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MAINTAINING A VIABLE COMPETITIVE POSITION IN THE ECOMMERCE SPACE THROUGH ADVANCED SUPPLY CHAIN MANAGEMENT STRATEGY ADOPTION

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Submitted to the Graduate Faculty of

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SCOTT ORR

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Scott Patrick Orr

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Maintaining a Viable Competitive Position in the eCommerce Space through Advanced Supply Chain Management Strategy Adoption

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Under the Supervision of Dr. Mary Bartling

Abstract

This paper will focus on the competitive challenges faced by organizations attempting to maintain a viable position in the direct to consumer eCommerce space. Although eCommerce is a relatively new sales channel, it is arguably an industry unto itself similar to brick and mortar retail. Large scale players have developed in the market creating strong competitive headwinds and barriers to market entry for smaller enterprises. In order to fully understand this situation today and to associate potentially effective supply chain strategies, this paper will provide a background of the evolution of current supply chain approaches as they have progressed from the time period of pure brick and mortar retail, through pure electronic based sales and distribution channels to today's mixture of pure and blended approaches and models. Additionally, this effort will investigate scholarly research around the application and the evolution of eCommerce supply chain strategic thinking to identify viable approaches for competitive enhancement. In particular, for this rapidly growing sales segment or industry, focus will be on those strategies and approaches that can be considered across organizational complexity and maturity in order to identify that which will better position the electronic based late entrant or long term participant to a more solid competitive footing in the direct-to-consumer retail sales channel.

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INTRODUCTION

Statement of the Problem

Electronic commerce (eCommerce) has experienced phenomenal growth in the last several decades. In 2015 eCommerce represented 7.2% of total retail sales vs 0.2% of total sales in 1998 in the U.S. Furthermore, during the same time period eCommerce has experienced growth at a rate nine times the rate of pure brick and mortar based retailers (Nicholson, 2017).

As is common knowledge, several large eCommerce retailers in the US market, including Amazon and Walmart, have grown to dominate in the eCommerce space. Attempts by various retailers to enter, compete, and remain viable in the market has become challenging at best. In large part, the success of the larger competitors is due to the solid understanding that these retailers have for the operational capabilities and constraints of their supply chain. Based on this understanding, these organizations are able to capitalize from highly flexible choices among fulfillment strategy options to meet the consumer demand at the right service level and cost. Although Amazon initially focused its selling strategy in the book segment, it has grown to dominate in nearly every category in which it has chosen to participate. Walmart and others have come later to the market, but their existing highly developed supply chain infrastructure has allowed them to compete. By capitalizing on advanced fulfillment technology and functional understanding of the supply chain, they have become viable participants in the space. Even with the phenomenal growth that eCommerce has exhibited, the smaller players have struggled to gain a solid foothold and many have been pushed out of the market entirely. This is of particular concern as small and medium sized businesses represent 99.7% of all businesses in the United States and employ approximately 58 Million people or 47.8% of the workforce (Office of Advocacy, U.S. Small Business Administration, 2017).

The rapid growth eCommerce has undergone has forced a continual evolution of the supply chain to meet the new reality. The existing supply chain has had to adapt to a demand pattern and distribution model that is radically different from what it was intended to support. Historically, for many of these organizations, that infrastructure was designed to fulfill primarily for brick and mortar operations and not to individual consumers. In the last several decades, organizations have been forced to adjust in order to survive in the increasingly competitive global and emerging markets (Mohammed, Newark, & Yuness, 2016). All parts of the supply chain from sourcing through fulfillment and on to reverse logistics have been affected.

Sourcing of goods has until recently been based on a highly adversarial and competitive relationship. For many organizations, internal sourcing and vertical integration was viewed as central to the success of the business and outside entities were 'hands-off' in terms of partnering and collaboration. In this environment, the most aggressive pricing position was often the victor without consideration of other, sometimes more important, factors such as innovation, quality, or service (Corbett, 2004). As a better understanding of the impact of these other factors has evolved, the value and benefits of outsourcing of portions of the supply chain and partnerships to mutual advantage have developed and gained in impact (Campbell, 1997).

Traditionally, consumer goods distribution has been designed for large scale movement of goods from an integrated manufacturer to a centralized or regional distribution center and on to the local retail operation, which provides a personalized point of sale interface to the consumer. This type of distribution network relies on efficiencies and economies of scale from bulk manufacture, purchasing, warehousing, inventory management and distribution; a reliance that is not practical in the business-to-consumer eCommerce space. In order to function efficiently and develop according to the expectations of the consumer in this new sales channel,

organizations had to adjust their business practices and operational structures. This adaptation was driven by several key factors including; reduction in organizational vertical integration leading to increased reliance and interaction with the supplier base, increased competition based on access to global markets previously out of reach to the general consumer, changes in the order characteristics and a shift in management philosophy to a more holistic or systems based approach. In this new vision of the organization, an understanding was embraced in which optimization of components within the supply chain individually does not necessarily result in overall efficiency of the system (Lummus & Vorkurka, 1999). The entire concept of a large scale, high volume distribution center is being challenged as organizations begin to better understand and learn to leverage inventory in non-traditional storage locations such as in-transit goods or retail stock located in a traditional store front or back room. (McCrea, 2016)

Operational planning and design for distribution has advanced along with the changes required in distribution strategy. Pick and pack operations have been forced to adapt to lower quantity but more diverse product selection to achieve comparative production levels that could easily be attained in traditional modes of operation in the old retail model. Smaller pick quantities with more line items per order naturally result in significant changes in requirements for, among others, material handling, technology, labor engagement and inventory management approaches. Without operational change to minimize the potential cost, service, and quality impacts that such an order profile would be expected to create, there is potential for significant negative impact to performance and customer experience. A negative impact not necessarily experienced with a competitor's process that could yield a performance handicap that would be difficult to overcome.

Direct interaction with the consumer, as a rule, was managed in the old structure at a retail interface enabling face-to-face human interaction and the ability to touch, feel and interact with the product. As consumer interactions have transitioned from the personal brick and mortar experience to eCommerce, this interaction experience has evolved into a potentially faceless and cold contact directly from the last step in the supply chain, transportation and delivery. An entirely different interaction dynamic that requires a 3rd party to function as the face of the retailer is the new reality for the business' customer experience. "From a consumer's perspective a product purchased online or "virtually" cannot be utilized unless it is delivered to them at the right place, at the right time and in the right condition." (Yaun Xing, Grant , McKinnon, & Fernie, 2011). Coupled with this customer experience challenge, the actual delivery to the consumer is comparatively complicated. The 'last mile' is a term used commonly in distribution referencing to that last stage of delivery between the high volume network point and the end consumer, typically a single point encounter for delivery, where most economies of scale cease to exist. Maintaining a high quality, accurate and personal experience for the consumer at a reasonable cost is difficult when it is estimated by the Council of Supply Chain Management that 28% of costs occur in the last mile. (Gopal & de Miguel, 2016)

The typical eCommerce retailer is challenged with capacity, flexibility of response, knowledge and understanding of logistics, economies of scale and other factors that limit their effectiveness. Enabling fulfillment strategies to the level that Amazon, Walmart and other large electronic retailers have employed requires specialized knowledge of logistics capabilities both within the organization and from 3rd party providers. Knowledge and integration of capabilities and restrictions coupled with extensive strategic development of the supply chain can allow the organization to capitalize on more advanced supply chain concepts. This knowledge base and

fulfillment capability is not easily attained nor commonly understood and therefore many smaller organizations struggle. While this challenge domestically is substantial, when a global distribution component is added, the challenge becomes significantly more complex.

