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Don’t Be Left out in the Cold: An Examination of Organizational Innovativeness and Its Influence on the Capacity to Innovate in Cold Chain Third Party Logistics Firms

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Don’t Be Left out in the Cold: An Examination of Organizational Innovativeness and Its Influence on the Capacity to Innovate in Cold Chain Third Party Logistics Firms

by

Anna Driver Johnson

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

Executive Doctorate in Business

In the Robinson College of Business

Of

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GEORGIA STATE UNIVERSITY

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ACCEPTANCE

This dissertation was prepared under the direction of the *ANNA DRIVER JOHNSON* Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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‘Esse Quam Videri’… ‘To be, rather than to seem to be’

- Marcus Tullius Cicero

1. ‘Esse Quam Videri’ is the motto of Swire, the parent company of United States Cold Storage (USCS) where I work. This statement about authenticity holds a tremendous amount of importance for me and served as a catalyst for my Doctoral journey three years ago. I turned 40 that year and paused to reflect on my life and what I wanted to contribute over the next forty years. I developed three objectives as part of this reflection which would allow me to be the most authentic version of myself: to create new opportunities to achieve my long-term career goals, to communicate my excitement for my industry, and to educate future logisticians on the supply chain. This doctoral journey has given me much more than I could’ve imagined when I set those goals and I’m forever changed by this experience.

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ABSTRACT

Don’t Be Left out in the Cold: An Examination of Organizational Innovativeness and Its Influence on the Capacity to Innovate in Cold Chain 3PL Firms

by

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The cold chain third-party logistics (3PLs) industry is comprised of 250 companies in the United States, representing a $5.7 billion dollar market (G. C. C. Alliance, 2019). The cold chain 3PL industry manages the storage of the food products the manufacturers produce and the logistics activities on behalf of the shipper. Currently, it is reported that over 94 billion pounds of food are stored in cold chain 3PL warehouses, with a projected growth to $2 billion dollars of goods and services tracked annually by 2023 (G. C. C. Alliance, 2017). Given industry growth, regulatory pressures, and serious disintermediation in the chain due to changing business models and alternative channels of distribution, the need for innovation-driven value from traditionally conservative, slow-to-change 3PLs is urgent. Therefore, I addressed the following research questions with this study: (a) What is the state of Organizational Innovativeness in cold chain 3PL firms? and (b) What is the nature of the relationship between cold chain 3PL firms’ innovativeness and their capacity to innovate? I am embedded in a cold chain 3PL, and my firm has a vested interest in understanding where to focus its efforts to effect change and create high levels of innovation capacity. All levels of the organizations were represented in the 192 participants who responded to a survey. The tested model represents a five dimensional second-

order latent construct for organizational innovativeness and its influence on a firm's capacity to innovate. I evaluated the model using WarpPLS™ 6.0 (Koch, 2017). The findings suggest that all five dimensions had a strong positive influence on organizational innovativeness, which validated prior research. In turn, organizational innovativeness, as a second-order construct, was a significant predictor of innovation capacity. Size was a control. Open-ended questions were asked to allow open commentary on innovation in the respective organization and for the industry at large.

INDEX WORDS: organizational innovation, innovation capacity, third-party logistics, field research, structural equation modeling

1 CHAPTER ONE: INTRODUCTION

The United States' third-party logistics (3PL) temperature-controlled industry is considered an integral component of the food supply chain, commonly referred to as the cold chain. The cold chain manages the temperature, quality, and safety of perishable food products from the point of origin to the final consumer (G. C. C. Alliance, 2017). The food cold chain ecosystem consists of the growers, manufacturers, distributors, and sellers of food that consumers purchase (Figure 1). Companies in this industry manufacture and process a wide variety of foods, including meat, seafood, dairy products, fruits and vegetables, baked goods, and candy. The food chain contributes over $790 billion dollars to the U.S. economy (Hoovers, 2018). Frozen and perishable foods make up 7% of the food market share, with an estimated $55.3 billion dollars in revenue.

Figure 1. The food cold chain.

1.1 Cold Chain 3PL Industry

In the middle of the food cold chain sit temperature-controlled 3PL providers (3PLs). The cold chain 3PL industry is an external supplier that manages logistics activities on behalf of a shipper (Hertz & Alfredsson, 2003). Food producers and retailers outsource their distribution networks to cold chain 3PLs to minimize capital expenses and provide flexibility for distribution throughout the United States. Temperature-controlled 3PLs are responsible for the storage of the food products the manufacturers produce. The 3PLs store food in large warehouses uniquely designed to maintain the temperature of frozen and refrigerated products in the cold chain. The

total U.S. cold chain 3PL market is estimated at over $5.7 billion dollars, with a compounded growth rate of 4.0% (IBISWorld, 2019). Over 78% of cold storage warehousing capacity is available for public storage, and the majority of temperature-controlled food, over 94 billion pounds, is stored in a third-party warehouses (T. G. C. C. Alliance, 2016). There are 3.7 billion cubic feet of storage space in 1,300 third-party warehouses across the United States (T. G. C. C. Alliance, 2016). Those 1,300 warehouses are owned by 250 cold storage companies. Most cold chain 3PLs are small, privately held operations, as measured by cubic feet capacity and number of warehouses. Table 1 shows the cold chain 3PL industry size measures.

Table 1. *Cold Chain 3PL Size Measures*

Size	Number of Warehouses	Cubic Feet of Space
Large [L]	>= 50	> 500,000,000
Medium [M]	20-49	100,000,000-499,000,000
Small [S]	1-19	<= 99,000,000

The industry is highly concentrated, with the top three cold chain 3PLs making up 67% of total market share Table 2; Figure 2; (G. C. C. Alliance, 2019).

Table 2. *Cold Chain 3PL Market Share*

Rank	Company	Cubic Feet of Space	Market Share (%)
1	Lineage Logistics	1,120,600,685	29.68%
2	Americold Logistics	1,019,953,858	27.01%
3	United States Cold Storage	371,672,950	9.84%
4	Interstate Warehousing	115,735,371	3.06%
5	AGRO Merchants	104,052,408	2.76%
6	Burris Logistics	74,901,966	1.98%
7	Henningsen Cold Storage	65,141,607	1.73%
8	NewCold Advanced Logistics	47,972,150	1.27%
9	Hanson Logistics	43,818,540	1.16%
10	Holt Logistics	27,000,000	0.93%

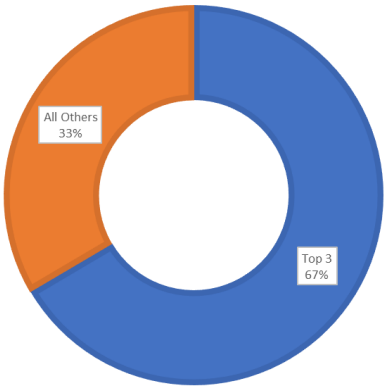

Figure 2. Cold chain 3PL industry concentration.

1.2 Cold Chain 3PL Resource Constraints

The cold chain 3PL industry employs over 37,000 employees throughout the United States ("About the Cold Chain," 2020). The majority of these are direct labor employees who work inside the temperature-controlled warehouses operating fork trucks, picking cases, and preparing products for shipping. The skill level required for warehouse positions is low, with workers' needing little to no schooling. The labor market for cold chain 3PLs is tight, with an average industry employee turnover of 32.5% (Salin, 2019).

The barriers to enter the industry are significant, due in large part to the size and capital costs of building and maintaining a cold storage warehouse. The average cost to build a warehouse is $40 million to $100 million dollars, depending on the size, location, and storage automation included in the solution. This barrier to entry is evident by the large number of small companies with one or two facilities. The large amount of capital required creates an environment in which the demand for strong returns is high. Returns on the capital invested are around 7–8%, which results in little excess capital to invest in other projects (Richards, 2006). In addition, capital projects are typically planned 2–3 years in advance because construction takes

9–14 months. Capital is tied up long before the building opens. Because there are often many competitors within a geographic location, competition is intense and requires the cold chain 3PLs to focus on service to ward off threats to their business.

1.3 Cold Chain 3PL Value Proposition

Cold chain 3PL customers are primarily food manufacturers and food retailers, including well-recognized U.S. institutions such as Conagra, FritoLay, General Mills, Unilever, Kellogg's, and Kraft-Heinz. When a manufacturer chooses to outsource storage and distribution operations to a 3PL organization, the manufacturer expects the 3PL organization to deliver a higher level of service and reliability to the end customer, as it is the expert in supply chain execution and serves as an extension of the manufacturer's brand.

1.3.1 Supply Chain Execution

Supply chain execution includes activities such as customer service, inventory control, order management, picking and packaging, storage and warehousing of products, value added services, and transportation (Daugherty, Stank, & Rogers, 1996). Cold chain 3PL customers expect to experience service and cost improvements by outsourcing their logistics activities to 3PLs. Customers in North America who outsource their supply chain operations could realize over a 9% reduction in overall logistics costs and an over 12% reduction in fixed asset costs through the cold chain providers' expertise in quality, efficiency, and accuracy ("What Customers Want…and Are Getting…From 3PLs," 2007). In outsourced relationships, customers place importance on the expertise of the 3PLs to perform efficiently and contain costs (Wallenburg, 2009). In support, "Cold Chain Providers Expertise" was "the most influential factor in the decision to outsource" in the GCCA Cold Chain Customer Report (G. C. C.

Alliance, 2018). Food manufacturers rely on their cold chain 3PLs to provide superior service and reliability as part of their supply chain execution responsibilities.

1.3.2 Brand Protection

The protection and integrity of food manufacturers' products are the basis for their reputation and brand trust. As partners in the food cold chain, 3PLs are an extension of food producers brands and are expected to understand and react to their role in protecting those brands (G. C. C. Alliance, 2018). Failure to protect the integrity of food costs the U.S. food chain:

- Food-borne illnesses: more than $50,000,000 annually (Mercier, Villeneuve, Mondor, & Uysal, 2017) and
- Food spoilage and shrinkage: $165,000,000,000 annually (Gunders, 2012).

The GCCA found that ensuring food safety and protecting food manufacturers' brands was the most important responsibility of cold chain 3PLs, surpassing every other priority (G. C. C. Alliance, 2018). In support, the survey found that 77% of cold chain 3PL customers either "Strongly Agreed" or "Somewhat Agreed" with the statement "My cold chain provider plays an important role in my company's food safety" (G. C. C. Alliance, 2018). For cold chain 3PLs, protecting the brand includes maintaining their levels of service and reliability for customers.

1.3.3 Relationships

Cold chain 3PLs strive to build long-term and deep relationships with food producers and retailers. Because service and dependability are paramount to a customer's perception of the cold chain 3PL, the industry is typified as somewhat reactive, risk adverse, and focused on transactional behavior to ensure it is protecting the food that consumers ultimately purchase (Richards, 2006; Sohal, 2012). Research has indicated that as backup, supply chain organizations

emphasize operational efficiency and productivity over other types of innovation and development (Christopher, 2005). This operational efficiency strengthens the relationship between cold chain 3PLs and their customers by establishing trust in their service, reliability, and reputation and translates into revenue expansion for the cold chain 3PLs. Trust is an important ingredient in supplier relationships (Richards, 2006).

1.4 Cold Chain Disruptors

The food chain in the United States is experiencing disruption from consumers and competitors. U.S. consumers are driving changes to the food chain with their shifting preferences, including mindfulness of where products are sourced, transparency on food labels, science-based foods such as plant-derived meat alternatives, and the return of comfort foods (Siegner, 2018).

U.S. consumers continue to shift from brick and mortar to online shopping at a rapid rate, and Forrester Research (2017) estimated that by 2022, 17% of all retail sales will come from online channels. Consumers are more comfortable than ever using mobile devices, and food producers and retailers have taken notice. The food manufacturing industry has been relatively static for many years, and in response, CEOs of 17 major food companies left their positions in the past 2 years and were replaced by more “fresh-thinking executives” (Lempert, 2018). The food industry is searching for a new consumer-centric model to meet the demand and address consumer trends. These consumer trends affect not only the food producers, but also the food retailers. Business Insider reported that Amazon is laying out a future in which it could be operating as many as 2,000 Amazon Fresh grocery stores within the next 10 years (Kim, 2016). It expects to have expected that by the end of 2018, 20 of them would be up and running in a pilot program of stores that are some combination of fresh-oriented convenience or grocery

stores and pick-up depots for online grocery orders (Kim, 2016). In August 2017, Walmart, the world's largest retailer, announced it had acquired 2-year-old online retailer Jet.com for $3,300,000,000 in cash and stock in the largest-ever acquisition of an e-commerce company to try to close the gap with Amazon and court online shoppers (Nassauer, 2016).

For cold chain 3PLs, e-commerce orders and order patterns are significantly different than traditional models for food retailers, which has resulted in the rise of distribution models that require full pallet, case pick, each pick, and on-demand ordering from the same manufacturer's pile of inventory within cold chain 3PLs' distribution facilities. For example, Sugar Creek Packaging, a copacker for large consumer packaged foods companies and various food service customers, contacted a cold chain 3PL recently with a request for services to be sold through one of the largest wholesale club customers in the country. This program would allow consumers to order cooked meat items directly through the club retailer's website to be shipped directly to the consumer. The copacker is looking for a 3PL to support these activities while still helping the larger food service program.

The growth in e-commerce also affects cold chain 3PLs through a rise in product proliferation, packaging variations, smaller and more frequent orders, an increase in new product rollouts, an increase in order changes, and data transparency. The food cold chain is in a period of rapid growth and transformation as consumer purchase behavior is shifting from traditional methods to online experiences.

1.4.1 Disintermediation

The rise in acceptance of alternative channels of distribution of temperature-controlled food presents tremendous opportunity for new entrants to penetrate the $5,700,000,000 cold chain market and for the introduction of innovation within the historically conventional cold

chain. Multiple entities, from food producers to new entrants, are trying to disrupt the food supply chain physically and digitally and get closer to the consumer to enhance customer value. This disintermediation, characterized by decreasing the number of intermediaries to reduce the time and cost required to offer products to consumers or by changing an entire business model to capitalize on the opportunities technological innovation provides, is taking place within the cold chain and will continue to accelerate as new technology and consumer demands evolve (Figure 3; (Linton, 2018).

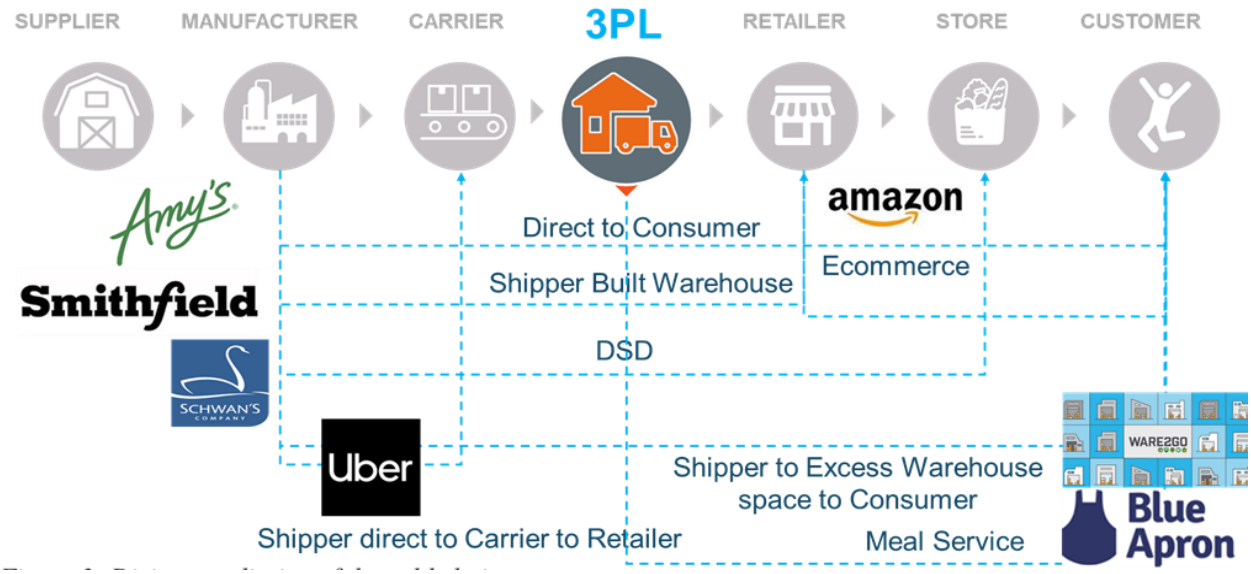

Figure 3. Example of disintermediation in the cold chain.

For example, UPS recently launched Ware2Go, which is essentially the Airbnb of warehousing. The new service matches e-commerce companies with 3PLs that have excess space available in their distribution centers. The service is a turnkey, U.S. fulfillment network designed to help merchants easily position products closer to end customers for a fast, inexpensive, and reliable order-to-delivery experience. UPS handles all the warehouse and transportation transactions for the merchant and creates additional revenue opportunities for UPS by commoditizing the 3PL market. Another example is Schwan's Direct Store Delivery model,

which bypasses retailer warehouses and ships directly to individual retail stores. Meal service companies like Blue Apron remove the retailer and store from their supply chain and ship food directly to consumers' homes. In addition to food companies' trying to disintermediate the cold chain, new technology threatens to change the entire business model. Blockchain could be used to enable transparency in temperature, times, quality, and location, which could remove intermediaries within the supply chain (Johnson, McCurdy, Schechter, & Loch, 2020). Hyperloops, which are pressurized capsules that are transported in reduced pressure tubes, could be used for freight and cargo, eliminating the need for trucks and rail cars in food distribution. The sheer volume of companies vying for their share of the consumer wallet has placed significant pressure on the cold chain industry to innovate or miss out on market share.

1.5 Statement of the Problem- Innovation in Cold Chain 3PLs

Consumer and market demand drive most of the current growth and innovation in the food cold chain (Logistics, 2018). Cold chain 3PLs support the innovation and initiatives the food producers and retailers present. For example, Walmart introduced RFID to the cold chain in 2003 to better track and control inventory at the pallet and case level and also implemented on-time, in-full requirements at their distribution centers in the United States in 2017 (Gilmore, 2017). These innovation initiatives require participation by cold chain 3PLs and their employees to ensure holistic execution across the entire supply chain. Innovation within cold chain 3PLs typically takes the form of processes, programs, and products for delivering a better, more cost-effective product to the consumer. Much of cold chain 3PLs' innovation is focused within the four walls of their temperature-controlled warehouses. This type of advancement in processes can be regarded as *process improvement* rather than process innovation. Process improvement is "performing the same business process with slightly increased efficiency or effectiveness"

(Davenport, 1992, p. 10). True process innovation requires performing work in a radically new way that alters the organization or the way it conducts business (Davenport, 1992). This distinction between improvement and innovation is evidenced by the rise of continuous improvement, Lean Six Sigma, and other process improvement teams at cold chain 3PL organizations. The majority of 3PLs have some type of improvement group in place within their company.

