company uses

regarding their logistic network. The chapter discusses historical facts that lead the logistic industry to defining the decision levels and their content. Research conducted by the authors was mostly if not all, literary review. Publication dates from resources they used range from the late 70's to the early 2000's meaning the facts and information on this subject stretch over decades and are validated by their continued use. This resource will be beneficial to the research assignment as it brings an industrial standard perspective on decision making factors and the impact they have on each other. This will be required as I discuss in greater the detail the cause and effect for adding value to logistic value chains. They then go into detail outlining the relationships these decisions have with each other. The chapter begins by describing the levels of logistic decisions. These logistics decisions are not presented in a comparison format where one should be made over or before the others. Instead, it should be understood they are all equally important parts of the logistics management approach and should be used together. This claim is further developed through an evaluation of the relationships between these decisions.

Mary Holcomb and Karl Mandroft's 2000 article "The Shippers' Perspective: Transportation and Logistics Trends and Issues," presents data from the largest domestic shippers on their spending, structuring, functions, integration, and activities of their logistics. Analyzing cost behaviors their finding are presented by first describing where the industry norms are and then explaining how these cost behaviors have or could help shippers with executing competitive strategies for both internal and external customers by use of logistics. Showing that an understanding of cost for logistc processes and activites provides a base that can be used in the management of logistics.

Another study that used actual participants from an industry was conducted by Ala Shqairat and Balan Sundarakani. With a focus on the oil and gas industries global value

chain agility, Shqairat and Sundarakani took a research approach of literary reviews, interviews, and data analysis. This research is especially relevant because the it was conducted in the last decade making it up to date. The statistical methodology used is one of reliability as well. Presenting relationships through data and market response interviews is sound and presents a stronger rational for relationships within a value chainTheir market pool was on the oil and gas industry of the United Arab Emirates (UAE). In total the researchers had three hypotheses. The first hypothesis looks to see if there is a positive relationship between implementing supply disruption strategies and oils and gas value chain agility, the seconds is to see if there is a positive relationship between implementing management strategies and oil and gas value chain agility, and lastly the third looks at if outsourcing has a negative effect on oil and gas value chain agility (Shqairat, 2018). Presenting findings on value chain and if implementations of disruption and management create agility were found to be most valuable for this essay as it helps with discussion on what planning, design and management strategies should be implemented into logistic activities to create value.

An article published by the University of Tennessee's Supply Chain Institute presents five central themes that emerged from their research "that will impact how transportation must be managed in the future." (Holcomb, 2020) Those themes are technology, scrutiny of global supply chains, shift of focus from last mile to last terminal, training for transformation, and finally the new standard of agility being in a part of standard operating procedure for transportation activities. Also discussed were the concerns in which supply chain managers may have for the future. Those three concerns were as follows: (1) cost to serve (distribution), (2) changing customer requirements/demand uncertainty, (3) integration of supply chain technology and processes. The themes showcase that operations of today are going to shift from their

traditional planning and control mechanism to ones that include change in standards, approach, and sourcing approaches for those involved in managing activities and making decisions based on supply chains. A framework used in the study is that of Votality, Uncertainty, Complexity, and Ambiguity (VUCA). This framework describes the modern supply chain challenges being seen in our pandemic era of COVID-19. Significance of this article is based around it's relevance to a modern supply chain. This year supply chains have been faced with unprecedented challenges with unknown long term global impacts. It is a source that begins to set the tone for what is to come in the world of supply chain a critical resource for those planning and managing in today's economies.

Methodology

This study used sources published and accessible through educational institutions library's and professional studies department publications qualitative methodology was used and a content analysis conducted. The specific instituations used were the University of Wisconsin – Platteville, University of Tennesee, and Mississsippi State University. Other secondary sources that were used included book publications from industry experts that presented their own quantitative and qualitative research findings. Eleven sources in total were used and helped in the complete a content analysis that shows principle concepts, how they are expanded to a logisitcs management perspective, and why they are instrumental in today's supply chain markets. As this paper focuses on the future of logistics management a content analysis is appropriate. It gathers content from historical and current perspectives and publicatons to outline pricniples of industry theories and follw how they have been expanded on used to demonstrate what can be used as recceomndations for the future of logistics management.

Discussion and Conclusions

In today's globalized marketplace, managing logistics and its interaction within ones supply chain is a critical to having an effective and competitive market presence. Porter's principles are that to effectively service one's market and build competitive approaches into activites and management, defined activities and their value must be understood. To understand those activites and value mapping of the activities and costs must be completed. Having a understanding of how to construct a roadmap of activities and cost to reference, logisitcs managers can then conduct one themselves and make operative decisions and see the impact those decisions have. Decisions making can have focus on building agility, mitigating risk, increasing capacity, reducing inventory. All decisions will be based on a business's strategies for their being competitive in their marketplace.