With its integration of several approaches to logistics and purchasing management, Supply Chain Management is a relatively new field of study that was formalized in the 1990s (Gonzales-Loureiro, Dabic, & Kiessling, 2014). As the discipline begin to evolve, Supply Chain Management gained a more strategic emphasis in leading edge organizations. As stated by Hong, P., Tran, O., & Park, K. (2010), a change in the competitive landscape began to develop; "Toward the end of 1990s, competition patterns switch from firm versus firm to supply chain versus supply chain" (p. 544). In order for organizations to be competitive in this environment, the role of the supply chain executive is significantly expanded from that of a similar role in the past. To complicate matters for the electronic retailer supply chain, the rapid expansion of access to and speed of the internet has already and continues to change consumer expectations and behavior. With mobile technology at levels only recently even dreamed of and performance expectations for the perfect personalized experience, the requirements for supply chain adaptability is at an all-time high (Marcelo, Verissimo, & M., 2014). These factors, the nature of this sales channel, and the global economic impact represented will change the role of the supply chain manager (Kiessling & Akdeniz, 2014) and the strategies to be employed for years to come. This is particularly true for small to medium entities in this market space who must capitalize on supply chain strategies in order to differentiate themselves in the field and establish a successful competitive position.

Purpose of the Study

The primary purpose of this research is to review current literature exploring competitive supply chain strategies either in use or in discussion conceptually relative to their applicability to direct-to-consumer eCommerce. From initial research, while significant material exists relative to the internet aspect of eCommerce in terms of marketing and pricing strategies, more limited material has been published on adapting supply chain strategies effectively to the direct-to-consumer eCommerce business segment. This is an opportunity to document prevailing thoughts relative to the effectiveness and usage of various strategies. From this research effort, it is intended that strategies and concepts directly applicable to the electronic commerce supply chain will be identified and highlighted.

Significance and Implications of the Study

This research will focus on specific application of supply chain strategies to the challenges faced by small to medium blended, brick and mortar, and pure electronic based online retailers. This approach will provide a usable reference for these particular size businesses. Providing support resources to these entities is a particular area of concern as these types of organizations employ a significant portion of the U.S. population. In general, small businesses are also the most at risk of failure in their initial stages of operation and have a higher failure rate than that of larger competitors. In the decade between 2005 and 2015, approximately 50% of small business startups failed to survive five years or longer (Office of Advocacy, U.S. Small Business Administration, 2017). While this statistic does not directly translate to retailers or online retailers, it is fair to infer that these organizations are critical to the U.S. economy, are

more vulnerable to competition and are attempting to enter and thrive in competitive structure against some of the largest corporations in the world.

Research Contributions

This research project will provide a specific contribution to the field of supply chain management by providing a consolidated and comprehensive resource for the public and those working in the logistic field regarding current supply chain management strategies and emerging concepts relative to direct-to-consumer electronic commerce (Soliman, 2015). This research will capture current concepts and thought leadership to emphasize these strategies and their application to this business effort with the intention of improving the competitive stance of struggling retailers in the brick and mortar and/or electronic commerce spaces.

Outcome Anticipated

It is anticipated that this research project will serve as an educational resource for the eCommerce industry as well as a research resource covering current literature on this topic. Additionally, this research paper will document strategies to assist with organizations attempting to increase their competitive position in the electronic commerce consumer market. Finally, this research will attempt to focus on strategic concepts that are applicable across various size organizations.

LITERATURE REVIEW

Historical Perspective

Supply Chain Management: Unheard of in the 1970's, core today's business (Alfalla-Luque & Medina-Lopez, 2009) documents the beginning of Supply Chain Management (SCM) as a discipline. The need for and early usage of many of the concepts in SCM have their origins in manufacturing. For any company that produces a physical product has"…had to make use of a supply chain that allowed raw materials to be obtained and stored, and end products to be stored and distributed." (Alfalla-Luque & Medina-Lopez, 2009, p. 202) Through analysis of current and historical research articles and publications, the author proposed to define the evolution of the concepts of SCM and attempt to determine the extent to which this development meets the gaps organizations are encountering in actual operations. The author found that the evolution of SCM occurred in stages over the course of several decades beginning in the 1950's and accelerating since.

In support of the idea of evolutionary stages, each decade of the sixty years leading up to the writing of the article can be represented in SCM with the development of different conceptual approaches to the logistics challenges encountered according to Southern (2011). These are as follows:

"The 1950's: The Transportation Era" (Southern, 2011, p. 54) – This decade purely focused on the rules and understanding of the physical movement of goods from the organization to its customer. No focus on support functions, analytics, or warehousing existed as a part of the equation in large part due to the lack of computational capability.

"The 1960's: Physical Distribution" (p 56) –Physical movement of materials and goods expanded to include inbound and outbound as separate and unrelated activities by practitioners during this decade.

"The 1970's: Physical Supply, Deregulation and Logistics" (p 56) – During this period inbound was a central focus of the logistics discipline. The separation of inbound and outbound activities characterized in the 1960's began to evaporate and the relation between the two segments were better understood. The beginning of the deregulation period with the passage of the Regional Rail Reorganization Act of 1973 led into more changes in the 1980's.

"The 1980's: Transportation Deregulation, Physical Distribution and Business Logistics" (p. 59) – Deregulation of the transportation industry expanded to affect rating and government controls with the Motor Carrier Act of 1980 and several other key legislations. This time period saw the broader usage of the term logistics.

"The 1990's: Business Logistics" (p.59) – This decade was pivotal as technology took a major leap forward with the mainstream acceptance of the Internet and also the beginning of Electronic Data Interchange (EDI) standards for inter-organization information transfer. The relationship between Suppliers and Producers took a significant turn as Strategic Partnerships gained attention. Additionally, specialization in this field began as 3PL organizations grew in influence.

"The 2000's: Logistics and Supply Chain Management" (p. 60) – The term Supply Chain Management became part of common business language. SCM as a strategic business function was first acknowledged allowing for true resource investment and practical application.

During this evolution, SCM leaders attempted to put a framework around the concept by developing a more formal definition. Descriptions as simple as "…the network of entities through which material flows…" (Lummus & Vorkurka, 1999, p. 11) were considered along with more complicated definitions as documented by the American Inventory and Production Control Society (APICS) summarized below as;

> "1 the processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies; and
>
> 2 the functions within and outside a company that enable the value chain to make products and provide services to the customer" (Lummus & Vorkurka, 1999, p. 11)

Regardless of definition, SCM saw the development of more advanced concepts such as Vendor Managed Inventory (VMI), Supplier Partnerships, Outsourcing, Just-in-Time (JIT) and the standardization of the Unified Product Code (UPC). The significant benefits that could be realized from application of these concepts began to be understood.