Cold chain 3PLs derive market share growth from the expansion of their relationships with existing customers. As the market evolves, cold chain 3PLs will need to capture new sources of revenue, which includes exploiting innovation and creating value for existing customers.

Cold chain 3PLs' position within the cold chain ecosystem allows them acute awareness of distribution operations and the vantage point to conceive, suggest, and set in motion innovations within their industry to further increase revenues and market share while creating value, but few innovations arise directly from cold chain 3PLs. However, cold chain 3PLs specify the need to "Identify New Business Opportunities" and "Capture Additional Revenue" as the top two growing concerns for future business (G. C. C. Alliance, 2018). New entrants, like Amazon, threaten to bring alternative thoughts, innovation, and disruptive value to the cold chain 3PL industry. When innovation is introduced into an industry, success typically favors new entrants rather than market leaders (Christensen, 1997). In addition, research has indicated that early adopters of innovation benefit from a first mover advantage and will see gains in market share as a result (Subramanian & Nilakanta, 1996).

Operators of cold chain 3PLs tend to focus on operational excellence as opposed to innovation because providing good customer service and ensuring smooth distribution of

products exceeds the need for innovation (Kilcarr, 2017). Improvements to operations include optimizing pick line productivity to increase case pick rates within the warehouse, implementing labor management standards to drive higher productivity rates, optimizing fork truck traffic patterns to speed the picking and put away process, and reorganizing stock-keeping units to slot higher velocity items closer to the front of the warehouse. Historically, technological innovation within cold chain 3PL companies has been slowly adopted, leading scholars to consider that organizational factors, such as structure or culture could influence the rate of innovation adoption (Dadzie, Johnston, & Sadchev, 2015).

Cold chain 3PLs will need to be prepared to be on the leading edge of supply chain trends to keep pace with the changing demands of the market, retailers, and food producers. Cold chain 3PLs will need to identify, capitalize, or hone their organizational structure to tackle innovation and value creation. Incumbent firms within the cold chain 3PL industry will need to generate innovation to survive in the rapidly changing business environment. *Innovation capacity (IC)* is the ability of firms to use their unique resources to create new products, processes, or ideas in dynamic business conditions (Herrmann, Gassmann, & Eisert, 2007). The IC of a firm relates to its ability to introduce new processes, products, or ideas (Hult, Hurley, & Knight, 2004b). This capacity to innovate and be able to generate innovation will depend on the unique characteristics of individual firms. The tentative nature of cold chain 3PLs to propose innovative solutions could result in the leadership and organization being unprepared for rapid innovation and new entrants into their ecosystem.

Although cold chain 3PLs have values that they all share, each firm also has distinct organizational factors that have grown through business execution and that influence how it will prepare to meet future demands for innovation. This set of factors, described as the behaviors

and activities of an organization which orient a firm toward innovation, creates an environment suitable to produce tangible outcomes (Ruvio, Shoham, Vigoda-Gadot, & Schwabsky, 2014). An environment of *organizational innovativeness* (OI) is a key resource for growth and performance (Ruvio et al., 2014). An organization's ethos for nurturing innovation gives rise to the ability to create outputs of innovation (Carvalho, Cruz, Carvalho, Duclós, & Stankowitz, 2017). A firm can amplify its behaviors and activities to create a stronger setting for innovation to develop.

The food cold chain is evolving, and with this evolution comes the introduction of new entrants to the marketplace, the threat of disintermediation within the cold chain, and the need for innovation-driven value from traditionally execution–improvement focused cold chain 3PLs. To create new solutions, cold chain 3PLs will require an environment that makes developing novel outcomes possible. The environment for innovation could be different from organizational settings that subsist in cold chain 3PLs today. As the industry progresses and new entrants create value through innovation, cold chain 3PLs that do not understand the influence of their internal environment for innovation on their ability to capitalize and generate new ideas, processes, or products will be left out in the cold with customers and consumers.

1.6 Research Questions

In this study, I addressed cold chain 3PLs' problems with the following research questions:

- What is the state of Organizational Innovativeness in cold chain 3PL firms?
- What is the nature of the relationship between cold chain 3PL firms' innovativeness and their capacity to generate innovative outcomes?

My objective for this research was to assess the internal environment for innovativeness within cold chain 3PLs and the effect that environment has on their innovation capacity.

1.7 Purpose

My purpose for this quantitative research was to examine the evidence of OI within cold chain 3PLs and its predictive value on the capacity to innovate. Because the environment for innovation within a firm is unique to each company and can influence the organization's competency to use those dimensions to develop innovation, it is necessary to study both characteristics of a firm's environment and the environment's influence on the capability for developing innovation. By examining the internal environment, it will allow me to recognize environmental attributes which can drive more innovation in organizations. Innovation can help create a competitive advantage and improve performance. This area of focus is of interest to me because I am imbedded in a cold chain 3PL and would like to understand what environmental characteristics of my firm support innovativeness and can be acted upon to increase its employees' capacity to innovate.

1.8 Organization

Chapter 1 provides background and foundational information pertaining to the study, including a statement of the problem, conceptual framework, and other relevant details. Chapter 2 presents a concise literature review on the OI of a firm and its relationship within IC and includes a discussion of key concepts and definitions presented in the previous chapter. Chapter 3 provides intricate detail on the data source, reporting structure, and analysis methodology for the study. Chapter 4 presents study results, and Chapter 5 provides a discussion of theoretical and managerial implications.

2 CHAPTER 2: LITERATURE REVIEW

To study the factors of OI that lead to IC, it is first necessary to define the key constructs, namely the dimensions of OI and IC.

Scholars and practitioners consistently agree that organizations benefit from the development of new ideas and products. Despite consensus on the rationale for innovation, there has been little unanimity on any aspect of innovation: origins, antecedents, consequences, types of innovation, or the measurement of successful innovation. Although the literature on innovation covers a vast scope of the innovation construct, my purpose with this research was to uncover the characteristics of a firm's environment (innovativeness) that affect its orientation toward innovation (Hurley & Hult, 1998; Moos, Beimborn, Wagner, & Weitzel, 2010). Therefore, the literature reviewed presents a unified depiction of OI as an antecedent to the capacity to innovate, which is evidenced by the ability to generate novel solutions within a firm.

2.1 Motivation for Innovation

Innovation in an organization cannot take place unless the firm can generate new ideas, products, or processes. Organizations do not automatically possess the motivation and propensity to engage in the creation of novel products or services. Firms are often hyper focused on executing their current business plan and do not want to lose sight of their primary function; thus, they miss out on opportunities to enhance their competitiveness and evolve with the changing business landscape. In his article "Winning Through Innovation," Tushman (1997) recalled an apropos story in which he described the introduction of refrigeration in the ice industry. Rather than taking advantage of the refrigeration innovation, the industry improved its cutting, storage, and shipping processes by over 300%. As a result, refrigeration eventually displaced the manual ice industry. Innovation develops when an organization turns opportunities

into new ideas and exploits the value of those ideas (Carvalho et al., 2017); (Neely & Hii, 1998). Being innovative is desirable for firms because innovation enhances and improves firm performance (Subramanian & Nilakanta, 1996). Similarly, IC has been shown to increase firm performance and improvements in service quality (Panayides, 2006). Both innovativeness and the capacity to innovate are desirable goals for a company. Building expertise in innovation through the enhancement of innovativeness which helps create the capacity to innovate will contributes to a firm's success (Tushman, 1997).

Having the ability to stretch beyond existing industry and firm boundaries can give a firm a first or early mover advantage (Damanpour, Walker, & Avellaneda, 2009). Innovation can also influence the firm's strategy and indicates the intent to grow the organization (Brettel & Cleven, 2011). The ability to produce innovative products can also be a point of differentiation among providers. Competencies in execution of innovation arise when firms become skilled at implementing and putting into action those ideas, products, and processes which arise from their unique organizational context. There are many benefits to the ability to create new products within an organization, so it is important to understand the organizational attributes and the capacity to innovate within a firm.

2.2 Organizational Innovativeness

In order to have the capacity to innovate, firms must possess the traits and environment that support innovation. These traits are considered the innovativeness of the firm. While innovation outputs are considered beneficial to organizations and provide a widely proven rationale to innovate, but little is known about the ethos of the firm which creates the ability to innovate and influence performance over time (Hult, Hurley, & Knight, 2004a). The purpose of

this research was to assess the internal environment for innovativeness within cold chain 3PLs and the effect that environment has on their innovation capacity.

Values and behaviors are the underlying processes that support IC and make up the firm's environment (Hogan & Coote, 2014). Values are central to the organizational environment of a firm. OI has been recognized as the "surface-level manifestation" of a firm's culture (Ruvio et al., 2014). In order for innovation to take root within an organization, it is not merely enough to have a strategy for innovation, the organization must adopt a culture that is internalized by employees (Dobni & Sand, 2018). Behaviors that are rewarded are often repeated. Managing invention and putting it into service is a complex process. Though no one model for innovation fits all firms, it is increasingly evident that environment of a firm has an influence on the ability to innovate.

Organizations that produce new products or processes are often considered to be innovative (Ruvio et al., 2014; Subramanian & Nilakanta, 1996). Much of the research on innovation measures the innovativeness of a firm based on the number of innovations and outcomes (Neely & Hii, 1998; Subramanian & Nilakanta, 1996). This view narrowly depicts innovation as only a result and misses the context of the environment of an organization that facilitate the implementation of those novel products and processes. The context of the firm is foundation of the organization which creates the environment in which innovation can flourish.

2.2.1 Organizational Innovativeness Literature Review

OI is a central concept in the taxonomy of innovation (Hurley & Hult, 1998; Ruvio et al., 2014). OI has a complex heritage as a construct, and almost as many definitions of OI exist as there are publications on the subject. The extant literature reveals the evidence for OI can be found in the environment of a firm (C. B. Gabler, R. G. Richey, Jr., & A. Rapp, 2015a; C. B.

Gabler, R. G. Richey, & A. Rapp, 2015b; Herrmann et al., 2007; Hult et al., 2004b; Hurley & Hult, 1998; Neely & Hii, 2014; Ruvio et al., 2014; Wang, 2004). OI is an organizational characteristic that is part of a firm's culture and reflects its intention to exploit new opportunities (Hurley & Hult, 1998; Subramanian & Nilakanta, 1996). While researchers agree that OI is part of the environment of a firm, researchers have developed multiple ways to view those organizational dimensions that contribute to the ability to generate innovation (Gabler et al., 2015a; Herrmann et al., 2007; Hult et al., 2004b; Hurley & Hult, 1998; Neely & Hii, 1998; Ruvio et al., 2014; Wang, 2004). In addition, the lack of a cohesive understanding of what characteristics a firm needs to be capable of the generation of innovation has created a multitude of determinants of innovativeness. Table 3 shows a selection of contextual definitions from the literature on OI.

Table 3. *Organizational Innovativeness Literature Review*

	(Ruvio et al., 2014)	(Subramanian & Nilakanta, 1996)	(Wang, 2004)	(Hsu, 2007)	(Riivari, Anna-Maija, Kujala, & Heiskanen, 2012)	(Gabler et al., 2015b)	(Puctait, Novelskait, Lämsä, & Riivari, 2016)	(Vanhala & Ritala, 2016)
Definition of Organizational Innovativeness (OI)	Climate that provides environmental support for the continuous generation of new ideas and products over time	An enduring trait consistently exhibited by truly innovative firms over time	Strategic orientation with innovative behavior and processes	Creation of new knowledge, or a novel recombination of existing knowledge	Environment that nurtures creativeness and guides firm to seek new solutions	Seeking creative solutions to problems or need	Market, Product, Strategic, and Behavioral innovativeness	Social and Behavioral processes
Benefit to Organization	Survival and success	High levels of efficiency and effectiveness (performance)	Competitive advantage, survival, and success	Competitive advantage	Success and survival	Competitive advantage	Development of innovation, performance, and regional competitiveness	Competitiveness
Dimensions of OI	Openness, Creativity, Risk-taking, Future Orientation, and Proactiveness	Process	Market, product, strategic, and behavioral innovativeness	Responsiveness to market change, and rapid development of new products or services	Product, market, process, behavior, and strategy	Innovation acceptance, management seeks new ideas, and technology innovation acceptance	Product, market, process, behavior, and strategy	Behavior, Processes, Strategy
Can be acted upon?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Scholars differ on their perspective and conceptualization of OI. Organizational Innovativeness has been defined as internal behaviors (Puctait et al., 2016; Ruvio et al., 2014; Vanhala & Ritala, 2016; Wang, 2004), a firm trait (Subramanian & Nilakanta, 1996), an environment (Riivari et al., 2012; Ruvio et al., 2014), climate (Ruvio et al., 2014), creative problem solving (Gabler et al., 2015a; Puctait et al., 2016), and innovativeness in products, markets, knowledge, and strategy (Hsu, 2007; Puctait et al., 2016; Vanhala & Ritala, 2016). Despite a lack of coherence on the definition of OI, evidence of OI can be found in the characteristics of the firm. I focused on examining the evidence of OI and how OI enhances the innovation generation of firms.

The ability to innovate is not a one-time event. Rather, the organizational fabric from which innovation arises is embedded in the ethos of the firm. That organizational fabric provides the ability to innovate consistently over time (Subramanian & Nilakanta, 1996). While most definitions of OI do not feature time as part of their conceptualization (Gabler et al., 2015a; Hsu, 2007; Puctait et al., 2016; Vanhala & Ritala, 2016; Wang, 2004), the inclusion by some (Ruvio et al., 2014; Subramanian & Nilakanta, 1996) suggests the culture of the firm should be stable and strong enough to create consistency in the capacity to innovate. Environments change over time, and to sustain competitive advantage, firms must be capable of generating innovations in a dynamic external ecosystem (Hult et al., 2004b). The ability to be successful over time is a result of the firm's behaviors and actions. Advancing beyond enabling the ability to generate an output, OI should facilitate the ability to produce a new or novel output (Neely & Hii, 1998). The newness of the output is a key concept for IC, as a new output requires the firm to behave differently than it has in the past (Davenport, 1992). It may require the commitment of people,

time, and capital for IC. The literature shows innovativeness is able to be managed by the organization and can be acted upon to amplify the innovativeness of a firm (Hult et al., 2004b).

While the literature stream on OI lacks a cohesive definition of the construct, scholars do agree that OI is beneficial to the firm's ability to innovate. The literature describes benefits such as creating a competitive advantage (Gabler et al., 2015a; Hsu, 2007; Puctait et al., 2016; Vanhala & Ritala, 2016; Wang, 2004), survival and success of the firm (Riivari et al., 2012; Ruvio et al., 2014; Wang, 2004), and firm performance (Puctait et al., 2016; Subramanian & Nilakanta, 1996). To gain a competitive advantage, survive, and be successful, innovativeness could be modified to heighten the IC of the firm. With this goal in mind, I adopted the definition of innovativeness as an organizational environment that provides support for the firm's orientation toward innovation (Ruvio et al., 2014). This definition encompasses the concept of an internal environment that stimulates innovation generation shared across the literature (Riivari et al., 2012; Ruvio et al., 2014) and provides the most comprehensive definition of the OI construct, which supports the ability to create new outputs over time and is a manifestation of the culture of a firm.

2.2.2 Organizational Innovativeness Dimensions

In addition to providing guidance toward a definition of innovativeness, the OI literature also proposes multiple components of the innovative environment (Table 4). Those dimensions of innovativeness form the composite characteristics of a firm and can be measured to examine the existence of OI within a firm. The literature on OI dimensions is disparate as each definition of OI is operationalized through a different measure. Further, some of the research measured OI using unidimensional scales (Subramanian & Nilakanta, 1996; Wang, 2004). Since the purpose of this research is to examine the OI of a firm and its influence on IC, the more granular the

dimensions of the OI construct, the better I can focus on areas to improve OI within my firm. The cold chain 3PL industry has been described as conservative, slow to react, and prioritizing operational efficiency over innovation. I focused my research on an OI conceptualization and dimensions which could be compared to the perceptions of the industry and my own firm.

Table 4. *OI dimension measures*

OI Dimensions	Source
• Degree of centralization	• (Subramanian & Nilakanta, 1996)
• Acceptance of innovation	• (Gabler et al., 2015a)
• Firm behaviors	• (Puctait et al., 2016; Riivari et al., 2012; Vanhala & Ritala, 2016)
• Attributes such as Risk-taking, Openness, Proactiveness, Future Orientation, and Creativity	• (Ruvio et al., 2014)
• Firm strategy related to processes, markets, behaviors	• (Puctait et al., 2016; Riivari et al., 2012; Vanhala & Ritala, 2016; Wang, 2004)

In examining the literature, Ruvio et al. (2014) established dimensions of the OI construct that emphasized firm characteristics at odds with existing industry perceptions. The Ruvio et al. (2014) work is a systematic examination of the definition for OI and provides a psychometric support for the OI construct. As the industry is not considered pioneering, the research can compare existing environments with innovativeness to determine the extent to which cold chain 3PLs exhibit innovativeness.

Consequently, this study's research model relies on a multidimensional construct for OI. The construct has five climate dimensions of innovativeness identified by Ruvio et al. (2014), which allow for a deeper understanding of the interrelationship among the attributes (Figure 4).