Activities of Logistics and Decision Outcomes

Determining these activities and behaviors is done by completing a value chain analysis. Outlining a value chain will provide logistic and other leadership personnel involved with business management a visual image along with the exercise of evaluating interactions between the departments required to support operations and other strategies of the organization. When conducting a value chain analysis Porter specifies two activities, Primary and Support and states that within these activities there are three types: Direct, Indirect, and Quality Assurance.(Porter, 1985) Porter's generic example includes the following activities in his primary list: Inbound Logistics, Operations, Outbound Logistics, Marketing & Sales, and lastly Service. It should be noted that primary and support activities will vary depending on the market and focus of your value chain. In Zhou's article the exercise conducted was based around Porter's VCA but

expanded with a logistics focus "…in the supply chain, logistics is used to optimize and integrate the logistics resources, while logistics value chain is used to design and plan the value-added activities in the logistics process. Therefore, all those activities constitute a new chain that is logistics value chain" (Zhou, 2013). The purpose of any value chain is to create a competitive advantage. "Spearheading a value chain analysis with logistics at the forefront is one that should continue as the results from their study it was found to help the express enterprises identify the key business, find new profit growth points, make the value of both the enterprises and customers improved, and then get the core logistics competitiveness." (Zhou, 2013)

Shqairt's findings "shows there is a positive and significant relationship between implementing supply disruption strategies, outsourcing strategies, management strategies, and value chain agility." (Shqairt, 2018) and Holcomb expresses the concern that logistics is not being used as a component of strategy execution. Logistic managers should ask how can logistics be used to execute the strategies I want to implement in areas of supply distruption, outsourcing, and management? Logistic activities and decisions have been argued as being able to help implement strategies and create a competitive advantage.. These activities can vary within a business's framework depending on the supply chain market being serviced. Activities of an express enterprise may differ from those of a global chain in the oil and gas sector. It is important to remember when measuring and planning a supply chain to first define the activities. This will allow an organization to make decisions about structuring and cost that will create a stronger more optimized chain. With value chain analysis setting the structure for managing a supply chain it is the next step in managing the logistics that structuring comes into play. Chopra and Sodhi state, "today's managers have two choices for achieving lower risk in the supply chain: They can resudce risk while also improving supply chain efficiency – a "win-win" – or

they can reduce risk while limiting the impact on supply chain cost efficiency." (Chopra, 2014) These two options should be considered as planning for response to global pandemic. Before discussing the best option it is important to understand the theoretical structure of activity based costing and how this theory helps, "extend traditional cost systems by linking resource expense to the variety and complexity of products produced, not just the physical volumes produced." (Kapplan, 1997)

Value of Logistics and Decisions

With defined activities the next step would be to insert a cost to those activities and look at the total value provided. The four questions Kaplan answers in his original publication of ABC analysis are important decision drivers for individuals responsible for logistic activities and their management. Kapplan argues that, "the identification of activities culminates with construction of an activity dictionary that lists and defines all the major activities performed in the production facility," (Kapplan, 1997). Kapplan and Porters definition of activities are similar when the definition of 'verb' is used. It should be noted Kapplan's use of object in his activity definition provides more detail for activities within a value chain analysis. This detail can be appreciated as mangers maneuver thorough their costs and where value is or can be created. When costing activities there are three categories to group them in: Unit-level, Batch-level, and Product-sustaining. ABC is only recommended for facilities that fall into two categories. Ones with indirect and support resurces that required large spends that have show trends of increases, and ones with products, customers, and processes that are highly diversed. (Kaplan, 1997) In regards to management of logisitcs using the ABC method it is important to recall that "Because logisitcs management is a flow-oriented concept with the objective of integrating resources across pipeline which extends from suppliers to final customers, it is desireable to have a means

whereby the costs and performace of the pipeline flow can be assessed" (Christopher, 2016) ABC provides the overall assessment Christopher references to and empowers decision making to be made effectively and potentially add profits to logisitcs centers within an organization. Services and activites being conducted must have a value to them, a reason for them to be completed and their costs consumed, with proper management, a defined strategy will result from conducting a value chain analysis and an activity based cost analysis. How are managers today overseeing their supply chains and strategizing to have optimized logistic systems in their network?

Industry giant, Walamrt, in response to being a more competitive force in their market, from a network approach took advantages of values they had in their operations to compete with competitors such as Amazon and Target. They targeted links in their value chain such as procurement, distribution, information systems, and store network. Making decsions in these areas resulted in success. The foundational value recognized by Walmart supply leaders was that their planning and execution increased revenue and provided competitive edge for Walmart. Specifically with their distribution, "Walmart announced in 2019 that it would add consolidation centres to improve supply chain efficiency." (Mark, 2019) This planning was the outcome of their "senior management had identified two broad areas where supply chain intiatives were critical to support corportate strategy: integrating retail stores and e-commerce to enhance the omnichannel experience of customers, and increasing the use of technology to assist customers and to reduce costs." (Mark, 2019) Walmart successfully shows that will defining activites and their cost decision making can be had that can create value such as customer service and reduced cost to activities. Showcasing the importance of understanding logistic activites and their impact on supply chain when facing upcoming challenges should be discussed along with how to

structure supply chains to sustain competitiveness and create a tactical tool to support strategies. It's important to remember transportation is the movement of goods and should be viewed as one of the biggest contributors to executing a strategy of competiveness of a supply chain. This was argued in an earlier publication of Holcombs in 2017 after conducting a study on a shipper's perspective of transportation and logistics trends and issues. What Holcomb presented and Walmart overcame was the challenge that shippers face of effectively intergrating internal activites that efficiently integrate external supply chain oppurtunites.

Recommendations and Implication

It is recommended that logistic managers create a visual representation of their activites and the cost associated using foundational principles provided by Porter and Kaplan. Each activity will have cost requirements mapped out, and each activity will be defined, and their interactions with each other will be clearly identified. Based on today's volatility supply chain that are facing issues of capacity, resource distribution, labor outages, and increased demand, decisions are being made to help business remain comptetive in their markets and meet customer expectations. Implications of conducting these excersizes into their management practices will enable managers to evaluate the impact changes have based on cost behavior changes and can decide if higher or lower costs are creating value where required.

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