ECommerce became possible with the advent of the Internet as a broadly available service. The 'Internet Bubble' of the late 1900's caused many to theorize that the Internet and eCommerce were passing fads. Many of the early large player's from these years (AOL, Lycos for example) nearly ceased to exist along with many who did close shop. Even the future giant Amazon struggled with growth in the late 1990's and early 2000's. (Oliver, 2001). However, as the recovery from the burst continued and consumer acceptance, fueled by additional technology advances, of eCommerce grew, the industry launched into a rapid expansion mode leading to the environment we now see.

Consumer Expectations

Performance requirements for eCommerce retailers have grown exponentially and seem to be accelerating. These expectations, which have become the basic level required to compete, have been established by a generation of consumer with a focus on immediate gratification unlike any other in the past. Expectations that would have seemed to be ridiculous and nearly impossible to achieve even 10 years prior have gone from being the shining example of exceptional performance to the benchmark for merely acceptable minimal customer service in very short order. Consumers' "…demands like next-day shipping, perfect accuracy and integrated mobile shopping experiences are transforming practices in manufacturing, warehousing and distribution, and brick-and-mortar stores for businesses of all sizes." (Bond, 2014, p. 34). Bond (2014) documents the strain and intensity of the effort by eCommerce retailers to both meet these demands and continue to innovate not only gain a competitive advantage, but also sometimes just to keep up. Difficulties in developing and implementing innovative new approaches to meet this expectation are both physical and virtual. Physical in terms of fulfillment operations, technology, labor and infrastructure. Virtual as the need to have accurate and instantaneous access to order status and inventory availability across the enterprise has become critical. A requirement that becomes more problematic with application of non-traditional inventory consumption strategies that are commonly employed to expand the supply chain depth and reach. Although these challenges are present and considerable, the ultimate answer and approach revolves around the application of SCM.

Competitive Position

In order to understand and demonstrate the concept of Viable Competitive Position in the title of this paper, several resources were consulted for reference. In the article *What Is*

competitive advantage? Three strategies that work, the author describes competitive advantage relative to success. "To be successful, you need to be able to articulate the benefit you provide to your target market that's better than the competition. That's your competitive advantage." (Amadeo, 2018). The author goes on to define competitive position relative to the competition as a function of competitive advantage. Further, the three general strategies that can be used to build competitive advantage include;

Cost leadership - through operational efficiencies.

Differentiation – service, information, options for fulfillment.

Focus – targeting the correct customers.

D'Aveni (2007) supports this with the idea that competitive position is built on market position such as low cost leader, high service leader, differentiation leader, product offerings, brand and reputation. Competitive advantage then becomes a continuous race to develop new, innovative approaches to the market that displace the competition while at the same time preparing to abandon that same new, innovative approach in favor of something else even more advanced. (D'Aveni, 2007). A classic example of the 'vicious circle' concept.

General SCM Strategy

The Supply Chain Operations Reference (SCOR) model is considered the quintessential model of the key linkages and general stages of advancement in the supply chain. These stages include the steps of plan, source, make, deliver, and return (Hong, Tran, & Park, 2010). A variation of this model is also commonly in usage which splits the deliver stage into three separate and more refined pieces; sell, fulfill and ship. Within this structure, critical activities and exchanges between stages occur physically, financially and informationally.

Supply chains evolve, grow, change and die. This natural cycle is affected by executive level goals and objectives, management techniques, regulatory responses, cultural conditions, competitive pressures, changing technologies, changing demand patterns and/or new market development (MacCarthy, Blome, Olhager, Srai, & Zhao, 2016). MacCarthy et. al. attempts to define what factors are most relevant to this change and what the future might hold through review and analysis of several case industry studies.

Supply chain lifecycle stages, "…similar to product life cycle, comprises emergence, growth, maturity and decline." (p 1700) Many eCommerce retailers exist continually in the emergence (characterized by exploring options in supply chain and new strategies) and growth (refining supply chains for process improvement and rapid increase in demand) phases. The mature phase involves stabilized demand along with stable supply chain design and structure, while the decline phase experiences reductions in demand and replacement with other supply chain priorities. According to the authors, differentiation is a key part of competitive strategy in the emergences and growth phases of a business. The proposed differentiation strategies, several of which are tied closely to SCM strategies, identified include;

> "(1) Supply network configuration: should production be centralized to one location with global distribution or dispersed to local markets with local distribution? Should sourcing be local and/or global?
>
> (2) Product delivery strategy: how does the product reach the customer: direct delivery from plant, from a stock-point in the distribution network, from a retailer or from some other location?
>
> (3) Customer-order decoupling point positioning: whether the producer uses engineer-to-order, make-to-order, assemble-to-order, or make-to-stock or some combination of these approaches.
>
> (4) Strategic inventory positioning: the customer-order decoupling point is by definition the last stock point along the material flow to the customer, but strategic inventory positions can be added upstream from the decoupling point.

(5) Strategic capacity positioning: the stages after the customer-order decoupling point may require some excess capacity to maintain stable delivery lead times when demand rate fluctuates.

(6) Transportation mode (at each stage in the supply chain): with respect to geography, customer lead-time requirements, costs and environmental concerns need to be considered.

(7) Process choice: internal production technologies and lot sizes typically depend on the level of product customization and standardization.

(8) Supply chain relationships: aspects concerning information sharing, supply contracts, governance modes, etc., with suppliers and customers affect supply chain design decisions." (MacCarthy, Blome, Olhager, Srai, & Zhao, 2016, p. 1707)

Hong et.al. (2010) focuses the research into the usage of electronic communication technologies (ECT) in the integration of the linkages of the supply chain to determine the impact to manufacturing and thereby overall organization competitive position. ECTs essentially include any form of electronic transfer of information including internet based processes and EDI. Based on statistical analysis of the International Manufacturing Strategy Survey IV of 711 respondents in 23 countries, the authors concluded that although the results of the statistical analysis did not suggest a direct linkage between ECTs and manufacturing improvements, they did suggest an improvement in supplier integration, customer integration, flexibility, and quality.

Torres & Lisboa (2014) delve into the impact on performance and implied competitive position of general strategies relating to the factors of marketing, innovation and efficiency. Based on analysis of 62 Portuguese eCommerce companies, the relationships between various strategies and performance are compared. With the competitive nature of the rapid growth in eCommerce, innovation in speed, accuracy, information availability, financial responsiveness, convenience, personalization, and price are all critical. However, through the study, differentiation relative to cost leadership which is linked to the efficiency factor was the least

significant. Innovation and brand recognition (marketing) were more significant, however, the author positioned all three as critical to the foundation of organizational performance.