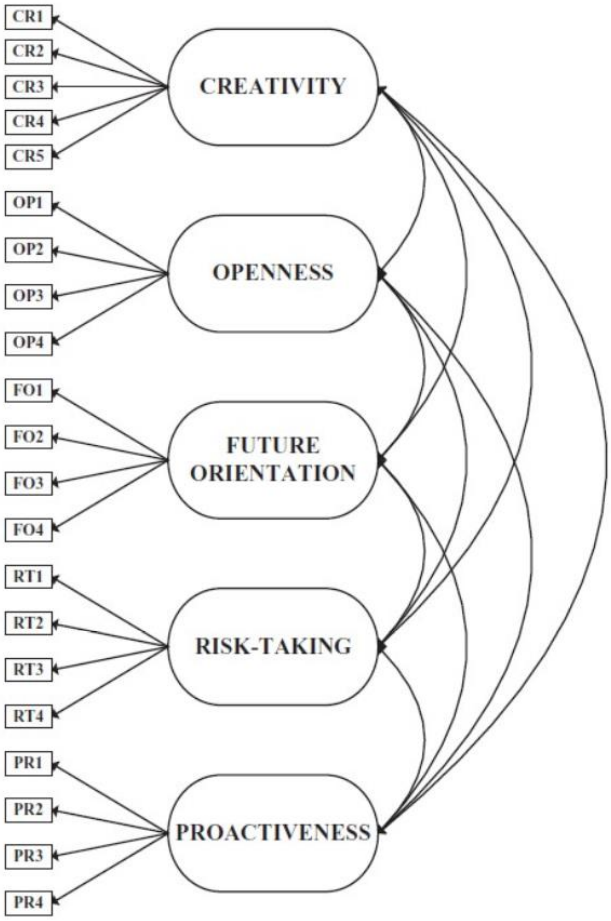

Figure 4. Theoretical model of OI by Ruvio et al. (2014).

This multidimensional perspective is suitable for our research, as the study focused on the dimensions of innovativeness that enable the capacity to generate new output. The rationale for selecting this construct definition was based on analytical conclusions of Ruvio et al (2014). Ruvio et al. analyzed the dimensions of existing innovativeness research through a comprehensive literature review of exemplary OI research on the attributes of the construct. Their review summarized 11 definitions of innovativeness and innovation. In addition, the dimensions proposed by Ruvio et al. (2014) were validated through practitioner interviews and focus groups and at three academic conferences to establish content validity. Creativity, Openness, Future Orientation, Risk-taking, and Proactiveness are the five dimensions of OI

conceptualized by Ruvio et al. (2014). A mailed survey tested the theoretical model using perceptual measures for each of the OI dimensions. Study participants were comprised of members of social services organizations in Israel, Norway, and Spain. Ruvio et al. (2014) chose the study's countries for their divergences of culture and values to ensure a holistic perspective and generalizability. I will contribute to the body of knowledge with this study by extending the construct to a different culture and applying the model in the cold chain 3PL industry which will provide new context to the research.

In the Ruvio et al. (2014) study they collected 527 completed questionnaires from three samples. All three samples were solicited from the top leading social services organizations in the respective countries. They analyzed the IO model using SEM, including the construct validity. The loadings on the all the factors were significant ($p \leq .05$). The overall model-produced factor loadings were high for each country, ranging from .609 to .882 (Israel), .557 to .836 (Norway), and .508 to .871 (Spain). The correlation coefficients were all relatively strong to very strong, as well as the goodness of fit measures. The analysis shows each indicator is distinctive, and each construct is separate, which should indicate organizations with higher scores for each dimension should show higher levels of OI.

A considerable part of Ruvio et al.'s (2014) research compared their multidimensional scale to a unidimensional approach to OI. Hurley and Hult (1998) developed a unidimensional scale for Innovativeness that included four items. These items were included in Ruvio et al.'s (2014) second study as a comparison between the context found within a multidimensional scale and a unidimensional scale.

After analyzing the studies, Ruvio et al. (2014) concluded the five-dimensional scale was stronger in explaining the relationships among the dimensions and provided a better fit and

higher levels of explained variances, in addition to providing more context to the OI phenomenon. This study adopts the five-dimensional OI construct developed by Ruvio et al. (2014) because the purpose of the study is to understand the OI of a firm and how the OI influences IC.

Ruvio et al.'s (2014) emphasis on the five dimensions of OI is useful to this analysis, as it provides a richness of the contextual aspects of OI that enable a better understanding of the environment through which IC can be supported. The dimensions, proposed in the OI construct, are relevant to this research because the evidence of OI within cold chain 3PL firms in an industry characterized as reactive and risk adverse is the purpose of this research. Ruvio et al.'s (2014) conceptualization of OI is propagative for comprehending how OI influences the capacity to innovate. Ruvio et al.'s (2014) attention to the five dimensions of OI is of value when determining attributes of a firm's environment that can be developed or expanded to provide better IC. Ruvio et al. (2014) also put out a call for future research to address the inconsistent findings in research linking OI to the IC of a firm. This research responds to the call to by exploring the relationship between OI and IC within the cold chain 3PL context.

2.3 Innovation Capacity

Innovation has been described as the development or use of new ideas, products, or processes which are original to the organization (Damanpour et al., 2009) (Hurley & Hult, 1998). Innovation capacity can develop when the firm's environment, values, and behaviors are operationalized to produce outcomes (Hurley & Hult, 1998). Wang (2004) operationalized IC as a capability which combines strategic orientation, innovative behavior, and process. IC therefore represents the strategic intent of the organization toward commitment to innovation (Brettel & Cleven, 2011). It often requires doing something differently than the established norms of the

firm and putting ideas into action (Hurley & Hult, 1998). Firms have varying degrees of capacity, depending on the unique characteristics of a firm's environment. The success of the innovation outcomes depends on a firm's capacity to use its innovativeness to create outcomes (Tushman, 1997). The capacity to innovate relates to the ability to introduce new processes, products, or ideas into a firm (Hult et al., 2004b). Carvalho et al. (2017) echoed this classification as a capability that involves organizational outputs.

2.3.1 Innovation Capacity Literature Review

IC in the literature has been described as an ability (Fidel, Cervera, & Schlesinger, 2016; Hurley & Hult, 1998; Julián & Camison, 2011), a potential (Neely & Hii, 1998; Prajogo & Ahmed, 2006), as the capability to continuously improve the ability to generate innovation (Doroodian, Ab Rahman, Kamarulzaman, & Norhamidi, 2014; Koc, 2007; Szeto, 2000), and a propensity to innovate (Silva, Simões, Sousa, Moreira, & Mainardes, 2014). Table 3 provides a summary of the literature on IC. Scholars agree that IC requires action to create innovation. In the cold chain 3PL industry, the potential ecosystem disruption from e-commerce, disintermediation, and changing customer demands could require firms to act and create new products, processes, or ideas to remain competitive. From this perspective, I adopted the following definition of IC: "the introduction of new processes, products, or ideas to the organization" (Hult et al., 2004b, p. 429).

Table 5. *Innovation Capacity Literature Review*

	(Hurley & Hult, 1998)	(Neely & Hii, 1998)	(Hult et al., 2004b)	(Szeto, 2000)	(Prajogo & Ahmed, 2006)	(Julián & Camison, 2011)	(Fidel et al., 2016)	(Silva et al., 2014)
Innovation Capacity (IC) Definition	Ability of the organization to adopt or implement new ideas, products, or processes successfully. Considered an organizational outcome.	Potential of that firm to generate innovative output.	Introduction of new products, processes, or ideas to the organization.	A continuous improvement of the overall capability of firms to generate innovation for developing new products to meet market needs.	The organizational potential to innovate, which is determined by the skills and strengths in basic R&D and technology.	A complex ability in which new knowledge and ideas are continuously applied to change the offerings (product innovation) and the ways it creates and delivers those offerings (process innovation).	The organization's ability to adopt and implement new ideas, processes, or products successfully.	The firm's propensity to innovate at the level of products and services.
IC Measures	Number of innovations adopted or implemented	Novel output, number of adoptions, speed of adoption	New products, processes, or ideas	The volume of innovation over time	Technology management and R&D Management	Product innovation and process innovation	Previous three years of new products, services, processes, or marketing activities	Internal R&D external R&D, acquisition of other external knowledge
IC Determinant	Innovativeness of a firm's culture acts in concert with various structural properties of the company	Internal processes, culture, and external environment	Market orientation, learning orientation, and entrepreneurial orientation	Network relationships—resourcefulness, sustainability, and exchangeability	Leadership, people management, knowledge management, and creativity management	Internal learning capacity and absorptive capacity	Customer knowledge management and customer collaboration	Investment in activities, firm size, and sub-sector of service in the sector of activity

2.3.2 Innovation Capacity Measures

IC provides the impetus to innovate, whether through the input or investment in innovation activities or the generation of outputs (Moos et al., 2010). Without the execution of innovation, a firm will not be able to produce innovative outcomes. In the literature, IC is often operationalized as an output or outcome. Innovation outputs are the measurement and quantification of a firm's capacity for innovation. The innovative outcomes of a firm are the artifacts of IC. For this research, IC is the manifestation of a firm's environment that results in innovative outcomes.

While the literature supports an outcome as evidence of IC, there is a lack of agreement on what is considered an outcome of IC. Frequently, the number of innovations is used as a proxy for innovation capacity, meaning that the more innovations a firm creates, the more innovation capacity it possesses. (Hurley & Hult, 1998; Moos et al., 2010; Tian, Deng, Zhang, & Salmador, 2018). This definition is difficult to operationalize in the cold chain 3PL industry because there are no commercially available artifacts of innovation that are consistently measured. In support, the difficulty of measuring innovation capacity stems from the nature of innovation as a multidimensional construct and a lack of comparability across industries (Neely & Hii, 1998). Researchers have acknowledged differences in the degree and type of innovation that firms develop (Damanpour et al., 2009). Hurley et al. (1998) suggested IC as a measure of the adoption of innovation. Prajogo et al. (2006) views it as the management of R&D and technology. Silva et al. (2014) measures the acquisition of internal R&D capabilities and external knowledge, equipment, and technology. Several scholars define the outcome of innovation capacity as new products, processes, or ideas to the organization (Fidel et al., 2016; Hult et al., 2004b; Julián & Camison, 2011; Neely & Hii, 1998). In the cold chain 3PL industry, there is no

standard way of quantifying innovation ability across the industry because there are no patents, R&D budgets, or consistently visible output measures. Further, given the fragmentation within the academic literature on what constitutes IC measures, practitioners are even more confused as to what qualifies as a measure of innovation capacity. However, the literature does provide some consistency for IC outcome measures in the categories of processes, products, and ideas. Because the cold chain 3PL industry lacks a consistent measure for IC, in this study, I probed the perception of IC through a three-item construct focused on the generation of new products, processes, and ideas as conceived by Hult et al. (2004).

Scholars have not provided a comprehensive overview of the IC concept that organizations can use as a guide to build the capacity to generate innovation within their firms. This research will further close the gap on IC conceptualization and operationalization by defining IC as the ability to generate new ideas, products, or processes (Hult et al., 2004b).

2.4 Link between Innovation Capacity and Organizational Innovativeness

A firm would have no need to be innovative unless it wanted to produce some output to impact business performance. Much of the literature agrees that, to be capable of generating innovation, a firm needs underlying factors that nurture innovation. The literature supports a relationship between OI and IC, but there is not agreement in the nature of the relationship (Carvalho et al., 2017; Hurley, Hult, & Knight, 2005; O'Reilly & Tushman, 2002; Ruvio et al., 2014). The OI of a firm creates a link between the core competencies and the products they develop (Herrmann et al., 2007). This link is crucial because innovation is not actioned in a vacuum. The IC of a firm is affected by the culture and structural characteristics of the firm (Hurley & Hult, 1998). According to Neely and Hii (1998), the environment of a firm is important in determining the degree of IC. OI has been described as the behaviors and activities

of an organization that orient a firm toward innovation and produce tangible outcomes (Ruvio et al., 2014). Much of the literature includes a description of the characteristics of the organization's environment to describe OI(Fidel et al., 2016; Julián & Camison, 2011; Neely & Hii, 2014; Neely & Hii, 1998; Prajogo & Ahmed, 2006; Silva et al., 2014; Szeto, 2000). As such, OI is a construct used to describe the environment of a firm and its orientation toward innovation (Carvalho et al., 2017; Hurley & Hult, 1998). According to research, OI facilitates innovative outcomes over time (Ruvio et al., 2014). The OI of an organization should enable the firm to generate innovative outputs over time (Hsu, 2007). IC can be described as the action or event that produces a result. OI describes the characteristics of the firm that enable innovation to occur and work in conjunction with IC to create a competitive advantage for the firm. IC and OI can exist independently, but, without the combination of environment and action, neither gives a firm a sustained competitive advantage.

The innovativeness of a firm has a positive effect on the firm's ability to adopt new ideas (Hurley & Hult, 1998). Successful innovation requires leadership to provide clear signals about what the company values and the direction the organization is taking. Introducing new products, ideas, or processes is the basis for innovation. Without this clarification, there would be no link between the climate for innovation and the output activity which comprises IC. The attributes of OI create the environment in which the firm can develop and implement innovative products, processes, and ideas. OI supports the implementation of innovation (Hurley & Hult, 1998). This support is part of the organization's environment. The execution of innovation depends on how the firm capitalizes on that setting for innovation (Tushman, 1997). Using the unique characteristics of a firm to create innovative output can be considered a dynamic capability (Herrmann et al., 2007). OI motivates firms to adopt and implement more innovations (Hurley et

al., 2005). As the cold chain 3PL firms do not want to hinder innovation, the research focused on the evidence of the dimensions of innovativeness within cold chain 3PLs that are acted upon and that create varying levels of IC in firms. Different types of OI can create differing levels of IC within the internal environment, so it is beneficial to study the dimensions of OI to understand which characteristics of an environment foster more innovation capability.

While literature underscores the positive influence of a firm's innovative environment on its ability to create new solutions, there is a lack of consistent research on a firm's characteristics to create an innovative environment to facilitate innovation generation. A lack of cohesion in the conceptualization and measurement of the attributes of the firm's environment creates a gap in the literature, which is related to understanding the relationship between OI and IC. This research will contribute to the knowledge base by confirming the predictive value of OI on the IC of a firm, determining the presence of IC within cold chain 3PLs and standardizing a measurement model to explore the relationship between the two variables. In this research, I draw on the work of Ruvio et al. (2014) to make the argument that OI exists within firms and has a positive relationship on the IC of a firm.

Figure 5 represents the research model developed for this study based on the literature on OI and IC, as well as the Ruvio et al. (2014) OI theoretical model.

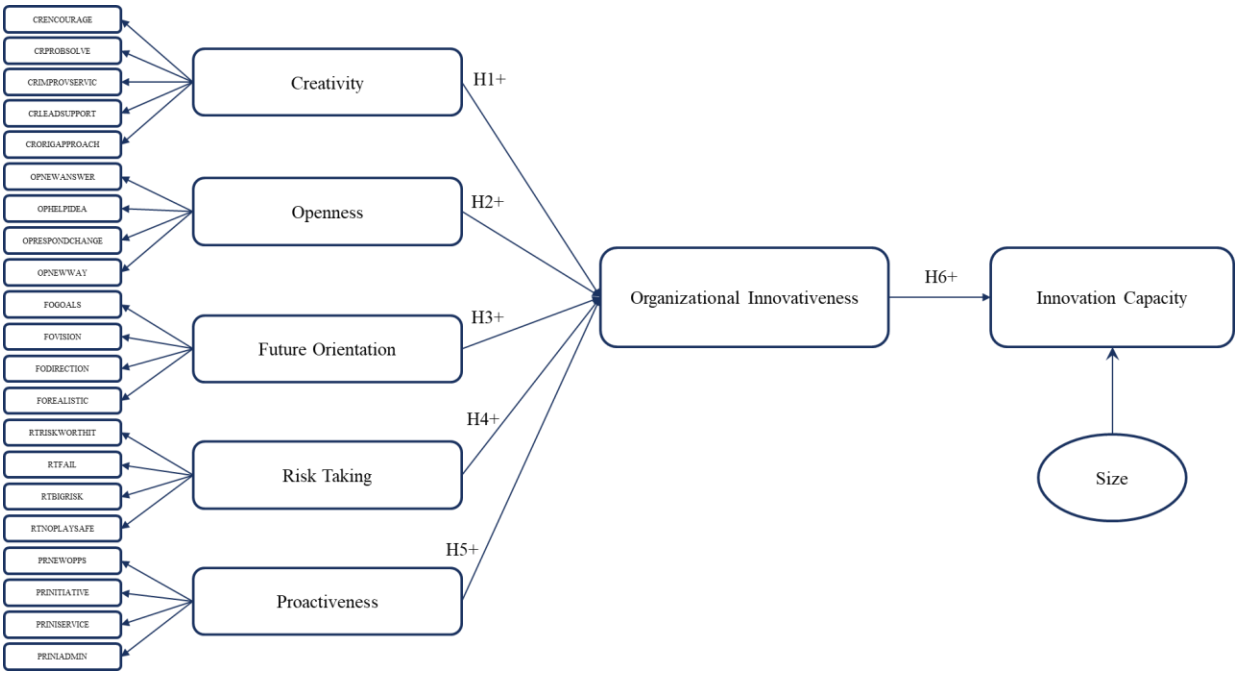

Figure 5. Research model adapted from Ruvio et al. (2014).

2.5 Rationale for Hypotheses

2.5.1 Creativity

Creativity is a behavior that focuses on the generation of new ideas (Ruvio et al., 2014). Creativity contributes to the creation of valuable, useful new products, services, ideas, procedures, or processes through individuals working together (Ruvio et al., 2014). Creativity has been shown to be a key aspect of creating IC in a firm (Saunila, 2014). The culture of the cold chain 3PLs emphasizes teamwork and trust. Trust has been shown to amplify the creativity of a team (Tian et al., 2018). However, cold chain 3PLs do not typically emphasize creativity in their operating environments. It is expected that a more creative operating climate will increase the innovativeness of the organization.

H1: The Creativity of a firm will positively influence the OI of an organization.

2.5.2 Organizational Openness

Innovation requires modifications to the way employees and leaders operate on a day-to-day basis (Davenport, 1992). Openness refers to the members of an organization and their willingness to be flexible and adaptable to new ideas (Ruvio et al., 2014). Open environments encourage new ideas (Subramanian & Nilakanta, 1996). Innovation can create change, and a firm's recognition and support for firm members determines how well the organization will adapt to change. Open environments empower employees and create a sense of ownership and control within the firm (Hernandez-Espallardo, 2018). This ownership fuels participation and involvement within the firm and can contribute to the capacity to innovate. Hurly and Hult (1998) recognized openness as an aspect of a firm's culture. Adaptive cultures support new approaches and ways of thinking, which enhance innovation. Flexible orientation emphasizes decentralization and differentiation within the company (Zammuto & O'Connor, 1992). Firms that exhibit flexibility within their cultures are able to better address uncertainties that arise from new ways of doing things and changes due to innovation (McDermott & Stock, 1999). Cold chain 3PLs who emphasize flexibility respond better to customer demands and create a competitive advantage in the industry (Hartmann & De Grahl, 2011). It is expected that Openness facilitates an environment that drives innovation.