Source/Make

Jack & Powers (2015) explore the management of strategic supplier relationships. Strategic supplier relationships are formed typically out of a desire to provide an improved product and improved competitive advantage based on cost, quality, or service. According to the author, significant research has focused on the benefits of partnerships and the selection process for a potential partnership, but from the standpoint of gaining the maximum benefit through effective management, there has been less investigative focus. This study was performed to help to determine the impact of the customer and consumer qualifiers on the final quality and customer performance achieved. The qualifiers investigated include top management support, technology readiness, and bi-directional trust between the partners. Through the use of online surveying of high level retail executives and business owners, it was determined that all three qualifiers have significant impact on both financial and quality performance of the supply chain from the customer and consumer perspective (Choi & Cheng, 2011).

Vendor managed inventory (VMI) is a another sourcing concept in which the vendor or manufacturer monitors inventory levels at either the DC or Point of Sale (POS) level in the retailer's supply chain. This concept was pioneered between Walmart and its supplier Proctor & Gamble in the late 1980's. Based on inventory levels measured relative to predetermined and in some cases dynamic targets, the vendor has responsibility and authority to automatically restock and bill the retailer. As one paper states, the primary purpose of a VMI program is to "transfer the burden of asset management from the consuming organization to the vendor…" (Waller, Johnson, & Davis, 1999, p. 183). The in depth sharing of demand and sales information provide improvement benefits to both the vendor and to the customer as supply was more closely able to

track to demand reducing stock out or overproduction issues. The study analytically proves the logic behind the benefits anticipated through simulation.

However, according to a study published in the International Journal of Production Research (Niranjan, Wagner, & Nguyen, 2012) not all VMI applications are successful. Although much hype surrounds the successful cases, there are examples in industry where VMI has been a failure and these are not frequently discussed. This study attempts to create a framework of benefits and concerns relative to the vendor, retailer, and product in order to support assessment of the success potential prior to implementing a VMI solution. This information is reflected in Table 1 below;

Table 1

Benefits and Concerns in VMI Relationship

Product	**Retailer**	**Vendor**
• Standardized • Repetitive • Standard ID through supply chain • Low demand variance • Demand is forecasted and stock is monitored	• Stable revenue • Purchasing costs are high • Info systems are good • Willing to collaborate • Purchasing is a core competency	• Trust and long term relationship • VMI benefits to both organizations • Key vendor that is a high % of current POs • Willing to collaborate • Info systems integrated

Source Niranjan et. al. (2012)

The Outsourcing Revolution: Why it Makes Sense and How to do it Right (Corbett, 2004) focuses on outsourcing as a business strategy and presents the historical perspective, the evolution of the concept, organizational applications internally and externally, and the potential benefits to an organization adopting this strategy. Nearly all functions within an organization have the potential to be outsourced and this strategy may be embraced for any number of

potential reasons. Factors behind an outsourcing decision can be purely cost driven or can be tied to the speed, flexibility, and scalability that an outsourcing agreement can provide. As a side benefit, for many organizations the movement of non-value add functions to another organization provides the opportunity for the enterprise to give consideration more strategically to the core business rather than focusing tactically on those support functions. Clearly care must be taken in the vetting process used to identify the right partner and Corbett (2004) refers to the process as being "more like hiring than buying" (p. 117).

Fulfill/Ship

There are four types of eCommerce organizational selling models according to *Distribution Strategies for Online Retailers* (de Koster, 2003). These types include direct distribution from manufacturers, traditional retailers and wholesalers who have expanded into online sales, new internet based online sales from organizations that have no physical assets (marketplaces), and new internet based retailers who invest in fulfillment resources but not in traditional brick and mortar assets. In each of these models, one common challenge is how to get product to the consumer cost effectively while meeting their service expectations. One difference highlighted between the traditional mode consumer and consumers in the online channel is how the consumer in each mode responds to failures in performance. Online shoppers will often go elsewhere if their needs are not met with little provocation and without notice. De Koster (2003) investigates the strategies utilized for fulfillment by these four selling models which possess previously unseen requirements.

The increasing requirement for accuracy and flexibility in eCommerce fulfillment operations as discussed above is critical as often the online retailer does not get a second chance to get it right. Distribution Centers (DCs) designed for fulfillment in traditional retailing models

were originally intended to service store replenishment in bulk; bulk inventory storage, bulk picking and bulk transportation (McCrea, 2016). Unlike eCommerce fulfillment, the bulk model naturally builds buffers in inventory that cushion the consumer from errors upstream in the supply chain. *Retail and eCommerce operations chase accuracy and flexibility* discusses alternative strategies that must be explored and understood for an organization to remain effective in eCommerce fulfillment performance. Options and technologies such as fulfillment from store inventory, real-time inventory tracking, advanced automated picking solutions and dynamic inventory balancing across the enterprise have to be considered and integrated into operations.

An article published anonymously in Modern Materials Handling discusses the increasing complexity in fulfillment requirements from an arrival and handling quality standpoint (Anonymous, 2015). As fulfillment and transportation resources handle more, faster, and more frequently, design to prevent damage between the point of pick and receipt by the consumer becomes more complex. Replacing a damaged item and dealing with negative social media feedback can be up to 17 times more than the cost of preventing that damage in the first place according to the publication. Investments in proper packaging are a critical piece of the supply chain fulfillment process and must be given adequate attention to ensure that the product is protected in any foreseeable in-transit scenario. Additionally, the article highlights a constant disagreement between retail marketers who view the package as prime advertising media and the transportation providers who consider that advertising to increase potential theft risks in the transportation process.

While pick and pack fulfillment is certainly a challenge in the eCommerce space, an equally significant challenge exists in the movement of goods from the fulfillment center to the

consumer's point of receipt. By changing the dynamics of a consumer sale from a) the consumer visiting a retail location to buy a product to b) the consumer ordering online with delivery to their home, a significant portion of the logistics cost and responsibility for the product handoff has transitioned from the consumer to the retailer according to a recent study (Grando & Gosso, 2005). Based on continually inflated consumer expectations for the online purchasing experience, retailers typically cannot pass along these costs back to the consumer and therefore must review alternatives and creative strategies to mitigate the impact of these costs on the organization's bottom line. This paper studies the various factors that affect the cost of that final mile delivery.

The authors of *Collaboration and Evolution of ECommerce and Express Delivery Industry Supply Chain* mathematically explore the collaborative efforts and interactions between express delivery and ECommerce in the Chinese market (Xu, Zhang, Cao, Chen, & Xuhong, 2016). The author hypothesizes that the financial, informational and physical interactions between the industries has created a high level of dependence on each other in China and then prove it mathematically.