H2: The Openness of a firm will positively influence the OI of an organization.

2.5.3 Future Orientation

Research shows organizations that take a long-term position rather than focusing on the near-term prospect are more likely to generate novel output (Damanpour & Gopalakrishnan, 2001; Damanpour et al., 2009; Herrmann et al., 2007; Hurley & Hult, 1998; Subramanian &

Nilakanta, 1996; Tushman, 1997). A future orientation embodies the temporal behaviors of members of a firm that demonstrate looking forward for new ideas as opposed to only looking at past experience as the basis for decision-making and development (Ruvio et al., 2014). Future orientation requires firms to look beyond existing customers, markets, and internal environments and to assess the outside needs of future customers to generate new output (Brettel & Cleven, 2011). The ability of a firm to structure a flexible and externally oriented culture will result in breaks from the norm and a vision toward the future for new ideas, processes, and programs. Future-oriented organizations establish a vision and set clear goals, which are communicated throughout the company. The strategic direction of a firm defines where and how the company will achieve long-term success (Siguaw, Simpson, & Enz, 2006). This vision allows the company to recognize opportunity in an ever-changing business environment. Leadership sets the direction and strategy for the organization. Leadership has been shown to influence innovation outputs (Moos et al., 2010). Those firms that are capable of innovation recognize the opportunities that give rise to different requirements (Herrmann et al., 2007). It is expected that a firm must be capable of transforming its organization, capabilities, and offerings to address the needs of a changing environment.

H3: The Future Orientation of a firm will positively influence the OI of an organization.

2.5.4 Risk-taking

Creating new products and services is inherently risky, as firms are required to invest time and resources into the development of output with no guarantees of success. The degree to which a firm values and encourages challenging the status quo and making calculated attempts to generate new outcomes has been shown to influence innovativeness (Hogan & Coote, 2014). The

willingness of leadership to take risks and support setbacks on the path to sustainable competitive advantage creates a culture in which innovation can develop (Brettel & Cleven, 2011). The support for risk-taking has been shown to increase the likelihood of innovation (Moos et al., 2010). The support for making strategic bets allows for the exploitation of opportunities often passed over in firms that have less OI (Hult et al., 2004b). The cold chain 3PL industry has been characterized as risk adverse. The high capital requirements for building and maintaining cold chain warehouses creates resource constraints, which requires most cold chain 3PLs to generate known returns for all projects. Risk-taking has been conceptualized as the commitment of firm members to take action and invest resources, with possible gains and losses as a result of their commitments (Ruvio et al., 2014). It is expected that the capacity to generate innovation flourishes in a climate that supports risk-taking.

H4: The Risk-taking of a firm will positively influence the OI of an organization.

2.5.5 Proactiveness

Proactiveness is an innovative behavior that requires members of the organization to take action to overcome the status quo and to pursue new opportunities, whether related to the current business or not (Ruvio et al., 2014). Without taking action, firms could invest resources into research on new offerings but never actually adopt innovation (Hult et al., 2004b). Proactiveness also means scanning the environment for opportunities and making decisions to bolster the organization to address opportunities. Companies who are proactive in providing slack resources in terms of people, infrastructure, and time are better prepared to capitalize on opportunities. In the cold chain 3PL environment, servicing customers and exceeding expectations are crucial to maintain customer relationships. Research shows proactive improvements propel customer loyalty (Wallenburg, 2009). Proactiveness can create higher levels of performance and goal

expectation exceedance (Deepen, Goldsby, Knemeyer, & Wallenburg, 2008). It is expected that a proactive organizational climate will amplify the OI of a firm.

H5: The Proactiveness of a firm will positively influence the OI of an organization.

2.5.6 OI's relationship with IC

The IC, as shown, is related to an internal environment that is favorable to innovation (Carvalho et al., 2017). The conceptualized dimensions of OI in this research are Creativity, Openness, Future Orientation, Risk-taking, and Proactiveness. Together, these dimensions reflect the amount of OI a firm possesses, which creates a climate to allow innovation to flourish. However, the OI, which is comprised of the five dimensions, has not been explored in relation to IC to determine if there is a positive influence of OI on the ability to generate innovation.

H6: OI will positively influence the IC of an organization.

Ruvio et al. (2014) focused on the validation of the OI construct rather than exploring the relationship between innovativeness and IC. In addition, no empirical work has tested the OI dimensions in the Ruvio et al. (2014) study, thus far. To overcome these research gaps, this study will build upon Ruvio et al.'s (2014) seminal work on OI and will confirm the dimensions of OI construct, in a fourth culture and new context while exploring the relationship between OI and IC.

3 CHAPTER 3: METHODOLOGY

The purpose of this quantitative study is to examine the evidence of OI that can lead to IC. To analyze the innovation climate of temperature-controlled 3PL organizations, it is necessary to identify the exogenous construct (OI) and the ways this construct can influence the organization's IC (dependent variable). Based on the literature and background of the case, I will examine the relationship between the OI of a company and its capacity for innovation, which can be affected and acted upon by the organization. The research model was based on the hypothesized relationships among the components of OI and IC. The conceptual framework developed for this study contends that the climate of an organization has an influence on the firm's ability to innovate.

3.1 Summary of Hypotheses

- H1—the Creativity of a firm will positively influence the OI of an organization.
- H2—the Openness of a firm will positively influence the OI of an organization.
- H3—the Future Orientation of a firm will positively influence the OI of an organization.
- H4—the Risk-taking of a firm will positively influence the OI of an organization.
- H5—the Proactiveness of a firm will positively influence the OI of an organization.
- H6—OI will positively influence the IC of an organization.

The research steps include the instrument development, data collection, and analysis of the first-order confirmatory model, second-order exploratory model, and the structural model. The remainder of this chapter describes the study design, sampling size, sampling strategy and population, and data analysis approach.

3.2 Study Design

The basis of this study design was from the literature review, which provided the main theory to develop the hypotheses appropriate for this research. I used a quantitative cross-sectional survey design targeting 3PL firm employees in the cold supply chain and measured individual perceptions of their firms' climates for innovativeness (OI) and capacity for innovation (IC). The survey methodology was appropriate for the research question because a survey provided the opportunity to examine the effect across a broad range of respondents from different companies in the industry and provide a more extensive understanding of the phenomenon. A survey approach was useful in this study to collect responses from across the temperature-controlled 3PL industry, which provided a larger sample from which to generalize the findings to a larger population.

I used a psychometrically tested survey instrument developed by Ruvio et al. (2014) to measure the OI construct to assess the evidence of OI in a firm. I included three perceptual questions for IC which were used to connect the observable phenomena with the theoretical attributes of IC. The three questions were based on a review of the IC literature. I developed the three IC questions based on Hult et al.'s (2004) definition of a firm's capacity to innovate. The capacity to innovate was operationalized as the introduction of new processes, products, and ideas to the organization (Hult et al., 2004b). I evaluated and represented each IC attribute as an IC question on the survey. The extant literature has not comprehensively studied the research question, and other domains merit future work to validate the conceptualization and operationalization of the constructs. I examined the relationship of a firm's environment, conceptualized as the OI with the IC of the firm. Survey participants completed two self-reported measurement scales, one for each of the endogenous variables: OI and IC. The instrument

consisted of 24 questions in total, which asked respondents to report their own perceptions of OI and IC of their organizations. Both scales had a 7-point Likert agreement scale. Table 6 describes each of the measures in this study. The survey measured how participants perceived the presence of the dimensions of OI and how they perceived their firms' IC as measured by their ability to generate new products, processes, and ideas. I also asked five demographic questions related to company size based on the number of warehouses, company headquarters location, employee location (headquarters or field), job classification, and industry experience. See Appendix A for the complete survey.

Table 6. *Measurement Model Definitions*

Variable	Construct	Operational Definition	Measure	Source
DV	Innovation Capacity (IC)	The ability of an organization to be capable of generating novel output.	Composite score based on perception of innovation at the product, process, and idea levels within a firm	(Hult et al., 2004b)
IV	Organizational Innovativeness (OI)	Internal behaviors that facilitate innovative outcomes over time.	2nd order latent construct comprised of five perceptual OI dimensions that are operationalized as: Creativity, Openness, Future Orientation, Risk-taking, and Proactiveness.	(Ruvio et al., 2014)
IV		Creativity is the creation of a valuable and useful new product, service, idea, procedure, or process by individuals working in a complex social system.	Creativity is a five-item measure reflecting the organization's ability to 'encourage creativity,' view 'managers as resourceful problem solvers,' develop 'new and improved services,' leadership showing respect toward 'creativity,' and management's ability to 'use original approaches to deal with workplace problems.'	
IV		Openness is the flexibility and adaptability of organizations in responding to new ideas and changes.	Measured by four items reflecting the development of 'new answers,' assistance in 'developing new ideas,' the organization's 'openness and responsiveness to change,' 'new ways to look at problems.'	
		Future Orientation is the temporal perspective of organizational preparedness for future environmental changes and positioning considering such changes.	Four items, rating the extent to which the organization establishes 'a realistic set of future goals for itself,' effectively ensure that 'all managers and employees share the same vision of the future,' 'conveys a clear sense of future direction to employees,' and has a realistic vision of the future for all departments and employees.	
IV		Risk-taking is the degree to which managers are willing to make large and risky resource commitments.	Four items that rate the organization's belief 'that higher risks are worth taking for high payoffs,' encourages 'innovative strategies, knowing well that some will fail,' 'likes to take big risks,' and does not like to 'play it safe.'	

IV		Proactiveness is the organization's pursuit of business opportunities, whether related or unrelated to its present product lines.	Four-item construct measuring management's ability to 'seek new opportunities for the organization,' take the initiative to shape the environment to the organization's advantage,' first to introduce new services, and 'take the initiative by introducing new administrative techniques.'	
Control	Size	Size of the cold chain 3PL	Measured by number of warehouses, proxy for employees and revenue- could influence the ability to operationalize innovation	(G. C. C. Alliance, 2019)

3.3 Target Sample Size and Control Variable

The unit of analysis in this study was the respondent in a cold chain 3PL company, and the study controlled for size to determine the extent of variation or openness to innovation based on the number of facilities the company managed across the United States.

There are more than 250 cold chain 3PL firms in the U.S. market (G. C. C. Alliance, 2019). I sent the online survey to senior management, directors, managers, operations supervisors, and non-management personnel in the cold chain 3PL firms. I determined this scale of participation was necessary to evaluate the firms' climates based on the individual respondents' perceptions within cold chain 3PLs in relation to the firms' ICs and to provide a holistic view of the industry, as well as the different levels of the firms.

3.3.1 Target Sample Size

The target sample size was 160. I developed the sample size by conducting an inverse square root calculation for partial least squares SEM (PLS-SEM) with a target minimum path coefficient of .19 and an alpha of 0.05 for Type 1 errors.

3.3.2 Control Variable

Organizational size has been shown to be a strong predictor of the ability to innovate (Hurley & Hult, 1998). Smaller companies are often resource constrained, particularly in an asset-heavy and labor-intense market (Ukko & Saunila). Of the 250 cold chain 3PLs, large firms (2) make up 56.69% of the market, medium-sized firms (1) contribute 9.84% to the market, and the remaining 246 firms are 33.47% of the market (G. C. C. Alliance, 2019). Market share is derived from cubic capacity and is the industry standard collected and tabulated by the Global Cold Chain Alliance. Table 7 shows the top 10 cold chain 3PLs and their cubic capacity, market

share, and number of facilities. The industry is highly concentrated, with the top three companies dwarfing the industry with the amount of cubic capacity and number of warehouses.

Table 7. *Cold chain 3PL number of warehouses*

Rank	Company	Cubic feet of space	Number of facilities	Market Share (%)
1	Lineage Logistics	1,120,600,685	165	29.68%
2	Americold Logistics	1,019,953,858	162	27.01%
3	United States Cold Storage	371,672,950	43	9.84%
4	Interstate Warehousing	115,735,371	8	3.06%
5	AGRO Merchants	104,052,408	19	2.76%
6	Burris Logistics	74,901,966	16	1.98%
7	Henningsen Cold Storage	65,141,607	12	1.73%
8	NewCold Advanced Logistics	47,972,150	2	1.27%
9	Hanson Logistics	43,818,540	8	1.16%
10	Holt Logistics	27,000,000	7	0.93%

Given the disparity in size between large and small cold chain 3PLs, it was necessary to control for size in the study. I asked respondents to indicate the number of warehouses their companies managed. The question was broken down into seven groupings: 0, 1–5, 6–10, 11–20, 21–49, 50 or more, and unknown. Since the industry is so highly concentrated, I included these groupings to ensure anonymity for survey respondents. I later indexed the results into small, medium, and large categories for analysis because the three categories were easier to analyze and compare results. Survey respondents were not familiar enough with financials or specific capacity numbers to provide reliable answers to alternative size demographics. Warehouse counts are located on the companies' websites and the warehouse counts can be recalled easily because the numbers are relatively small in comparison to the financial and capacity information. The number of employees could also be used as a size measurement because labor is required to operate each warehouse. However, the number of employees is not public information and cannot be easily recalled by firm employees. The age of a firm was also considered as a measure

for the size of the company. While age could reflect the size of the company through the acquisition or construction of new facilities, age does not correspond to size in the cold chain 3PL industry. The capital constraints in the cold chain 3PL industry make growth challenging for small companies. Many small cold chain 3PL firms have been operating for multiple years but do not have the capital to build new facilities. In the cold chain 3PL industry, only one company was public, so information on financial performance, operational metrics, and other data that could be used for sizing the industry was not publicly or readily available.

3.3.3 Survey Population and Sample Strategy

The study population included senior management, directors, managers, operations supervisors, and non-management personnel in the cold chain 3PL firms in the United States. I recruited participants from the GCCA, an umbrella organization that creates partnerships among associations, governments, institutions, and private companies in the manufacturing and distribution of temperature-controlled food and connects those partners with public refrigerated warehousing companies, commonly known as cold chain 3PLs. The GCCA body of members includes more than 1,000 management executives within temperature-controlled 3PLs in the cold chain. This population was a convenience sample where I had access to the GCCA through membership in the association. The GCCA provided e-mail permission and the access to their member list for the survey (Appendix B). I sent the surveys to members of the GCCA, which included executives, managers, and warehouse operators in the cold chain 3PL firms. The individuals were from different departments and functional teams within the temperature-controlled supply chain 3PLs and represented the areas where organizational climate factors and IC can be observed. The variety of job functions and departments represented allowed generalizability of the results. The individuals within the member companies gave the e-mail

addresses to the GCCA. A total of 2,371 surveys were distributed via e-mail to the participants. The participants completed the survey over a one-month period in August of 2019. Participants took the surveys online, with options for PC and mobile-based access. The e-mail for soliciting participation in the survey is included in Appendix C. The invitation to participate was initially sent to the entire survey population, with three follow-up reminders sent only to those who started and did not complete the survey and those who had not participated in the survey. In total, 237 respondents started the survey, with 192 containing complete and useable data for further analysis. The response rate was 9% for the survey. Research has shown response rates to e-mail surveys to be much higher, around 33% (Nulty, 2008). However, the response rate to this survey was consistent with the response rate in other studies in the logistics industry, as well as the response rate for other surveys administered by the GCCA (Hilletofth & Hilmola, 2010).

Survey participants were asked two qualifying questions to ensure the ability to reflect on cold chain 3PL organizational climate and IC. The first question screened participants by asking the participant to indicate 'Yes' or 'No' to the statement 'My company operates cold storage warehouses in the US.' If the respondent answered 'No,' he or she was thanked and sent to the end of the survey. The second question to screen participation was the number of warehouses the company operated in the United States. If the participant selected '0,' he or she was thanked and sent to the end of the survey.

Qualtrics administered the survey. The Qualtrics survey platform provides a data repository for survey responses. Participants accessed the survey using a link in the survey solicitation e-mail. The first page of the survey provided statements related to the purpose of the study, procedure, confidentiality, risk or benefits, voluntary participation or withdrawal, contacts, and informed consent. The survey instructions indicated how the respondents were to complete

the survey. After indicating their consent to be included in the study, participants began the questionnaire. I completed a pilot test prior to sending the survey link to prospective participants to ensure accessibility and quality of the survey administration. The pilot survey participants were recruited based on convenience- there were two from my company but not in functions that qualified for the survey. Based on the pilot test, the length of time to complete the survey was 10 minutes, which I communicated to survey participants in the e-mail solicitation (Appendix C).

The survey can be broken into three sections. (1) The first section provides demographical information about the respondents and the organization, including the number of warehouses, company headquarters' location, the respondent's role in the organization, and the number of years in the industry. (2) The second section provided 7-scale Likert statements to assess the climate for innovation within the firm. (3) The third section measured three 7-point Likert statements on the IC of the respondent's firm. I used the second and third sections to test the hypotheses proposed in this study. Online surveys have many benefits, including less manual data entry, a reduction in administration effort, and less time to complete the surveys (Nulty, 2008). I chose to use an online questionnaire to ensure a cross-sectional examination of the industry and reach as many individuals across the industry as possible.

3.3.4 Survey Demographics

Participants in the survey were 192 cold chain 3PL employees from small-, medium-, and large-sized firms. Most of the participants were from small firms (55.7%), 39.1% were from medium-sized firms, and 3.6% were from large firms. The remaining 2% did not specify their company size. The respondents were asked to identify their locations, either in the corporate office or in the field. I was interested in understanding differences in innovation perspectives among those closest to leadership compared to individuals in the field. Of the respondents,

45.3% were in the headquarters or corporate office, with warehouse or field-based respondents comprising 49.0% of the survey population, 2.1% identified as other, and 3.6% preferred not to answer. The map in Figure 6 shows the number of respondents who selected each state as their company headquarters.