According to an article in the Journal of Business Sciences, "the global supply chain is shifting the cost cutting and risk mitigation effort to focus on distribution, logistics, and partners' reliability and away from manufacturing cost." (Varzandeh, Farahbod, & Jake Zhu, 2016, p. 126) As a part of that reliability, organizations must consider the increase in risk that is inherent with the increased globalization of suppliers and consumer markets. Risk in the current business environment must take into account a number of new and complex challenges form sources that previously did not warrant significant study. These risk sources include such potentials as environment disaster, technological failure, geopolitical risks, socio-economic factors, labor actions, regulatory changes, and transportation interruptions. While risk management has gained attention from the larger players, this study demonstrated that small/medium organizations need

to consider a change in approach and focus. Table 2 below, taken form the study (Varzandeh, Farahbod, & Jake Zhu, 2016, p. 128), documents the general risk management approach taken by each organization from responses of executives in a number of small/medium/large organizations. The responses of small/medium organizations focused more on reactionary strategies (acceptance and mitigation) rather than on avoidance strategies (transference and avoidance). This is clearly concerning and an area for further investigation and improvement in awareness and applicable strategies.

Table 2

SCRM Strategies of Large, Medium, and Small Companies

	Acceptance			Mitigation			Transference			Avoidance		
	L	Med	S	L	Med	S	L	Med	S	L	Med	S
Risk Factor												
Economic	2	10	1	4	18	24	3	0	3	7	3	0
Environmental	5	12	14	10	19	14	0	0	0	1	0	0
Geopolitical	6	18	17	6	13	11	0	0	0	4	0	0
Societal	2	8	14	4	20	14	0	0	0	10	3	0
Technological	2	9	12	4	17	14	0	5	2	10	0	0

Taken directly from (Varzandeh, Farahbod, & Jake Zhu, 2016, p. 128)

Returns (Reverse Logistics)

Whether an organization embraces the reality of consumer goods return or takes a position of discouragement and deterrence, “Companies can no longer afford to treat reverse logistics as an afterthought. It needs to be a core capability within the supply chain organization.” (Rogers D. S., 2013). In this article, the author positions returns as a potential profit and business growth

engine. Capture of relevant information regarding returns is key to long and short term problem identification and resolution. Some relevant information according to (Dutton, 2010) includes;

- Percentage of items returned
- Dollar Volume of items
- Cost of recovery and return
- Comparative cost of recycling or scrapping
- Repair cost as a percentage of overall cost
- Cost of repair parts for out of production items

Bernon, Cullen & Gorst (2015) agree with this general idea and state returns constitute "a necessary aspect of retailing…and have become a critical activity for organizations" (p. 584). In this study, the authors delve into a recent complication to the returns process in the development of the Omni-channel concept. Omni-channel incorporates the idea that every interaction with a retailer, whether online, mobile based, telephone based, or in person at a retail shopping location, should have the same look, feel, and customer experience. This idea opens the door to purchase via one channel and return through another with all of the financial, information, and physical challenges inherent. The author goes on to explore some of the process requirements that inhabit this challenge to better understand requirements and potential strategies.

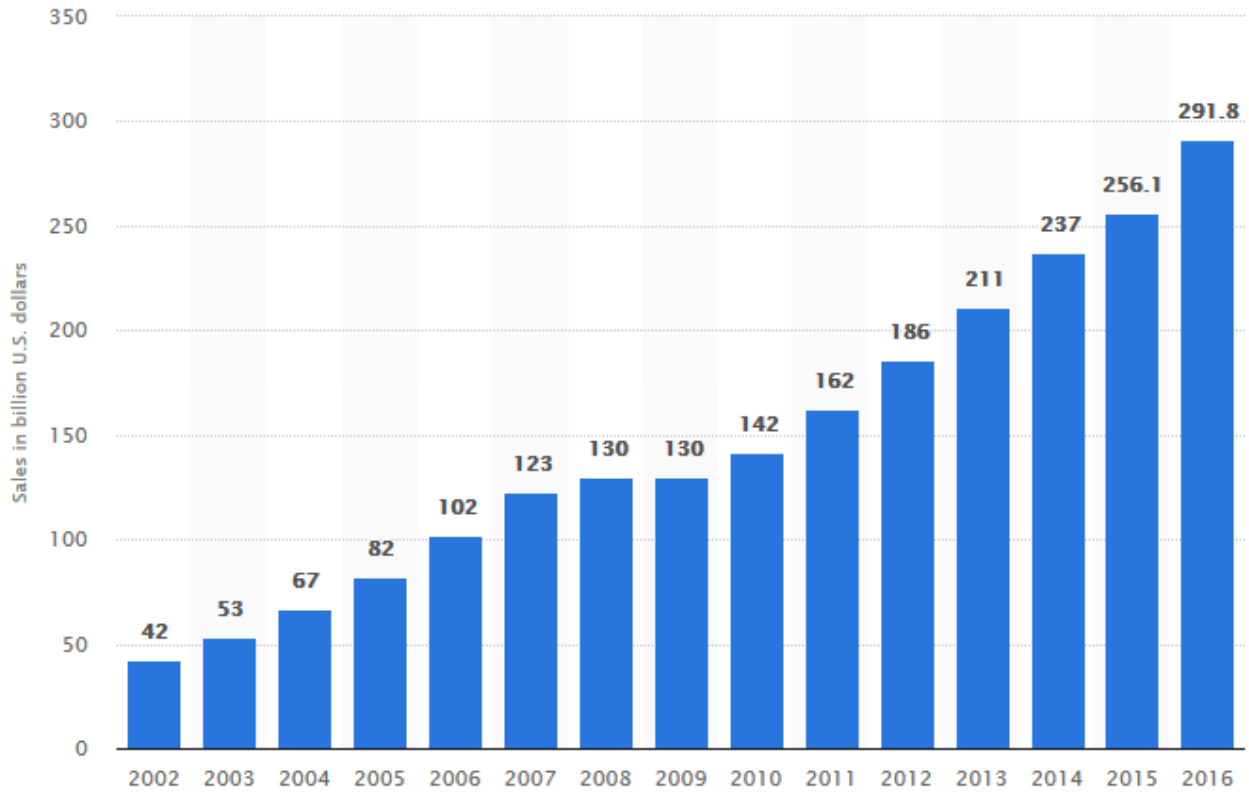
DISCUSSION

Growth Implications

A major challenge to success in the eCommerce space is a retailer's ability to respond to consumer demand and in particular consumer demand variances. Figure 1 (Statista, 2018) below shows the growth in ecommerce annually over a recent 15 year period in the US market (2002 – 2016). Responding to overall market expansion of 15+% YOY for a continual timeline as reflected below is challenging. However, actual growth experienced for individual organizations when successful in their chosen market can be significantly more pronounced than the market aggregate.

Figure 1

Desktop retail eCommerce sales in the United States from 2002 - 201



Taken directly from (Statista, 2018)

As described previously, the eCommerce sales channel has seen unprecedented year over year, continual growth in the US over the last several decades. Although a little slower to start elsewhere in the world, other markets and economies are rapidly catching up and in one case, China, have surpassed the US in the top position during calendar year 2016. Table 3 below lists the top 10 eCommerce markets globally based on a study published on remarkety.com. (Cohen, 2018). While this source cites the more developed top markets in the world, there is still significant market potential that has not been tapped in less developed economies. If this were extended to include some of the lesser developed portions of the world, the market potential would expand significantly. In fact, according to the U.S. Census Bureau, this table does not include two of the top five most populous countries in the world: India and Indonesia (U.S. Census Bureau, 2018). Clearly although several decades in development, the potential for global eCommerce has only been somewhat explored.

Table 3

Global eCommerce Market Rankings for 2016

Rank	Country	Market Value*	Internet Users	% of Population
1	**China**	$1.0 T	721 M	*52.2%*
2	**U.S.A**	$396 B	286.9 M	*88.5%*
3	**U.K.**	$166 B	60 M	*92.3%*
4	**Japan**	$124 B	115 M	*91.3%*
5	**Germany**	$107 B	71 M	*88.1%*
6	**France**	$72 B	5 M	*85.9%*
7	**South Korea**	$38 B	43.2 M	*85.5%*
8	**Canada**	$20 B	28.3 M	*88.4%*
9	**Russia**	$15.7 B	102 M	*0.1%*
10	**Brazil**	$14.6 B	139 M	*66.5%*

** Listed in U.S. Dollars*

Source Cohen (2018)

This growth spikes seasonally with the 4th quarter holiday shopping time between Thanksgiving and Christmas being the most intense. According to Statista.com, 2017 eCommerce sales in the United States is estimated at $336.7 Billion and, of this, approximately $99.4 Billion or 29.6% was spent in the final quarter of the year. (Statista, 2018). Another statistical monitoring source estimated that this statistic is much higher at $108.1B in sales for the months of November and December alone (Berthene, 2018). Berthene (2018) also tracks significant individual purchasing days during the holiday period and provides some interesting insights. Of the 61 shopping days in the months of November /December, 53 were estimated to exceed $1 Billion in sales. While this is significant, it is also important to recognize that the two largest of these days, when combined, accounted for approximately 11.5% of the seasonal sales (Black Friday at $5.03B and Cyber Monday at $6.79B). Although there is variation between these two sources in terms of sales reported this difference is likely attributable to alternatives in sources surveyed, markets and products included, and/or methodology. The information does provide a confirmation of the significant periodic variation in sales that drive the need for flexibility in fulfillment capability and supply chain responsiveness for anyone in the eCommerce space.

Fulfillment Approach

In order to address the capacity needs as demonstrated in the above discussions both from a growth as well as from a cyclical variability standpoint, one of the first Supply Chain Management (SCM) strategies to explore centers around fulfillment. A typical organization transitioning from a traditional bulk fulfillment structure to one designed to support direct-to-consumer needs will struggle with this aspect of SCM strategy from beginning to end of the fulfillment center operation. The entirety of the fulfillment center process undergoes a change

when comparing to a traditional model. Some of these contrasting comparisons are shown below in Table 4.

Table 4

Characteristic Comparison of Traditional and Direct-to-Consumer (D2C)

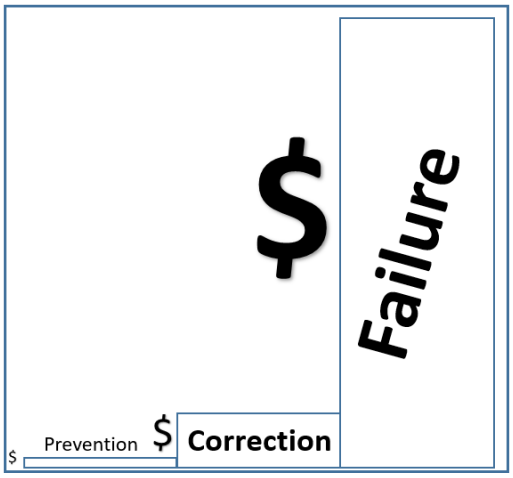
Characteristic	Traditional Model	D2C model
Order Size	*Large (mulitiple boxes to pallets)*	*Small (individual packages)*
Pick Complexitiy	*Simple*	*Complex*
Forecast/Planning Ability	*Solid*	*Limited*
Pick and Pack Response	*1-2 Days*	*1-4 Hours*
Order Accuracy Requirement	*Important*	*Critical*
Workforce Size	*Small*	*High*
Pick Technology	*Simple (manual)*	*Complex(Voice pick, pick to light, ASRS, etc.)*
Material Handling	*Simple (cart, fork lift)*	*Complex(conveyor, sorting systems)*

Clearly this table is a high level brush at some of the more obvious and significant differences in the two models. However, two of the differentiators in this list that are key and drive many of the differences in other characteristics is that of 'Pick and Pack Response' (PPR) and 'Order Accuracy Requirement' (OAR). These two characteristics are critical to the consumer experience for two vital reasons. First, in many cases performance in these two areas are the final experience the consumer has with the eCommerce retailer. If this part of the fulfillment cycle fails, the likelihood of return business from the consumer drops dramatically. Second, failures in PPR and OAR absorb fulfillment capacity that cannot be regained. Particularly a failure in OAR is significant as replacing that order essentially doubles the time to fulfill that order. The 1:10:100 rule applies in this situation; If the cost to fulfill an order accurately is $1, it will cost $10 to recover if a mistake is caught prior to shipment and $100 if

the mistake makes final delivery to the consumer and has to be recovered as illustrated in Figure 2. (What is 1:10:100 rule?, 2018)

Figure 2

1:10: 100 TQM Rule of Cost to Handle Error



Source (What is 1:10:100 rule?, 2018)

In order for an organization to be effective at PPR and OAR, several aspects of SCM fulfillment strategy can be applied. There is a need for fundamental restructuring of the pick and pack process to provide efficiency and quality improvement to achieve the expected rapid PPR and zero defect OAR that are expected. Although detailed analysis and modeling for optimal solutions is both beyond the scope of this paper and very unique to the individual fulfillment operational needs, a high level discussion of some of these approaches is warranted.

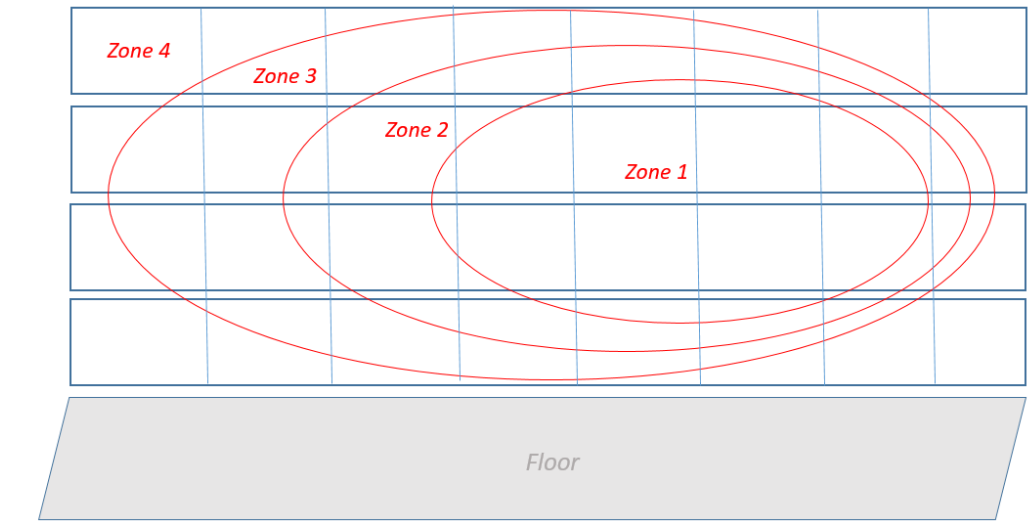
Traditional designs of warehousing structure and operation centered on fixed inventory positions, fixed order processing positions and a mobile workforce to retrieve, return and assemble, sometimes randomly from all available inventory storage locations. Additionally, traditional warehouse organizations involve fixed, dedicated storage locations by SKU to