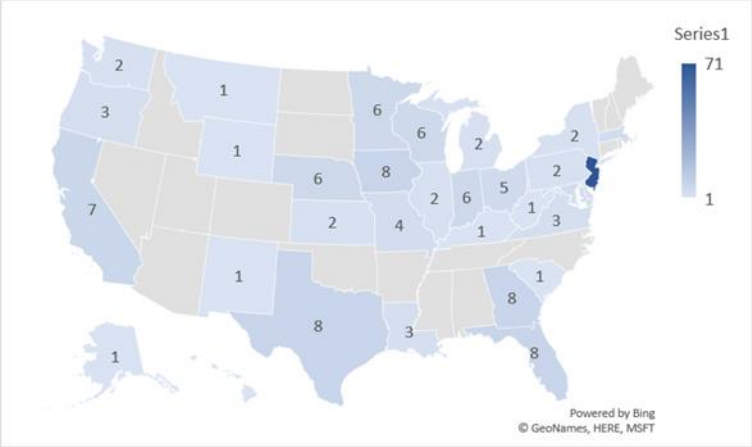

Figure 6. Cold chain 3PL respondent HQ location.

Next, participants were asked to disclose their levels within the organization. Of the 192 participants, 20% identified themselves as an executive, 14% as a vice president, 10% as a director, 39% as a manager, 6% as a supervisor, 2% as an operator, 5% as other, and 4% as none. Most of the respondents had more than 10 years of experience in the industry (67.2%), with 16.7% in the industry for 1–5 years, 8.9% in the industry for 6–10 years, 4.2% other, and 3.1% with less than a year. The role and tenure of the respondents was aligned because it typically takes tenure to progress in a role within a cold chain 3PL. Respondents were asked to select the location of their corporate headquarters. Most of the cold chain 3PL headquarters are in densely populated states.

Table 8. *Demographics by role, location, and experience*

	Small	Medium	Large	None	Total
Role					
Executive	34	5	0	0	39
VP	15	12	0	0	27
Director	15	3	1	0	19
Manager	33	38	4	0	75
Supervisor	2	9	1	0	12
Operator	2	0	1	0	3
Other	3	6	0	1	10
None	3	2	0	2	7
Total	107	75	7	3	192
Location					
HQ/Corporate Office	67	19	1	0	87
Warehouse/Field	34	53	6	0	93
Other	2	2	0	0	4
None	4	1	0	0	5
Blank	0	0	0	3	3
Total	107	75	7	3	192
Industry Years					
Less than 6 Months	3	0	0	0	3
6 months to 1 year	0	1	2	0	3
1–5 years	21	10	0	1	32
6–10 years	10	7	0	0	17
more than 10 years	69	56	4	0	129
Other	4	1	1	2	8
Total	107	75	7	3	192

3.3.5 Data Analysis Approach

The approach to data analysis included three steps, after cleansing and preparing the data for testing the measurement model.

I performed the first level of analysis to generate descriptive statistics to describe the characteristics of the respondents and check for the distribution of scores for skewness and kurtosis.

I used structural equation modeling (SEM), with the technique of partial least squares (PLS) for both the measurement and structural models. The second level of analysis was to analyze the measurement model. I used PLS-SEM to confirm the potential of a second-order

construct in the theory confirmation phase. The PLS-SEM analysis was conducted using WarpPLS 6.0 which controls for endogeneity using instrumental variables. To assess the measurement model, I established the indicators for construct reliability, internal consistency, Cronbach's alpha, convergent and discriminant reliability, correlations, and common method bias.

The third stage of analysis focused on the structural model link between OI and IC. Analysis performed on the structural model in this stage of analysis included testing for collinearity, path coefficients, goodness of fit, predictive power, and R^2. For the third stage of analysis, I used partial least squares structural equation modeling (PLS-SEM). PLS-SEM is an appropriate tool to analyze the data to assess unobservable latent constructs and capture simultaneous effects between latent constructs resulting from causal relationships. The PLS-SEM software selected for this study was WarpPLS 6.0. Warp was selected because it provides the ability to test all hypotheses simultaneously, and addresses nonnormal and nonlinear data models (Koch, 2017).

4 CHAPTER 4: RESULTS

This chapter presents the analyses conducted to explore the hypothesized relationships between OI and IC and confirm the OI construct dimensions. The results of the analysis are also discussed. Section 4.1 discusses the characteristics of the survey respondents and presents descriptive statistics. Evaluations of the first- and second-order measurement models are given in section 4.2; and structural model results and hypotheses tests are presented in section 4.3. Section 4.4 presents qualitative feedback results.

4.1 Descriptive Statistics

After the data was scrubbed and prepared for analysis, I analyzed the data. The data for the OI and IC constructs in this study had normal distribution and were skewed left (Table 9). The survey used a seven-point Likert scale, and the negative skew of the data means most of the respondent scores were on the higher end of the scale showing only marginal skewness. Size has a positive skew. For all three variables, the values of skewness are small and do not impact univariate normality therefore, the distribution of the data had normal distribution. See Appendix D for visual representation. The kurtosis results show the tails of the distribution were much thinner than normal distribution (Hair, Risher, Sarstedt, & Ringle, 2019).

For normal data, WarpPLS uses Jarque–Bera to test for normality. Two of the three variables showed normality of the data. Size did not show normality. WarpPLS uses nonparametric methods to account for nonnormal data and it is the appropriate tool for my research (Koch, 2017). All constructs showed one peak on the unimodal tests.

Table 9. *Normalcy tests*

Normality Test	IC	SIZE	OI
Skewness	–0.246	0.724	–0.281
Excess kurtosis	0.211	–0.458	0.118
Jarque–Bera	Yes	No	Yes
Unimodal–RS	Yes	Yes	Yes
Unimodal–KMV	Yes	Yes	Yes

4.2 Model Evaluation

The model consists of first-order reflective indicators and second-order reflective indicators. The first-order reflective model represented Ruvio et al.'s (2014) theoretical construct of OI. The five dimensions and their associated indicators were analyzed in the first-order confirmatory measurement model. The outcomes from the first model's latent variables were saved and used to create the higher order latent variable called OI. The OI and IC constructs are evaluated in the second-order exploratory measurement model. After establishing the measurement model is valid and reliable, the structural model is analyzed to determine if there is evidence to support the proposed model.

4.2.1 First Order Confirmatory Measurement Model

The second level of analysis provides validation of the OI construct and measure. Structural equation modeling (WarpPLS) was used to examine the validity and reliability of the variables. The OI measurement model consists of first-order reflective indicators. Evaluating the reflective measurement model involves checking for indicator reliability, construct reliability and internal consistency, convergent validity, discriminant validity, common method bias, and multicollinearity.

4.2.1.1 Convergent Validity

Convergent validity measures how well the respondents comprehend the scale items as the survey author intended (Koch, 2017). A measurement model will have acceptable convergent

validity if the *p* values are equal to or lower than .05 and the loadings are equal to greater than .5. For the five OI dimensions, factor loadings are all higher than cross loadings. The factor loadings are all high (loadings > 0.708) and the *p* values < .001 for all factors (Table 10). The Cronbach's alphas are also higher than 0.5 for all the OI dimensions. For convergent validity measures, 0.5 is recommended when assessing indicator scores. This indicates that the OI dimensions explain more than half of the variation of the indicators within each OI dimension. The average variances extracted (AVEs) are also above 0.50, which indicates that at least 50% of the variance of the items can be explained by the construct (Hair et al., 2019). The loadings and AVEs suggest that the model has good convergent validity.

Table 10. *Scale items and convergent validity*

Variables	Composite Reliability	AVE	Cronbach's Alpha	Loadings	SE
Create (CR)	0.889	0.62	0.84		
CR:1 Encourage				0.852	0.061
CR2: Problem solve				0.732	0.063
CR3: Improve service				0.758	0.062
CR4: Leadership support				0.852	0.061
CR5: Original support				0.722	0.063
Openness (OP)	0.9	0.69	0.85		
OP1: New answers				0.839	0.061
OP2: Help with ideas				0.821	0.061
OP3: Respond to change				0.854	0.061
OP4: New ways				0.815	0.062
Risk-Taking (RT)	0.9	0.67	0.83		
RT1: Risk is worth it				0.885	0.061
RT2: Failure tolerant				0.803	0.062
RT3: Big risks				0.855	0.061
RT4: No play safe				0.716	0.063
Proactiveness (PR)	0.869	0.63	0.80		
PR1: New opportunities				0.682	0.063
PR2: Initiative				0.811	0.062
PR3: Initiate new service				0.854	0.061
PR4: Initiate new admin				0.804	0.063
Future Orientation (FO)	0.916	0.73	0.88		
FO1: Goals				0.759	0.062
FO2: Vision				0.867	0.061
FO3: Direction				0.906	0.060
FO4: Realistic				0.881	0.061

Note. All loadings significant at p<0.001; SE= Standard error.

4.2.1.2 OI Construct Reliability

Reliability is a measure of the quality of the measurement instrument. Because I am validating the OI measurement model, it is necessary to analyze whether the reliability of the scale items associated with each latent variable are understood across all survey respondents.

Construct reliability is a measure of the scale items and whether they measure the same underlying attribute. The composite reliability for the five dimensions of OI range from 0.889 to 0.916 (Table 11), demonstrating strong composite reliability for the latent variables. A conservative criteria of composite reliability and Cronbach's alpha recommends measures equal

to or greater than 0.7 (Koch, 2017). Cronbach's alphas for five OI dimensions are all larger than the 0.70 threshold, ranging from 0.797 to 0.876 (Table 11).

Table 11. *Construct reliability*

Variables	Composite Reliability	AVE	Cronbach's Alpha
Create (CR)	0.889	0.62	0.84
Openness (OP)	0.9	0.69	0.85
Risk-Taking (RT)	0.9	0.67	0.83
Proactiveness (PR)	0.869	0.63	0.80
Future Orientation (FO)	0.916	0.73	0.88

4.2.1.3 Discriminant Validity

Discriminant validity describes whether survey respondents think the measures are related to other latent variables. Discriminant validity can be tested by comparing the square root of the average variance extracted against any of the other correlations involving that latent variable. The square root of the average variance should be higher than any of the other correlations containing the latent variable (Koch, 2017). Table 12 shows the discriminant validity correlation of latent variables with square root of the AVEs. Each square root of the AVE is higher than the other latent variable correlations, so discriminant validity exists in the model.

4.2.1.4 Common method bias and multicollinearity

Common method bias results from the instrument used in the research rather than the survey respondents. WarpPLS uses full collinearity VIFs to test for common method bias because they are derived from full collinearity tests between predictors and predictor–criterion analysis (Koch, 2017). Full collinearity VIFs have a threshold of <3.3, which is the ideal range. All indicator VIFs were below 3.3, which suggests no multicollinearity or common method bias (Table 12).

Table 12. *Correlations Among Latent Variables with Square Roots of AVES*

Variables	Create	Open	Risk	Proactive	Future	IC	Size	VIFs

Create	**(0.79)**							2.2
Open	0.729	**(0.83)**						3.1
Risk	0.304	0.43	**(0.82)**					1.2
Proactive	0.405	0.611	0.492	**(0.79)**				2.8
Future	0.349	0.556	0.322	0.594	**(0.86)**			1.7
IC	0.346	0.528	0.408	0.7	0.448	**(0.90)**		2.1
Size	0.099	0.081	0.037	0.192	0.175	0.267	(1.00)	1.1

Note. Bold numbers on the diagonal are the square root of the average variance extracted; VIF = Variance inflation factors.

Table 13. *p Values for Correlations*

Variables	Create	Open	Risk	Proactive	Future	IC	Size
Create	1	<0.001	<0.001	<0.001	<0.001	<0.001	0.172
Open	<0.001	1	<0.001	<0.001	<0.001	<0.001	0.266
Risk	<0.001	<0.001	1	<0.001	<0.001	<0.001	0.612
Proactive	<0.001	<0.001	<0.001	1	<0.001	<0.001	0.008
Future	<0.001	<0.001	<0.001	<0.001	1	<0.001	0.015
IC	<0.001	<0.001	<0.001	<0.001	<0.001	1	<0.001
Size	0.172	0.266	0.612	0.008	0.015	<0.001	1

In summary, the reflective indicators for the OI construct had composite reliability, convergent validity, and discriminant validity, and they showed no evidence of common method bias or multicollinearity.

4.2.1.5 Overall First Order Model Evaluation

Next, the overall measurement model was analyzed. The research model showed an acceptable goodness of fit. All fit measures were above acceptable values (Table 14).

Table 14. *Goodness of Fit Measures*

Measure	Result	Acceptability
Standardized root mean squared residual	0.115	<=0.1
Standardized chi squared with 299 degrees of freedom	1.276, $p < .001$	$p < .05$
Standardized threshold difference count ratio	0.833	>=0.7, ideally = 1

The factor loadings were all high (>0.5; Table 15) and the correlation coefficients among latent variables ranged from .30 to .73 (Table 16). Latent variable correlations among OI dimensions showed moderate to strong correlation, which is expected, in a first order construct.

Table 15. *Factor Loadings for the First-Order Model*

Factor Loadings	Create	Open	Risk	Proact	Future
CR Encourage	0.852				
CR Problem solve	0.732				
CR Improve service	0.758				
CR Leadership support	0.852				
CR Original support	0.722				
OP New answers		0.839			
OP Help with ideas		0.821			
OP Respond to change		0.854			
OP New ways		0.815			
RT Risk is worth it			0.885		
RT Failure tolerant			0.803		
RT Big risks			0.855		
RT No play safe			0.716		
PR New opportunities				0.682	
PR Initiative				0.811	
PR Initiate new service				0.854	
PR Initiate new admin				0.804	
FO Goals					0.759
FO Vision					0.867
FO Direction					0.906
FO Realistic					0.881

Note. All factor loadings are significant at $p < .001$.

Table 16. *Latent Variable Correlations*

Variable	Variable	Correlation
Create	Open	0.73
Create	Risk	0.30
Create	Proact	0.41
Create	Future	0.35
Open	Risk	0.43
Open	Proact	0.61
Open	Future	0.56
Future	Risk	0.59
Future	Proact	0.32
Risk	Proact	0.49

4.2.2 Second Order Measurement Model

The next step in the analysis of the measurement model is to evaluate the second-order exploratory model.

4.2.2.1 Convergent Validity

For the OI and IC constructs, factor loadings are all higher than cross loadings. The factor loadings are all high (loadings > 0.708) and *p* is less than .001 for all factors except for the Risk factor loading 0.639 (Table 17). However, *p* was less than .05 and the Cronbach alpha of > 0.50 indicated that the OI explains more than half of the variance of the indicators. The Cronbach' alphas are also higher than 0.5 for the IC construct. The AVEs are also all above 0.50. Based on the loadings and AVEs, the model shows good convergent validity.

Table 17. *Scale items and convergent validity*

Variables	Composite Reliability	AVE	Cronbach's Alpha	Loadings	SE
IC	0.929	0.813	0.884		
IC1: New Processes				0.888	0.061
IC2: New Products or Services				0.935	0.060
IC3: New Ideas				0.881	0.061
OI	0.876	0.589	0.821	0.852	
Open				0.734	0.061
Create				0.884	0.062
Future				0.74	0.062
Risk				0.639	0.064
Proact				0.818	0.061
Size	1	1	1	0.732	0.059

Note. All loadings significant at p<0.001; SE= Standard error.

4.2.2.2 Construct Reliability

The composite reliability for the model ranges from 0.876 to 0.929 (Table 18), demonstrating a good composite reliability for the latent variables. A conservative criteria of composite reliability and Cronbach's alphas recommends measures equal to or greater than 0.7

(Koch, 2017). Cronbach's alphas for the OI and IC constructs also both larger than the 0.70 threshold, ranging from 0.821 to 0.884 (Table 18).

Table 18. *Construct Reliability*

Variable	Composite Reliability	AVE	Cronbach's Alpha
IC	0.929	0.813	0.884
Size	1	1	1
OI	0.876	0.589	0.821

4.2.2.3 Discriminant Validity

Table 19 shows the correlation of the latent variables with the square root of the AVEs. The square roots of the AVEs are higher than the other latent variable correlations so the model displays discriminant validity.

4.2.2.4 Common method bias and multicollinearity

Table 19 lists the VIFs for each latent variable in the model. VIFs less than 3.3 suggest no multicollinearity or common method bias. All latent variables in the second-order model have VIFs < 3.3.

Table 19. *Correlations Among Latent Variables with Square Roots of AVES for the Second-Order Model*

Variable	IC	Size	OI	VIFs
IC	**(0.901)**	0.73		1.782
Size	0.267	**(1.00)**		1.077
OI	0.64	0.154	**(0.768)**	1.695

4.2.2.5 Overall Second Order Model Evaluation

Next, the overall model was analyzed. The factor loadings were all high (>0.5; Table 20) and the correlation coefficients among latent variables ranged from .154 to .64 (Table 19).

Table 20. *Factor Loadings for the Second-Order Model*

Variables	IC	Size	OI
IC New Processes	0.89		
IC New Products and Services	0.94		
IC New Ideas	0.88		
Size		1	
OI Create			0.73
OI Open			0.88
OI Future			0.74
OI Risk			0.64
OI Proact			0.82

4.2.3 Structural Model Results

Once the first- and second-order measurement models were analyzed for validity and reliability, the structural model was evaluated. Five steps are used to assess a structural model: check for multicollinearity, assess the path coefficient, determine the level of R^2 and adjusted R^2, establish the effect size, and explain the predictive relevance (Hair et al., 2019; Janadari, Subramaniam, Sri Ramalu, & Wei, 2016).

4.2.4 Multicollinearity

VIFs measure the degree of collinearity among variables (Koch, 2017). As mentioned in previous chapters, VIFs of less than 3.3 are preferred. Table 19 shows the VIFs for each latent variable in the model. All VIFs are < 3.3, indicating no issues with multicollinearity.

4.2.5 Path coefficient beta (ß)

The path coefficient shows the direct effect of the independent variable (OI) on the dependent variable (IC) in the structural model. The path coefficient for the model was significant at $p < .001$. The relationship between OI and IC was strong, with a path coefficient of $\beta = 0.613$, with standard error of 0.064. Confidence intervals did not contain zero, so Hypothesis

6 (OI will positively influence the IC of an organization) was supported. Table 21 provides a summary of the statistics for the structural model.

4.2.6 Effect Size

The effect size measures the strength of the relationship between variables. The larger the effect size, the stronger the relationship (Koch, 2017). Values of 0.35, 0.15, and 0.02 are considered large, medium, and small are effects, respectively. Values below 0.02 are not considered relevant (Koch, 2017). The effect size for the OI to IC relationship is 0.392, which is considered a large effect (Table 21).