simplify the management of inventory and reduce search complexity. This strategy is evolving as more operations adapt new philosophies. Storage positions for a particular SKU have become dynamic and not necessarily in proximity to storage locations for similar or even the same SKU. SKUs can be stored in multiple pick locations either due to pick velocity (term that combines the ideas of pick frequency and typical pick quantity), or due to picking designs in which multiple zones exist with dedicated picking resources. Even the idea of the workforce being the mobile piece of the fulfillment operation is changing as concepts of inventory or orders in motion have become commonplace.

Pick facings for eCommerce fulfillment must be optimally organized based on the movement of each SKU and the typical order composition. Typically, eCommerce orders consist of more diverse line item selection with smaller SKU pick quantity per line item. This typical order pattern suggests either a facing with commonly picked SKUs or a facing with similar SKU families in close proximity to help drive efficiency through reduced picker movement or improved quality through familiarity. Industrial engineering concepts can then be applied to the SKU placement to ensure higher frequency pick SKUs are placed optimally to reduce fatigue. Specific placement design of course, is defined by the particular composition of SKU pick frequencies, size, storage requirements, and material handling systems in usage. This concept generally can be illustrated in the following Figure 3 in which pick efficiencies deteriorate as the SKU location moves further from Zone 1.

Figure 3

General Pick Facing Optimization for Productivity



Wave releasing of orders for pick and pack based on an organizationally defined criteria is another way to improve performance relative to the dual targets of efficiency and quality. The wave criteria can be based on grouping of order with similar SKUs to allow for personnel to concentrate in a particular picking area or based on consolidation of similar size orders to gain efficiencies. Generally, whatever the waving strategy criteria might be, typically the focus is to improve efficiency by reducing wasted movement or pick accuracy through better familiarity with the SKUs picked to reduce defects. This approach is essentially an application of lean methodologies seven wastes (Jasti & Kodali, 2015).

Investment in material handling is costly, but if correctly applied can provide the eCommerce fulfillment operation with significant advantages in efficiency, accuracy and flexible capacity: all of which, have been identified as critical to a competitive position. Material handling systems are highly customized to the application and scale for which they are intended and can vary in complexity and cost. Systems can be as simple as a paper based picking WMS

supported routing and utilizing a manual picking cart for direct to carton or bulk picking. In more complex high volume applications, automation of physical picking as well as decision support technologies can and often should be applied. Picking automation can be limited to conveyor systems moving orders to pick zones or can be advanced to the point of solutions such as carousel technologies or ASRS (Automated Storage and Retrieval Systems). Decision support technology has continued to evolve in effectiveness with more advanced technologies and could include technologies based on RF communication such as pick to light, voice assisted picking, wearable scanning technology, or a combination in state of the art Augmented Reality technologies in which the user is supported with hands free scanning and direction technology coupled with voice (SupplyChain247, 2018). Of course with increased complexity and technology comes additional cost to install and operate, in many cases in the multi-millions of dollars (Frazelle, 2002)

Although state of the art technologies are fascinating and exciting to consider and experience, many organizations are far from this level of complexity and truly could not benefit from application in their present structure. In order to capitalize on high technology based solutions, first the groundwork must be laid. Inventory Control and Warehouse Management Systems must be in place and accurate to enable technology to provide assistance (Murphy & Knemeyer, 2105). One hundred percent accuracy in direction is only as good as the information provided and physical compliance to that information. In order to obtain the physical compliance and the information associated, solid fundamental processes must be in place for tracking of inventory put-away and movement functions. As stated, this is foundational to any further advances in fulfillment support.

Building and operating fulfillment centers to support peak season requirements is generally not an efficient or viable supply chain approach. For some organizations where seasonal business may double or triple non-seasonal business, this would imply multiple idle resources at certain times of the year. Seasonal demand spikes are not unique to eCommerce, but the proximity of the end consumer to the beginning of supply chain in eCommerce vs brick and mortar retail reduces many of the buffers that traditionally help to mitigate this effect. To support these variations in seasonal demand in eCommerce, innovative strategies are being developed which will need to be considered to better enable fulfillment scalability.

Expanding multiple physical distribution hubs in the fulfillment network is one viable approach to the seasonal scalability issue. However, this approach can be costly and inefficient. Although full time redundant capacity is inefficient, some organizations are pursing part time operations. These operations can be setup as secondary full operational DCs (also referred to sometimes as ‘pop-up’ facilities) generally focused on a particular product or market and can be run only part times of the year to cut costs. Alternatively, some organizations are able to expand capacity in existing operations simply through the addition of labor or sometimes entire operational shifts. Each strategy has its pros and cons and should be considered individually for application to a given need.

For those organizations with a brick & mortar in addition to an online presence, utilizing that retail space as a secondary DC is a viable option to create a secondary fulfillment operation (Bayram & Cesaret, 2017). There are many considerations that should be evaluated, prior to beginning a program of this type, but shipping from store locations can be very effective in reaching consumers faster particularly when in specific target markets as both cost and response time can be improved. Some of the challenging factors to consider include among others; store

inventory visibility, inventory accuracy, systems to pick at store level, interference with retail operation, training required, and space availability for shipment preparation. On the positive side though, in addition to the reduced transportation cost and quicker delivery to local markets, this option allows for better usage of existing resources and an opportunity to effectively manage the inventory of SKUs (Stock Keeping Units).

Not all retailers can take advantage of secondary fulfillment operations, but additional SCM strategies can be considered. Partnerships or other arrangements with vendors can provide avenues for additional capacity in addition to the other benefits that may be obtained. Direct fulfillment from the vendor DC during peak times can add much needed capacity. Care must be taken in these relationships to ensure that other priorities do not obscure the need to fulfill for the e-retailers customer base and also to ensure that the transaction is transparent to the end consumer. An alternative that is similar in nature, but more aggressive might be to completely outsource the fulfillment function to allow for focus on core competencies of the eCommerce business (Corbett, 2004).

Consumer Experience Approach

Many eCommerce consumers today have been raised in a different economic and more aggressive customer focused climate than has ever existed in history. This is due to many factors including access to information, primarily due to the internet. Whereas 50 years ago, the consumer had limited options for purchasing goods and access to limited information on product capabilities, performance, and the usage experience from other consumers, today's consumer is overwhelmed. Globalization of not only business sourcing, but options to truly purchase directly at the consumer level globally have changed retailing profoundly. Additionally, for any item under consideration for purchase, a consumer has nearly unlimited access to reviews and

information on performance, technical specs, manufacturing, cost, competitive alternatives, other consumer experience and more. This has truly changed the competitive landscape and as the players in the market become savvier, the competitive field becomes more challenging.