Table 21. *Path coefficients and significance of structural model*

Path	Coefficient β	p Value	p	*t*-stat	95% Confidence Intervals		Effect Size f^2
Size -> IC	0.173	.007	0.07	2.485	0.037	0.31	0.047
OI -> IC	0.613	< .001	0.064	9.572	0.487	0.738	0.392

4.2.7 Coefficient of determination

The R^2 value measures the amount of variance the model can explain. I have reported R^2 and adjusted R^2, which only increase if the added predictors improve the model's predictive power. The higher the R^2 and adjusted R^2, the more explanatory power the model displays (Hair et al., 2019). The R^2 for OI to IC relationship was 43.9%. The adjusted R^2 was 43.3%, which corrects for 0.6% spurious increases that do not work to improve the predictive power of the model. Table 22 shows the summary statistics for the structural model.

4.2.8 Predictive Relevance (Q^2)

Q^2 coefficients are known as the Stone-Geisser coefficients and are another indication of the model's predictive strength (Koch, 2017). The calculation is done by removing data points in the model and then re-estimating the model parameters to predict the removed data points (Hair et al., 2019). By comparing this statistic to the R^2, the result can determine whether the model works independently from the data used to model the relationship between the variables. The Q^2 for the model is 0.441, which is close to the R^2 statistic and indicates predictive relevance of the model.

Table 22. *Structural model summary statistics*

Path	R^2	Adjusted R^2	AFVIF	VIF	Q^2	p Value
OI -> IC	0.439	0.433	1.518	1.518	0.441	< .001

4.2.9 Hypotheses Results

4.2.9.1 Results of Testing Hypotheses 1–5

Table 23 shows the factor loadings for H1–H5 dimensions of OI. Factor loadings are all high for the OI dimensions (loadings > 0.5). The *p* values were significant at < 0.001 for all the OI dimensions. Therefore, the null hypotheses can be rejected and H1–H5 can be accepted.

4.2.9.2 Results of Testing Hypothesis 6

Hypothesis 6 stated OI will positively influence the IC of an organization. A positive relationship was observed between OI and IC with a large amount of variation explained (0.613), as well as a large (0.392) and significant ($p < 0.001$) effect size (Table 23). Therefore, H6 is supported.

Table 23. *Hypothesis results*

No.	Hypothesis	Loadings	SE	Coefficient β	Effect size f^2	Hypothesis supported?
H1	A firm's Creativity will positively influence its OI	0.734	0.062			Yes
H2	A firm's Openness will positively influence its OI	0.884	0.061			Yes
H3	A firm's Future Orientation will positively influence its OI	0.74	0.062			Yes
H4	A firm's Risk-taking will positively influence its OI	0.639	0.064			Yes
H5	A firm's Proactiveness will positively influence its OI	0.818	0.061			Yes
H6	OI will positively influence a firm's IC			0.613	0.392	Yes

Note. All loadings significant at $p<0.001$; SE= Standard error.

The purpose of the first half of this chapter is to describe the results of the theoretical model proposed in previous chapters and test the hypotheses to determine how the results support the research questions:

- What is the state of Organizational Innovativeness in cold chain 3PL firms?
- What is the nature of the relationship between cold chain 3PL firms' innovativeness and their capacity to generate innovative outcomes?

The results from the model evaluation and hypothesis tests show support for all six hypothesized relationships in this study.

4.3 Summary of Key Findings

In this research, I explored the relationship between an organization's innovativeness and its ability to produce innovation. The research questions related to this study are as follows:

- What is the state of Organizational Innovativeness in cold chain 3PL firms?

- What is the nature of the relationship between cold chain 3PL firms' innovativeness and their capacity to generate innovative outcomes?

The purpose of this research was to explore the gap in extant literature related to the OI construct and the connection between the OI of a firm and its ability to generate new output. The results indicate that there is support for the notion that OI positively influences a firm's ability to innovate. Regarding the state of OI within cold chain 3PLs, there is support for all five dimensions and their positive influence on the OI of a firm.

4.3.1 Discussion of Key Findings

This study supports the hypothesized relationship between OI and IC. The purpose of this research was to understand the state of OI within a firm and its relationship with the ability to generate innovation. This study confirms prior research indicating the importance of the internal organizational environment that supports innovation (Hult et al., 2004b). Companies that want to create innovative solutions may leverage their distinct mix of OI behaviors to create a sustainable competitive advantage in the marketplace. The findings are consistent with prior research linking the environment of a firm with the ability to innovate (Gabler et al., 2015a; Herrmann et al., 2007; Ruvio et al., 2014; Subramanian & Nilakanta, 1996; Wang, 2004). However, prior research suggests that the dimensions of OI are not well understood in relation to IC (Neely & Hii, 1998). The results of this research suggest that the OI dimensions influence the capacity to innovate in firms. Specifically, the combination of Openness, Risk-taking, Creativity, Future Orientation, and Proactiveness had a significant and positive effect on the ability of a firm to create innovation. Companies that want to generate innovative output can leverage their distinct mix of OI dimensions to create a sustainable competitive advantage. Hurley et al., 2004 indicates

that firms with higher levels of OI are more motivated to innovate. This research demonstrates a relationship between the OI of a firm and the capacity to innovate.

In support of Ruvio et al. (2014), this study echoes the view that a multidimensional OI construct provides richer information on the climate of an organization, which can influence innovation. More importantly, this OI climate can be acted upon, and cold chain 3PLs can amplify their IC by assessing their competencies in the OI domain areas and making practical changes to their strategy, structure, culture, and processes. In addition, I conducted this study at an industry level. The results can serve as a benchmark by which cold chain 3PLs can compare their own company against the larger U.S. cold chain 3PL industry and reflect on their own attributes that can be enhanced to generate more innovation.

The OI construct comprises five dimensions of innovativeness that act together to positively influence the IC of an organization. In the next section, I consider the OI dimensions in relation to the literature, study results, and application to cold chain 3PLs.

4.3.1.1 Creativity

Creativity has been shown to be a key attribute in giving a firm the capacity to innovate (Saunila, 2014). In the current research, I found Creativity to positively influence the OI of a firm. However, the cold chain 3PL industry has been described as old, steady, and predictable. The literature shows that 3PLs favor operational efficiency over innovation due to the need to satisfy customer demands (Kilcarr, 2017). Creativity is not typically emphasized in the daily operational execution of cold chain 3PLs. Cold chain 3PLs have high industry turnover and low margins. Leadership does not encourage creativity because it would require allocation of already constrained resources in the operations and take focus away from servicing customers. Creative endeavors could be perceived as a waste of time or not efficient for warehouse operations. Firms

that want to enhance their IC could promote a balance between practicality and originality to satisfy the desire to remain efficient while allowing individuals to flex their creative skills. In support, when asked what actions the company could take to be more innovative, one respondent commented, “Allocate time and space for us to be creative and test products and theories in an environment where we can capture real data [S].” Leadership would also need to foster an environment and culture in which originality is encouraged and respected.

4.3.1.2 Openness

Research has shown that organizational openness is a behavior that enhances innovation (Hartmann & De Grahl, 2011; McDermott & Stock, 1999; Subramanian & Nilakanta, 1996). Openness refers to a firm’s ability to be flexible and adaptable to changes in an environment (Ruvio et al., 2014). Openness has a positive relationship with OI.

Cold chain 3PLs have experience in adjusting their work to address unexpected disruptions in their supply chain. Customers change orders, cycle times, carriers, and fulfillment requirements daily. In addition, the industry is changing, with automation, e-commerce, labor constraints, rising costs, and the threat of disintermediation. As part of the service industry, cold chain 3PLs are driven by customer demand and operational efficiency. Most firms in the industry have process improvement teams that focus on adapting business processes to meet the needs of new customers and changing demands. They are adept at finding solutions to problems and open to new ideas. In support, one survey respondent said that “focusing on automation that has flexibility is key, with changing customer profiles [M]” as a trend in the industry. Those firms that want to enhance their IC and remain competitive could apply the same principles of process improvement to innovation opportunities. These process improvement teams typically comprise individuals within operations, but it could be beneficial to introduce cross-functional team

members to contribute different perspectives to problem solving. Cold chain 3PLs will need to adapt and be flexible to address the changing business environment.

4.3.1.3 Risk-taking

In previous studies, risk-taking has been shown to influence innovativeness (Brettel, Chomik, & Flatten, 2015; Hogan & Coote, 2014; Hult et al., 2004b; Moos et al., 2010). Risk-taking involves investing resources in projects that might fail. In the capital-constrained cold chain 3PL industry, any capital commitment without a solid return is considered risky. R&D was mentioned by several survey respondents as a way to "try new things, [S]" yet few, if any, cold chain 3PLs have a budget for R&D. Innovation as a concept involves uncertainty, experimentation, and testing to bring new products, services, and ideas to the marketplace (Richards, 2006). The industry as a whole has been characterized as risk averse (Richards, 2006). In support, respondents mentioned risk aversion as a challenge to innovation in this study's survey. The concept of size also impacted the view of risk-taking from a capital perspective. A survey respondent stated, "We are small so having funds to 'try' things is hard to come by. [S]"

Previous studies have indicated that leaders who encourage risk-taking and support setbacks create a culture in which innovation can likely develop (Brettel et al., 2015; Moos et al., 2010). Thirty-nine respondents in our study identified themselves as executives in cold chain 3PLs. Of those 39, 89.7% had over 10 years of experience in the industry. These executives are industry veterans who understand the position of cold chain 3PLs, their customers, and the environment in which they operate. Experience drives the direction of the leadership. The industry is characterized as risk averse, so the influence of the efficiency and stability of the industry could impact the willingness of leaders to permit risky behavior. This constraint could mean cold chain 3PLs that do not pivot from their current thinking and behavior could miss out

on opportunities to capitalize on the changing environment. In support, Hult et al. (2004) found that firms that had less OI were more likely to reject new ideas than firms with higher OI.

Risk-taking requires an investment in resources, including people, to be successful. Another challenge to the perception that risk-taking enhances IC is the high rate of turnover among employees. With turnover hovering around 30% for the industry, management might not be willing to train and invest in people who will leave the company. This could prevent cold chain 3PLs from employing a risk-taking model in their organizations. The cold chain 3PLs that embrace risk-taking at the executive level and cascade that support down throughout the organization will amplify their OI and be capable of creating innovative output.

4.3.1.4 Proactiveness

Action is the name of the game in cold chain 3PL companies. The employees in these organizations are in a constant state of physical and mental action, always striving to be efficient and service their customers and maintain customer loyalty. Customer loyalty has been associated with proactive problem solving (Wallenburg, 2009). Taking action and capitalizing on opportunities have been described as behaviors of innovation (Ruvio et al., 2014). In support, in response to what cold chain 3PLs can do to enhance innovation, respondents in the survey said, “Think outside the box and be proactive, [S]”, “commit significant dollars to R&D [M]”, and break down the “we’ve always done this” mentality [L]. The current research shows that proactiveness has a positive influence on the OI of an organization. Proactiveness relates to the pursuit and exploitation of new opportunities including those in new markets, customer groups, and industries (Ruvio et al., 2014). Cold chain 3PLs already have experience being proactive within their firms, so to be successful innovators, they should identify and pursue new customer needs and develop solutions that address future demands and trends quickly and effectively.

Research orientation and some capital investment could be needed to develop new, unproven solutions. This could be both a challenge and an opportunity for capital-constrained cold chain 3PLs. Companies that invest in innovation and enhance their proactiveness can develop solutions that will create first-mover advantage and enhance their competitive position within the industry.

4.3.1.5 Future Orientation

The Future Orientation dimension focuses on future goals, vision, and direction for the organization. Looking toward the future means scanning the external environment for trends and being able to invest and respond with innovation (Ruvio et al., 2014). Future Orientation was shown to have a positive effect on the OI of a firm. Research suggests that innovative companies have a clear vision and strategic direction that guides the organization to long-term success (Siguaw et al., 2006). Cold chain 3PLs that want to maximize their OI can develop and commit to goals that reflect a future orientation. Research shows that leadership influences innovation outcomes (Moos et al., 2010). Leaders who want to be innovative should have a long-term strategy and share it with the organization to enhance their IC. Respondents mentioned "strengthening the connection between innovation and vision [S]" to improve innovation.

The vision and goals should be communicated to the entire organization to ensure the whole company is energized and future focused. Most survey respondents (47%) classified themselves as general managers, supervisors, or operators, which describes individuals in the physical warehouse setting. These individuals are not typically located at the corporate office and thus may not receive direct communication on the vision and strategy of the organization. "Setting clearer plans and goals [S]' was cited by a cold chain 3PL employee as enhancing the innovation ability of cold chain 3PL firms.

4.3.1.6 IC outlook in the cold chain 3PL industry

Ruvio et al.'s (2014) OI construct theorized a model based on five key dimensions of innovativeness. Although their model focused on the firm's environment, it did not establish a connection to the firm's ability to produce new products, services, or concepts. I explored the relationship between OI and the capacity to innovate in the U.S. cold chain 3PL industry. As previously mentioned, a coherent perspective of the capacity to innovate is lacking. This research offers a view into an industry's assessment of its ability to produce new products and services for the market and fills a gap in the cold chain 3PL industry research by taking the temperature of the industry on IC.

Despite its reputation as a conservative and slow industry, the cold chain 3PL employees who participated in the current study were "hot" for the ability to innovate within their companies. I asked three survey questions as part of the IC construct related to the respondents' perception of the generation of new products or services, ideas, and processes within their firms. The average score for the sample population was 4.96 (median = 5) out of 7. The large organizations rated their ability to innovate higher (4.96) in comparison to the medium (4.81) and small firms (4.28; Table 24).

Table 24. *IC Composite Score by Size*

Size	IC Score
Small	4.28
Medium	4.81
Large	5.78
Average	4.96

This positive view of IC is encouraging within an evolving business environment that is constrained by tight capital, high turnover, low margins, and demanding customers. This innovation capability perception could go far to motivate individuals within firms to continue to

make progress in opening new markets, customers, and services so they will remain competitive when it comes to innovation. However, smaller cold chain 3PLs may look toward the larger companies as a source for innovation and employ “follow the leader” strategies to preserve capital. Given the tight job market and desire to service customers across the industry, small cold chain 3PLs should view this perception as a wakeup call to concentrate their efforts on increasing their IC.

In addition, it is particularly interesting to note that the lower level employees in cold chain 3PL organizations scored their company’s IC higher than their leadership (Table 25). I included all levels of cold chain 3PL organizations in this study because innovation can be observed from the warehouse floor to the corner office. Innovation generated from customers and retailers is typically implemented in the warehouses. Lower level employees can be more open to change because they are accustomed to accommodating requests and servicing customers. They could perceive the company as more capable of innovation than their management since they have confidence in their own ability to address innovation and make changes. This positive perception of IC can be exploited within cold chain 3PLs to enhance their IC at the warehouse level by looking for sources of innovation within their operations. This would benefit the cold chain 3PLs because internal sources of innovation could require fewer resource commitments in a constrained industry. Further, managers and operators’ optimistic view of IC will help drive change management when firms incorporate innovation into their strategies because the tactical employees have already bought into the idea of innovation.

Table 25. *IC Score by Job Role*

Role	IC Score
Executive	4.81
VP	4.67
Director	4.79
Manager	5.16
Supervisor	4.90
Operator	6.33
Other	4.44
None	4.00

4.4 Qualitative Results Analysis

In addition to the scaled survey instrument, respondents were asked two open-ended text questions at the end of the survey (Table 26).

Table 26. *Open-Ended Text Questions*

No.	Question
1	What industry trends will drive innovation in the next 3 years?
2	What are some of the biggest challenges to innovation in your company?

The text questions were analyzed using Leximancer, a text analysis and data visualization tool (Leximancer). A text analysis tool was beneficial because I was interested in how individuals within cold chain 3PLs perceived how their companies viewed disruptions to the industry. Leximancer provided a concise method for reducing the text material into manageable categories and then identifying relationships among the text categories(Ltd, 2016). These relationships were aggregated into concepts that served as the themes presented for each question.

As part of the study, the survey participants were asked two open-ended questions related to the trends that drive innovation and barriers to innovation. These topics address both the extent to which cold chain 3PLs exhibit OI and how that innovativeness influences their ability

to generate new outcomes. The remainder of the results section explores the themes found in the text analysis of the open-ended questions, which provides perspective on innovation in the industry and insight into how cold chain 3PLs address their changing business environment to amplify their OI and capacity for new solutions.

4.4.1 Innovation Trends

Cold chain 3PL survey respondents were asked to comment on trends in the cold chain that had the potential to drive innovation over the next 3 years. Four broad themes emerged from the Leximancer analysis that included labor, storage, automation, and warehousing (Figure 7). Labor and storage related to finding ways to control costs in cold storage, whereas automation and warehousing focused on external drivers of innovation.

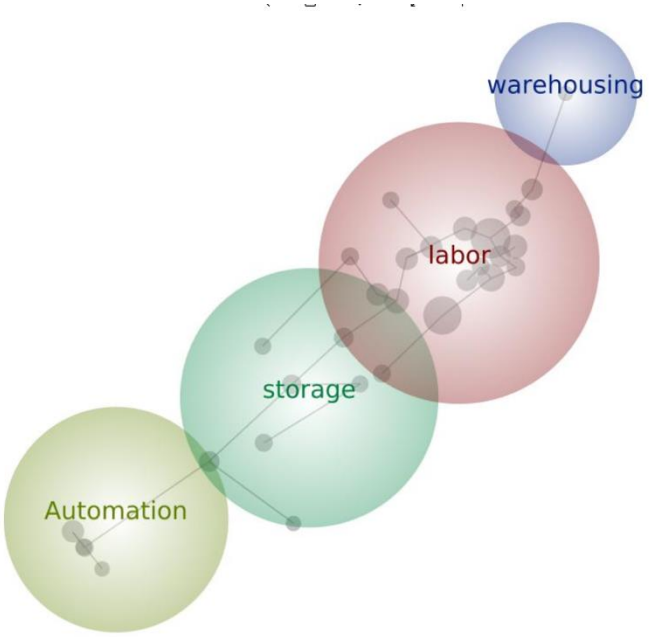

Figure 7. Innovation trends in the cold chain.

4.4.1.1 Labor

Cold chain 3PLs across the industry cited labor as an influence on innovation in the cold chain 3PL industry. The rising cost of wages and the low unemployment rate contribute to an overall scarcity of labor in the cold chain 3PL industry. Industry turnover is also above 30%, which means cold chain 3PLs are in a constant recruiting and retention cycle where they compete against positions with more comfortable working conditions. The quality of the labor is also a factor driving innovation because most of the jobs in a warehouse have a low skill requirement. Table 27 provides quotes from the respondents related to labor trends driving innovation.

Consumer preferences and the rise of e-commerce will put pressure on cold chain 3PLs to expand existing services to meet changing demands. New services could require additional labor, so cold chain 3PLs will need to develop new solutions to address an increase in labor demands in a tight job market.

Table 27. *Theme 1: Labor concerns driving innovation*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 1: Labor Cold chain 3PL respondents across the industry noted the labor shortage, skill of the labor market, and the rising cost of labor throughout the cold chain as a catalyst for innovation and a driver for finding new ways to work with less reliance on humans.	• "Unemployment rate [L]" • "Labor shortages [M]" • "facilities perpetually understaffed [S]" • "Talent development [M]" • "Finding talented labor [S]" • "Demand for services in a constricted labor market [M]" • "High warehouse labor costs, increasing minimum wage [S]" • "Find simple, affordable labor replacement [S]" • "Driver (transportation carrier) shortages [S]"

4.4.1.2 Storage

The high cost of operating a cold storage warehouse was noted as a potential driver of innovation in the cold chain industry (Table 28). The capital cost to build and maintain cold storage warehouses is much higher than the cost of ambient facilities. Any efficiencies gained through innovation in refrigeration, storage, power, and freezing costs would be accretive to the bottom line and improve the competitiveness of cold chain 3PLs.

Table 28. *Theme 2: Storage concerns driving innovation*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 2: Storage Respondents noted concerns about the efficiency and cost of operating cold storage as a driver of innovation.	• "Efficiency in storage [M]" • "Reducing freezing costs [S]" • "Price stability will require the modernization of facilities [S]" • "Power reduction through technical improvements [S]" • "Sustainable and environmentally friendly buildings [S]"

4.4.1.3 Automation

Automation in cold chain 3PLs is already taking place across the United States. As more automation is implemented, it is expected to play a large part in facilitating innovation within the industry. Automation and related technological advancements, such as robotics, digitization, visibility, blockchain, business intelligence, and the Internet of things were cited as potential sources of innovation in the next 3 years (Table 29).

Although automation will reduce the dependency on labor within a facility and potentially reduce costs, some respondents noted concerns about how customers would view productivity improvements and if they would expect to see those cost savings reduce their rates in the future. Another respondent expressed concern about the implementation of automation due to labor concerns.

Automation of facility storage and handling activities can serve as a catalyst for innovation in the cold chain 3PL industry.

Table 29. *Theme 3: Automation driving innovation*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 3: Automation The trend in cold chain 3PL implementation of automation in the warehouse was specified as a continuing practice that will influence innovation in the next 3 years, in addition to other types of automation called out in the responses. Respondents noted concerns about implementing automation and customers expecting cost savings from operations to be reflected in their rates.	• "Automation [L], [M], [S]" • "Robotics [S]" • "Internet of things [S]" • "Digitization of the supply chain [S]" • "Business intelligence [M]" • "Blockchain [S]" • "Technology visibility and supply chain orchestration [S]" • "Focusing on automation that has flexibility is key, with changing customer profiles. [M]" • "More customers will bake cost savings from different types of automation into their baseline service expectations[S]."

4.4.1.4 Warehousing

The expansion of e-commerce to temperature-controlled food is viewed as a driver of change in the cold chain 3PL industry. E-commerce will require changes to facility practices and alter food manufacturer profiles within warehouses. E-commerce also facilitates smaller, more frequent shipments from cold storage facilities. As cold chain 3PLs strive to service their customers, customer demands will have an impact on the functions within the warehouse and can be viewed as sources of innovation. Another consumer influence on warehousing services is the continued drive for food safety and traceability. The provenance of food and visibility within the holistic cold chain could require new ideas, products, or services to meet regulatory and consumer requirements.

Retailers are putting pressure on food processors to improve service lead times and shorten order lead times. These retailer demands could also force cold chain 3PLs to develop innovative solutions to address retailer needs.

Transportation services have an impact on warehouse operations, and driver shortages and drive time laws create demands on warehouses to pick, pack, and ship products even more efficiently. Cold chain 3PLs are hot for innovation and employees see trends in the industry that will drive innovation over the next 3 years. The inevitability of disruption in the cold chain industry presents opportunity for 3PLs to generate innovative solutions to create competitive advantage. The current research is concerned with the internal environment within cold chain 3PLs that enables them to capitalize on market trends and generate innovation. As such, the research findings provide context within the industry for the relationship between the internal OI and the capacity to innovate. Table 30 summarizes the respondents' quotes on warehousing trends driving innovation.

Table 30. *Theme 4: Warehousing trends driving innovation*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 4: Warehousing Many cold chain 3PL survey respondents noted developments in customer demands that will shape the type of warehousing required in the future, including rising demands for e-commerce and the concern over disintermediation, retailer pressure, food safety, and the impact of transportation-related issues that affect warehousing.	• "E-commerce [M]" • "Smaller, more frequent orders. [M]" "Prompt services [M]" • "Customer demand [S]" • 'Shifting demographics [S]" • 'More direct shipments to consumers, direct to retail/consumer shipping methods, high import volumes (China trade, PANAMAX vessels) [M]" • "KPIs and shrinking service lead times [S]" • 'Systems that allow for a pick/pack operation to compete with Amazon [M]" • "New entrants backed by private equity and continued consolidation of the industry [M]" • "The ability to provide a one-stop shop for all aspects of warehousing [M]" • "SKU proliferation and retailer fees [M]" • "Demands of the customer in terms of tractability for both product in transit and in storage [M]" • "Food safety will continue to drive warehouse functions. Everyone wants to know who is making their food, how they did it, and where has it been." We must make sure that our warehouses fit and have a positive effect on our customers' product. [S]" • "On-time, in-full requirements combined with a 24–7 economy and short order fulfillment times, drop and hook at customers [M]" • 'High transportation costs and limited hours [S]"

4.4.2 Barriers to Innovation

I identified five dimensions of OI that a firm can use to increase its capacity to innovate. However, cold chain 3PL survey respondents identified multiple barriers to innovation that could hamper their path to innovation generation. The barriers included internal obstacles and external challenges that may affect the innovativeness and capacity to innovate within cold chain 3PLs (Figure 8). Recognizing these barriers can help cold chain 3PLs navigate the challenges of innovation generation.

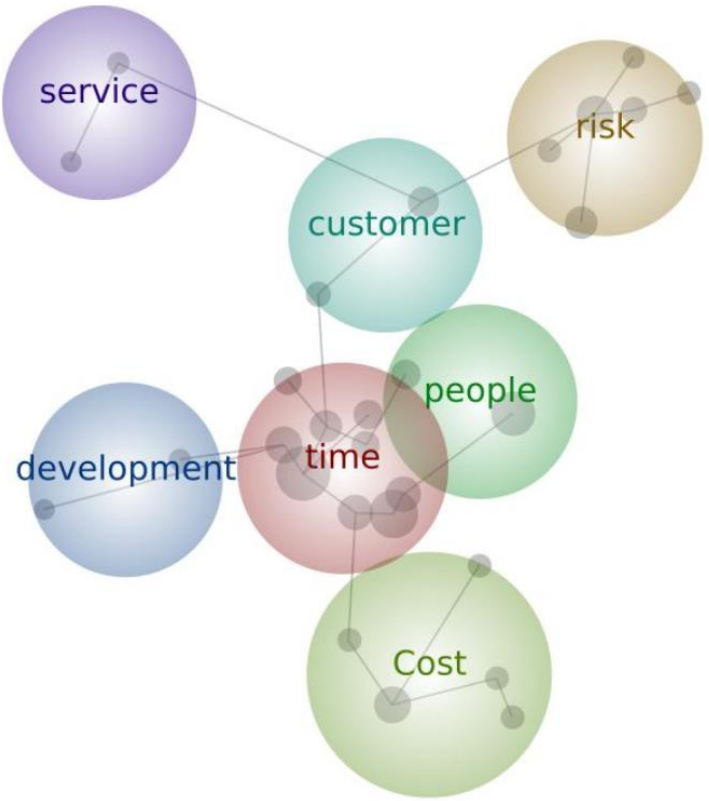

Figure 8. Innovation challenges in the cold chain.

4.4.2.1 Internal Barrier: Capital Cost

Respondents cited capital resources as a concern for cold chain 3PLs (Table 31). The cold chain 3PL industry is a capital-intensive industry that leaves little excess funds to source

projects that are not guaranteed a return. In support, 17.3% of survey respondents cited capital resources as a barrier to innovation, making it the most frequently cited issue in the survey. One respondent cited "capital constraints due to rapid growth [M]" as the biggest barrier to innovation in their company. Return expectations were also mentioned in the open-ended survey question. Capital expenditures and returns are closely monitored, which could compel employees to take a short-term view of their environment as opposed to a future-oriented outlook. One survey respondent noted the "ability to spend capital on innovation with risk that we may not see the return on that investment and ROI [M]" is a concern.

In addition, most 3PLs require financial justification for their projects, which are often based on customer contracts. Innovative projects could exceed customer contract commitments, "causing difficulty when attempting to justify large scale projects financially as they may have 7–10-year windows for IRRs. [M]" One survey respondent also noted that 3PLs need the ability to "deliver new products/services at a competitive cost. [S]" Innovative solutions could be more costly than current products or services, which may mean financial return expectations need to be adjusted to ensure customer adoption of the innovation. Cold chain 3PLs need to be flexible and open to altering financial measures for innovation.

Although there is unease among cold chain 3PL employees due to a lack of capital available for innovation, firms in the cold chain 3PL industry are not unfamiliar with making large investments in technology (e.g., the Walmart RFID project) and understand there is a cost to innovation and technology advancement. Cold chain 3PLs that want to flex their IC should be open to investing in innovation and create a plan to devote funds to projects that are not justified through customer commitments or known returns.

Table 31. *Innovation barriers theme 1: cost*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 1: Cost Cold chain 3PL respondents noted that the cost of innovation was a concern and a lack of capital resources was a barrier to IC. Respondents also mentioned a lack of an R&D budget, a concern with creating innovation that was cost effective for customers, and the need to generate returns on projects could also prevent IC from flourishing within cold chain 3PLs.	• "Cost, financial resources to push innovation, funding, budget [S]" • "Cost. We are a one-warehouse operation and realize that our technical ability to innovate is always tempered by cost. [S]" • "Capital constraints due to rapid growth [M]" • "large capital requirements, and required allocation of capital to the chosen areas of innovation [M]" • "We are small so having funds to "try" things is hard to come by [S]" • "Delivering new products/services at a competitive cost [S]" • "Customer contracts tend not to exceed more than 5 years, causing difficulty when attempting to justify large scale projects financially because they may have 7–10-year windows for IRRs [M]"

4.4.2.2 Internal Barrier: Time

Slack resources were a significant issue for cold chain 3PL employees. "Our bread and butter are operational efficiency and execution [S]," noted one survey respondent. Efficient operations mean little time is wasted in warehouse operations. In support, another survey respondent stated, "In our very fast-paced line of work, we continue to do things 'the way they've always been done' because we do not have the luxury of time to stop and reinvent the wheel [S]." Customer demands and the pressure from retailers also constrain time within the warehouse. Cold chain 3PLs that want to augment IC could invest and plan for flexibility in their workforces to allow innovation to occur. Surplus time would allow employees room to apply creativity to problems, experiment with innovation, and look outwardly to anticipate future customer and market needs. By giving employees time to innovate, cold chain 3PLs can advance

their OI, which will positively influence their capacity to innovate. Table 32 lists quotes from respondents on the time barriers to innovation in cold chain 3PLs.

Table 32. *Innovation barriers theme 2: time*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 2: Time Respondents noted concerns over a lack of internal and external slack resources available to focus on innovation and implementation of innovation.	• "Internal factors: . . . lack of time [S]" • "In our very fast-paced line of work, we continue to do things "the way they've always been done" because we do not have the luxury of time to stop and reinvent the wheel. [S]" • ". . . impact of time/change to current operations [M]" • "Everyone is caught up in the daily details that no one has the time to experiment with unproven innovations [S]" • "We are a relatively small company, so innovation can be difficult because all the members of our team are busy with daily tasks and meetings. [S]" • "Have depth of staff to commit time resources to innovation [M]" • "External factors influencing the economics of innovative solutions (e.g., short lead time to implement) [S]"

4.4.2.3 Internal Barrier: People

Having time to innovate was cited as a barrier to innovation, but human capital constraints were also identified as an inhibitor to innovation. Issues with the amount and quality of the resources were specifically mentioned as concerns (Table 33). High turnover and rising labor costs put pressure on firms in the industry to operate as efficiently as possible. An employee commented, "We run very lean and often find ourselves working in the business and not on the business. [S]" Growth in the industry has also contributed to a shortage of labor. In support, one respondent noted that "lack of resources (due strong growth) [S]" was a barrier to innovation.

Cold chain 3PL industry members also had concerns with the quality of the skills that employees could require to manage innovation. The cold chain 3PL industry has a low-skilled employee base that is trained to excel at efficiency and operating a warehouse. They are rewarded by customers for performance and by management for maintaining the status quo. The employees may not have the skills necessary to think outside the box and investigate new ideas for the future. Survey respondents mentioned "find[ing] the correct team to understand and put in place innovation, [S]" "willingness to increase bench strength beyond current needs (thus increasing cost) in order to have trained supervision and management ready for growth, [S]" and "provid[ing] financial resources for the development of talent. Additional talent will allow for more time to work on the business and generate different ideas [S]" as examples of people constraints to innovation. OI and Future Orientation are associated with the ability to "think outside the box [S]" and allow individuals to find solutions to problems and identify opportunities (Ruvio et al., 2014). Innovation will likely require cold chain 3PLs to commit resources to staffing and education to create an environment in which innovation can develop. Without those resource commitments, cold chain 3PLs could be left out in the cold in the race to innovate.

Table 33. *Innovation barrier theme 3: people*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 3: People Survey respondents frequently noted human capital restraints as a barrier to innovation, citing a lack of slack resources available to innovation and a skill deficiency within the current employee base.	• "Labor shortages [M]" • "finding a good team [S]" • "We are building our system and the people refining it keep leaving [M]." • "Management resources for implementation [S]" • "Having people available to focus on the innovation [M]" • "We run very lean and often find ourselves working in the business and not on the business [S}." • "Employee ability, education level of employees, and the ability to learn new technologies quickly [S]" • "Staffing for such service will be a challenge due to labor availability [M]" • "Having the internal technical resources to execute new technology initiatives [M]" • "Educating staff who in many cases barely finished high school. Keeping it simple and forward thinking in the same instance is the trick. [S]" • "IT support and having the right people in positions to ensure the success of innovation [M]"

4.4.2.4 Internal Barrier: Risk

The cold chain 3PL industry is characterized as risk adverse, so it is no surprise that risk aversion was cited as a barrier to innovation (Table 34). Multiple respondents noted issues with management's risk tolerance, including, "conservative ownership not wishing to take large risks [M]," "ownership enjoys successful innovation, but are risk averse [S]," and "reluctance by local/regional management to embrace chance and take risk [M]." According to Moos et al. (2010), leadership could affect the generation of innovation, so cold chain 3PLs that want to be

successful at innovation could increase their tolerance for risk and allow innovation to flourish. Leaders can demonstrate the importance of innovation to the organization by being more open and tolerant to risk.

Tolerance to risk also means fostering an environment in which innovation failure is supported. One employee remarked that the company lacked an "acceptance for initiatives that are not operationally proven or have an unknown financial return [M]." Companies that want to drive innovation must be willing to encourage flexibility, take risks, get creative, and get comfortable with uncertainty. Failure provides opportunity to learn, and the knowledge gained from those projects could lead to innovation in the future and create a competitive advantage.

Table 34. *Innovation barrier theme 4: risk*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 4: Risk In an industry already perceived as risk averse, respondents echoed this theme with comments about management risk aversion, the dilemma of investment in innovation without an identified return, the fear of failure, and how to balance risk with reward.	• "Conservative ownership not wishing to take large risks, ownership enjoys successful innovation, but are risk averse [S]." • "Reluctance by local/regional management to embrace chance and take risk [M]." • "We are an old company and trying to balance a steady and predictable culture and one that rewards some risk-taking. It is not always clear where that line is [S]." • "Many people are set in their ways, sometimes hesitant to embrace change and technology [S]." • "Fear of failure, fear of risk, cost of changing and then having it fail [S]" • "Not opposition to new ideas, but new innovations had better work [S]" • "Making sure investments generate improvements or productivity [M]" • "Gaining acceptance of initiatives that are not operationally proven or have an unknown financial return [M]"

4.4.2.5 Internal Barrier: Development

The growth in demand for cold storage over the past few years has resulted in a lack of excess capacity in the industry (Table 35). The lack of storage space could mean that companies do not view innovation as critical to their competitive advantage. In support, one respondent mentioned, "Minimal excess capacity in the cold chain has resulted in some stagnancy in focusing on new innovation, service offerings and other differentiators [M]." However, other respondents remarked that lack of space was a function of industry growth, which constrained resources such as capital and people: "lack of resources (due strong growth) [S]" and "keeping up with demand for more warehouse storage [S]." Capacity constraints have introduced new

companies to the market, and the new companies are further challenged with stabilizing their operations while balancing developing their OI. One employee noted, “Our company is barely 2 years old, we are still growing and figuring out best practices [S].” Another development area affecting cold chain 3PL innovation is standardization and communication among internal employees. Many of the cold chain 3PLs are decentralized, so amplifying their OI and pushing it out to the organization is a challenge. A survey respondent suggested “dispersion of personnel around the country due to nature of business . . . so communication and team efforts are more challenging [M]” as a challenge to innovation. In addition, standardization of the definition of innovation, training on new products, and innovation practices will need to be disseminated throughout the organization and supported by all regions in the implementation of innovation. Cold chain 3PLs should be cognizant of their growth, capacity constraints, and internal processes for innovation to ensure they have an internal environment suitable for innovation.