The second factor that influences consumer expectations is the nature of the things that the Millennial Generation or Gen Y perceives as valuable. As this generation has grown up through generally very prosperous times with significant access to technology that has provided instant access to desires and broad exposure to social media and various topics of concern, this grouping of consumers has unique characteristics and expectations. While being described often as knowledgeable, highly self-aware, more socially and environmentally conscious, and sophisticated, these characteristics can yield other, more negative, descriptions such as entitled, self-absorbed, and having unrealistic expectations (Valentine & Powers, 2013). As described by Alexander & Sysko (2013), members of this "…group feel that they can do anything; in their lives, everything should revolve around them…" and that "…time for self is very important…" (Alexander & Sysko, 2013, p. 130). Regardless of the way this is viewed, the end result is a consumer that expects a lot from those they do business with. This impact to the e-retailers is that this consumer base can be characterized as;

- expecting immediate satisfaction regardless of circumstances
- expecting to spend little time waiting
- knowing what they want, expect to find it in a product or service and will go elsewhere if they don't
- expecting personal attention and acknowledgement
- willing to transfer loyalty to a different source based on any dissatisfaction

In other words, eCommerce consumers want ‘what’ they want, ‘when’ they want it, ‘where’ they want it, and want it at a minimal investment in cost and time. In short, the consumer wants control of the experience.

Information is critical to the consumer to feel in control. Every effort to update the consumer on the progress and status of their purchase should be made. From initial assessment of inventory availability even when not available locally or at all, to issues prior to delivery to the actual delivery being completed. Providing this information will build confidence and provide the consumer with the opportunity to intercede if necessary. Failure to provide factual information could lead to a customer that does not return because of their experience.

Omni-channel has evolved as an attempt to answer the expectations of the consumer as described above. Omni-channel to the consumer means that interactions with a physical or electronic retailer will be the same in feel, capabilities, inventory availability and other important factors regardless of the mode or time of interaction. It is essentially the ‘what’, ’when’, and ’where’ expected by the eCommerce consumer is met. Supply Chain Management (SCM) strategies can help in many ways to support satisfaction of these expectations.

Differentiation is one of the key factors in consumer selection of sourcing. Through application of SCM strategies, fulfillment differentiation can help the e-tailer to develop approaches to address the ‘what’ of consumer expectations. In order to provide a customer ‘what’ they want, the product desired must be available and it must be clear to the consumer that this is the case. This requires very accurate understanding of inventory status throughout the enterprise with the capability to fulfill from wherever that inventory is. In a more advanced interpretation of this idea, inventory in transit, whether on order from the supplier or in the

returns supply chain needs to be available to meet the needs of the customer. This capability is one of the key concepts of the Omnichannel model.

Speed of fulfillment and delivery has been a common rallying cry of eCommerce retailers over the last decade. Amazon with its Prime service offering has been a driving force behind this approach with the end state of delivery within the same day of ordering. However when observing what consumers actually are looking for, this idea is only part of the solution. As stated above, the Millennial consumers wants what they want, when the want it. That can be fast, but fast can also create an issue if delivered while the consumer is out of town. In another example, delivering a product ordered on a Friday for overnight delivery is late if it is needed on Saturday and delivered on Monday. The 'when' part of the equation is potentially fast, potentially slower, or potentially by appointment at a specific time or day. These options can be provided by understanding and capitalizing on the last mile delivery capabilities of various fulfillment and delivery partners that an organization might engage for service. Offering these strategic options is one way to differentiate and satisfy the expectations of the consumer.

Although residential delivery to the consumer's home has been assumed to be the optimal delivery point and significant time and effort has been invested to understand the most cost effective way to handle this last mile delivery (Gopal & de Miguel, 2016). As consumer expectations have become better understood, the residential delivery is in many cases sub-optimal. For example, when a consumer lives in a secured complex on a busy city street, delivery to the residence during the day is an invitation to theft. SCM strategies can consider alternative approaches to delivery for this consumer. Perhaps having the product held for pickup at a location such as a brick and mortar location or a carrier owned storefront operation is preferred. Having the ability to re-route a shipment to where the consumer will be or hold

fulfillment until a better time would solve this challenge. In short, as stated above, the consumer desires control to meet their time utility needs.

As with all consumers, cost of service is of prime consideration. In the eCommerce space consumers consider not only the cost of the product itself, but also any additional costs such as returns or outbound shipping. While consumers will always focus on product price, focus on the cost of shipping seems to have been escalated in the consumer's mind by the perceived offer of free shipping that eCommerce giant Amazon has created through the Prime program. Ultimately, shipping of product is a cost that is more significant in terms of impact on profitability when shipping to individuals vs shipping in bulk. The key to this issue from a supply chain standpoint is to mitigate this cost as much as possible so that the perceived free shipping offer can be extended. Mitigating cost can be accomplished in the supply chain through application of a number of approaches. One that has gained some traction with internet retailers is to artificially create a larger shipment to the consumer by setting free shipping purchasing thresholds (McKinnon, 2012). This creates a scenario where incremental product added to the order adds a larger contribution to the profit margin than it does cost to the shipping, thus helping to offset the cost overall. Similar to this strategy is a second in which the eCommerce retailer offers to ship product from the website to the local store for pickup with no cost. This allows for eCommerce orders to be shipping along with regular inventory replenishment shipments to the retail location, thus virtually eliminating incremental shipping costs.

A more complex approach to this problem that requires a larger footprint of primary and alternative fulfillment centers revolves around optimization of origin-destination. By utilizing a broader selection of shipping points and thereby reducing the transportation distance from the stocking location to the consumer, average cost is minimized on a per shipment basis.

Additionally, by improving the proximity of inventory and consumers, with adequate understanding of transportation provider service offerings, a savvy eCommerce retailer can optimize to the lowest cost service that will satisfy the consumer expectation of delivery service.

CONCLUSION

This paper began with a discussion of the rapid growth and expansion of the eCommerce sales segment and how that growth has fueled adaptation to the supply chain. Several large players have grown in the last two decades to dominate and the small/medium players have struggled to regain ground lost. A large part of the successes of the larger player hinges upon the understanding and capitalization on the capabilities of their supply chain and that of their vendors. The purpose of this paper was to explore the academic field of research to attempt to identify some of the more appropriate applications of supply chain management in an effort to identify those that can be utilized to support a stronger competitive position.

A sampling of relevant academic work was conducted with some success at identifying Supply Chain Management approaches applicable to the eCommerce field. While the literature review uncovered a number of relevant scholarly articles for this research, a number of concepts and applications are being developed more rapidly than the research can keep up with. The intense competitive nature of this sales channel continues to drive innovation at a rapid pace. This paper has accomplished its purpose of providing an overview of current thought leadership into competitive supply chain management approaches to eCommerce and summarizing some of those approaches for application.

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