Table 35. *Innovation barrier theme 5: development*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 5: Development Cold chain 3PL respondents noted that the industry dynamics related to warehouse capacity, internal communication and standardization, internal buy-in, a lack of knowledge on innovation, and competing priorities limited the ability to innovate and develop new solutions.	• "Speed of growth and maintaining culture, synthesizing processes [M]" • "Minimal excess capacity in the cold chain has resulted in a stagnant view of innovation, service offerings, and other differentiators [M]." • "Space, freezer space, lack of resources (due strong growth), keeping up with demand for more warehouse storage [S]" • "We operate out of an older facility that limits just how much we can try new things. We are limited in space and the capabilities of the facility [S]." • "Not having the opportunity to go to shows to see what is out there [S]" • "Not all information about customers is shared across different locations, getting all departments to work together and agree with what needs to be changed, dispersion of personnel around the country due to nature of business make communication and team effort more challenging [M]." • "Learning the new process and procedures, training on innovative ways across the country [M]" • "Getting the owners to buy-in to it, acceptance by employees, gaining acceptance for initiatives that are not operationally proven [S]" • "My company is highly decentralized when making uniform changes involving innovation. There appears to be a mindset at the regional level that "if it's not their idea . . . it's a bad idea [M]" • "Our company is barely 2 years old; we are still growing and figuring out best practices [S]." • "Competing priorities. We have acquired six companies in the last 18 months and have several others in the pipeline along with several green-field developments, so we are constantly juggling resources necessary to drive innovation [S]."

4.4.2.6 External Barrier: Customers & Service

Interestingly, customers and service were noted as potential barriers to innovation in the cold chain 3PL industry (Table 36). Customer service is the highest priority for cold chain 3PLs. The deep relationships they nurture with customers ensure the viability of the whole industry. The customers drive much of the innovation within the cold chain today. They present a challenge to cold chain 3PLs when it comes to innovation because each type of food producer and retailer represents a different product type and service requirement. Matching solutions with the appropriate customer application was cited as a challenge to innovation. One respondent commented that "finding the correct customer to fit our footprint and providing value added services in a cost-effective way [S]" was a barrier to innovation. Cold chain 3PLs will need to find solutions for customers that are cost effective and beneficial to create demand for their services in the future. In addition, customers will need to be educated on "new services so they see the value [S]" to ensure cold chain 3PL innovation is successful.

Cold chain 3PLs will also have to maintain their level of service while changing their innovativeness to create the capacity to innovate. Because service is such a high priority to cold chain 3PLs, they could be hesitant to adopt new products/services if they think it might impact their customer base. Resistance to change was identified as a challenge to innovation and was noted as "faith in old methods and devices [S]" and a "mind set of same old same old [S]." The balance of service and innovation will need to be addressed to ensure the current customer base stays satisfied while scanning the environment for future opportunities to stay competitive.

Cold chain 3PLs that do not want to be left out in the cold when it comes to IC should determine which dimensions of OI they want to enhance to foster the development of innovation while being cognizant of both internal and external challenges to innovation.

Table 36. *Innovation barriers themes 6 & 7: customer and service*

Themes (*Automated, Manual Review*)	Representative Quotes
Theme 6: Customer Many cold chain 3PL survey respondents noted developments in customer demands, the breadth of service requirements, value creation, and the economic impact in the market that could affect the ability of cold chain 3PLs to innovate.	• "Our industry is highly focused on the needs of the customer [M]" • "Dealing with a large and varied customer base and their wide variety of products and storage needs [S]" • "Finding the correct customer to fit our footprint and providing value-added services in a cost-effective way [S]" • "Customer demographics and changes in market [M]" • "Getting new customers on board with a change in lifestyle [S]" • "Educating clients on new services so they see the value [S]" • "External factors influencing the economics of innovative solutions (e.g., short lead time to implement, limited contract terms, reactive instead of collaborative approaches to business development) [S]" • "Customer commitment [S]"
Theme 7: Service Maintaining the level customer service while embracing change was a frequently mentioned concern for cold chain 3PL respondents.	• "Faith in old methods and devices, mind set of-same old same old [S]" • "The biggest challenge in pushing innovation forward is resistance to change [S]." • "Keeping up with demand for more warehouse storage. We have added 40,000 sq. ft. of freezer space. [S]" • "Using new hardware/software with "old" customers [S]" • "Communication between our customers and our customer service Customers not using procedures we have in place [M]."

5 CHAPTER 5: DISCUSSION

In this chapter, I explore the contributions to theory and practice, limitations to the research, and direction for future development on this research topic. In the last section of this chapter, I summarize and conclude the dissertation research study.

5.1 Contributions

5.1.1 Academic Contributions

This research contributes to the OI literature in several ways. First, this research bridges the gap between the environment of an organization and their ability to generate innovative products, processes, and ideas. There is a lack of research on the link between OI and IC. Both constructs have been variably conceptualized and are often confounded by a lack of a clear definition, which results in an overlap in the use, measurement, and frameworks of the constructs. This research clearly establishes the existence of OI and makes a distinction between innovativeness and the capacity to innovate within the innovation domain. As such, combining the literature on OI and IC based on the findings of this research indicates that the OI of a firm positively affects the ability to innovate within the firm.

Second, this research extends the body of knowledge on OI by confirming the significance of the dimensions of OI. Prior research by Ruvio et al. (2014) demonstrated the measurement reliability of the OI construct that included Risk-taking, Openness, Creativity, Future Orientation, and Proactiveness but was not empirically tested. Ruvio et al. (2014) called for additional research to validate the OI conceptualization as well as measurement in other industries. My research answers the call by demonstrating that the OI construct dimensions were distinct and reflective of the OI construct. The measurement model shows that the more OI a firm fosters, the more capacity to innovate it possesses.

Additionally, my research answers the call for further research by extending the OI conceptualization through the support for the structure and validity of the measure in a different industry and country. Prior research included cross-cultural analysis of social and health service organizations from Norway, Spain, and Israel. The current study's results can further the rationale for a multidimensional measure to assess the innovative climate of a firm along with the validation of the OI dimensions integrated in Ruvio et al.'s (2014) study. By studying the environment for innovation of cold storage providers in the US, my research strengthens the claim that firm environment dimensions can be observed different organizational contexts and extends the relationship between OI and IC.

5.1.2 Practical Contributions

This research was based on the perceptions of employees in cold chain 3PL companies. The data provide insights into the view of innovation and the ability of firms to innovate within the cold chain industry.

First, the survey instrument can be used as a diagnostic tool to assess the OI of firms in the cold chain industry. The current study shows that the more OI a firm possesses, the more innovation it will be able to generate. The survey can provide valuable feedback related to the strengths and weaknesses of a firm and where companies can make improvements to their climate. The tool can provide a holistic view of the climate of a firm and help managers align their strategy with climate dimensions to ensure the organization is maximizing its IC.

Second, this research provides insight into the behaviors and climate within the cold chain 3PL industry. Despite the industry being known as a conservative and slow, the cold chain 3PL employees who participated in the current study were "hot" for the ability to innovate within their own companies. I asked three survey questions as part of the IC construct related to the

respondents' perception of the generation of new products/services, ideas, and processes within their own firms. The average score for the sample population was 4.93 (median 5) out of 7. This positive view of IC is encouraging within an evolving business environment that is constrained with tight capital, high turnover, low margins, and demanding customers. This IC perception could go far to motivate the industry to continue to make progress in opening new markets, pursuing new customers, and implementing new services so they will not be "left out in the cold" when it comes to innovation. The GCCA could also use this research to augment existing training programs in the industry with skills related to the OI dimensions. This study provided qualitative data on the industry trends that are driving innovation, which have not been previously gathered and synthesized in the past. The industry will also benefit from this research because survey respondents noted their viewpoints on barriers to innovation, which can be addressed both across the industry and within cold chain 3PL firms to liberate IC.

Finally, my own company can benefit from this research by capitalizing on the knowledge of the firm's strengths in the OI dimensions, which can create sustainable competitive advantage and thwart disintermediation and threats from external forces. The leadership should incorporate OI dimensions a part of their strategy and help shape the vision of the company. Future strategy sessions could be updated to include assessment of the organization's concentration of OI dimensions in relation to new growth opportunities. This evaluation could be used to highlight the gaps in the climate that could stymy growth and innovation.

5.2 Limitations

Although this study is rich in contribution to theory and practice, there are limitations. The sample size for this study is in line with other research conducted in the industry and is within the sample size estimate range; however, a larger sample size for the study would have

provided a richer source of data, especially from large and medium-sized companies. In addition, I focused on cold chain 3PL employees located in the U.S. which made it more difficult to identify significant relationships from the data. Thus, the results and implications of this study may not be generalizable to the greater business ecosystem.

The cold chain 3PL industry does not have standardized and observable measures of IC such as revenue, profits, R&D spend, or patents, which made quantifying the IC of the firm a challenge. Prior researchers (Hult et al., 2004b) defined perceptive measures that can be used to assess the IC of a firm. In the current study, I used self-reporting to assess the capacity to innovate within the respondents' organization. Self-reporting by employees can potentially increase the likelihood of common method bias. However, given the lack of evidence of IC across the industry, employees can be considered a reliable source of information regarding their firm's ability to generate new ideas, products, processes, and services. The individuals admitted to the study were in positions and physical locations where innovation generation could be observed and assessed. Longitudinal studies could be beneficial in the future to establish causality among the variables.

Despite conducting a cross-sectional study, which allowed me to observe the cold chain 3PL industry across small, medium, and large companies, the nature of the study did not provide an opportunity to measure the continuous generation of innovation over time. To observe a sustainable competitive advantage, it will be necessary to understand the capacity of a firm to create innovation over time. By conducting a longitudinal study, researchers could gain a better understanding of the effect of OI on IC and identify patterns between the construct relationships.

5.3 Future Research

Research has indicated that the external environment affects the ability to drive innovation (Hult et al., 2004b). However, for this study, I was interested in confirming the Ruvio et al. (2004) OI model, the implications of this model within cold chain 3PL firms and extending the study to include IC. The external environment was not considered within the context of this research. Future research could explore the moderating effect of the external environment on the relationship between OI and IC.

Using the same survey instrument in another industry or obtaining a larger sample size within the cold chain 3PL industry would provide confirmation of the relationships and their significance identified in the current study. Because this research is some of the first to replicate the research using the survey instrument, further research is needed to validate the findings and hone the implications in theory and practice.

In the current study, I observed participants at a single point in time in a specific industry in the US, which might not provide a representative perspective of the relationship between OI and IC. Moreover, I used a perceptual construct to assess IC in cold chain 3PL firms due to a lack of consistent, observable innovation output in the industry, which could have led to common method bias among respondents. Future researchers should include repeated observations of the same respondents over time, which could provide more granular assessment of the climate of a firm and its ability to generate innovation. Longitudinal studies could also reduce the likelihood of common method bias by providing more data points on employee opinions and providing context to the data and how they change over time.

In this research, I focused on cold chain 3PL firms in the U.S. Although the survey respondents were demographically diverse in terms of company, experience, location, time in the

industry, and job title, I did not take into consideration the perspective of cold chain 3PLs outside the U.S. This comparison across countries and cultures could provide deeper understanding of the behaviors, climate, and ability to innovate throughout the global industry. In addition, more research is needed in other industries and countries to further the generalizability of the survey instrument and results.

5.4 Conclusion

Innovation is considered an essential component of a firm's success (Hult et al., 2004b; Tushman, 1997; Wang, 2004). The environment of a firm has been shown to foster innovation (Carvalho et al., 2017), so in this research, I explored the relationship between the innovative environment of a firm and its capacity to innovate. The difficulty in exploring this relationship lies in the lack of agreement on the conceptual definitions and dimensions of OI and IC, along with no consistent way to assess and measure the OI of a firm. The findings from this study show evidence of innovativeness within firm environments and that OI can positively predict a firm's ability to generate innovation. This is important because the findings suggest that the higher the level of OI a firm possesses, the higher its capacity to innovate. These findings contribute to the literature by providing evidence that IC exists within firms and is strengthened through a firm's multidimensional environment for innovation. In practice, firms that want to amplify their IC can assess their environment for innovation using the measurement model confirmed in this study along five dimensions (Creativity, Openness, Risk-taking, Future Orientation, and Proactiveness) to determine areas of focus and enhancement.

APPENDICES

Appendix A: Survey

Table 37. *Innovation Capacity Survey*

Innovation Capacity

Start of Block: SURVEY INSTRUCTION

Start of Block: Informed Consent

Q1 Welcome to the Cold Chain 3PL Innovation Capacity Survey!

Purpose: You are invited to participate in a research study that seeks to understand the influence of culture on an organization's capacity to innovate. You have been chosen for this study because you are a working professional in the United States in a cold storage company. A total of 500 participants will be recruited for this study. Participation will require 15 minutes of your time.

Procedure: If you decide to participate and meet the qualifications for this study, you will complete a 10-minute survey delivered through the Qualtrics survey platform.

Confidentiality Records will be kept private to the extent required by data privacy laws. Dr. Loch, Anna Johnson, and the advisory committee will have access the survey results, which will be password protected. Information may also be shared to the Georgia State University Institutional Review Board, the Office for Human Research Protection (OHRP). You will not be asked for your name or contact information, and we will use "Respondent #" rather than names. Findings will be summarized and reported in group form. You will not be personally identified.

Risks/Benefits: This study will not cause you any consequences or harm. This study will not benefit you individually; yet we hope that the results of this study will benefit the United States

cold storage industry.

Voluntary Participation/Withdrawal: This is a voluntary participation; you can drop out at any time. You may skip questions or stop participating at any time during the survey.

Contact If you have questions or concerns, please contact Dr. Karen Loch at kloch@gsu.edu or Anna Johnson at ajohnson362@student.gsu.edu. If you think you have been harmed by the study or you would like to discuss your rights in this study, please contact Georgia State University Office of Research Integrity at 404-413-3500 or irb@gsu.edu.

Consent: If you agree to all of the above and would like to continue with the survey, please press continue. You have the option of printing this informed consent form for your records.

- ○ I consent, begin the study (1)
- ○ I do not consent; I do not wish to participate (2)

Skip To: End of Survey If Welcome to the Cold Chain 3PL Innovation Capacity Survey! Purpose You are invited to participate... = I do not consent, I do not wish to participate

Q3 My company operates cold storage warehouses located in the United States

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If My company operates cold storage warehouses located in the United States = No

Q4 How many warehouses does your company operate in the United States?

- ○ 0 (1)
- ○ 1-5 (2)
- ○ 6-10 (3)
- ○ 11- 20 (4)
- ○ 21-50 (5)
- ○ 50 or greater (6)
- ○ Unknown (7)

Skip To: End of Survey If How many warehouses does your company operate in the United States? = 0

Q5 In which state is your company’s US headquarters located?

- Alabama - AL (1)
- Alaska - AK (2)
- Arizona - AZ (3)
- Arkansas - AR (4)
- California - CA (5)
- Colorado - CO (6)
- Connecticut - CT (7)
- Delaware - DE (8)
- Florida - FL (9)
- Georgia - GA (10)
- Hawaii - HI (11)
- Idaho - ID (12)
- Illinois - IL (13)
- Indiana - IN (14)
- Iowa - IA (15)
- Kansas - KS (16)
- Kentucky - KY (17)
- Louisiana - LA (18)
- Maine - ME (19)
- Maryland - MD (20)

- Massachusetts - MA (21)
- Michigan - MI (22)
- Minnesota - MN (23)
- Mississippi - MS (24)
- Missouri - MO (25)
- Montana - MT (26)
- Nebraska - NE (27)
- Nevada - NV (28)
- New Hampshire - NH (29)
- New Jersey - NJ (30)
- New Mexico - NM (31)
- New York - NY (32)
- North Carolina - NC (33)
- North Dakota - ND (34)
- Ohio - OH (35)
- Oklahoma - OK (36)
- Oregon - OR (37)
- Pennsylvania - PA (38)
- Rhode Island - RI (39)
- South Carolina - SC (40)
- South Dakota - SD (41)

- ○ Tennessee - TN (42)
- ○ Texas - TX (43)
- ○ Utah - UT (44)
- ○ Vermont - VT (45)
- ○ Virginia - VA (46)
- ○ Washington - WA (47)
- ○ West Virginia - WV (48)
- ○ Wisconsin - WI (49)
- ○ Wyoming – WY (50)
- ○ Other (51) _____

Page Break

Q6 Which title best matches your role within your company'? (Select one.)

- ○ Executive (1)
- ○ Vice President (2)
- ○ Director (3)
- ○ Manager (4)
- ○ Supervisor (5)
- ○ Operator (6)
- ○ Other (7) _____

Q7 Where are you located?

- ○ Headquarters / Corporate Office (1)
- ○ Warehouse / Field (2)
- ○ Other (3) _____

Q8 How long have you been working in the cold storage warehousing industry (years)?

- ○ Less than 6 months (1)
- ○ 6 months to 1 year (2)
- ○ 1-5 years (3)
- ○ 6-10 years (4)
- ○ Over 10 years (5)

Page Break

Q11 The following questions ask you to consider how your organization functions and what behaviors your company values. For each statement below, rate your organization on a scale of 1-7 (1- strongly disagree, 2- disagree, 3-somewhat disagree, 4- neither agree nor disagree, 5- somewhat agree, 6- agree, 7- strongly agree)

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
My company encourages creativity (1)	○	○	○	○	○	○	○
My company expects us to be resourceful problem solvers (2)	○	○	○	○	○	○	○
My company is constantly looking to develop new or improved services (3)	○	○	○	○	○	○	○
In my company, the ability to function creatively is respected by the leadership (4)	○	○	○	○	○	○	○
My company encourages us to use original approaches when dealing with problems (5)	○	○	○	○	○	○	○
My company is always moving toward the development of new answers (6)	○	○	○	○	○	○	○

In my company, assistance in developing new ideas is readily available (7)	○	○	○	○	○	○	○
My company is open and responsive to changes (8)	○	○	○	○	○	○	○
In my company, we are always searching for fresh, new ways of looking at problems (9)	○	○	○	○	○	○	○
My company believes that higher risks are worth taking for high payoffs (10)	○	○	○	○	○	○	○
My company encourages innovative strategies, knowing well that some will fail (11)	○	○	○	○	○	○	○
My company likes to take big risks (12)	○	○	○	○	○	○	○
My company does not like to “play it safe” (13)	○	○	○	○	○	○	○

In my company, we are constantly seeking new opportunities for the organization (14)	○	○	○	○	○	○	○
In my company, we take the initiative in an effort to shape the environment to the organization's advantage (15)	○	○	○	○	○	○	○
In my company, we are often the first to introduce new services (16)	○	○	○	○	○	○	○
In my company, we usually take the initiative by introducing new administrative techniques (17)	○	○	○	○	○	○	○
My company establishes a realistic set of future goals for itself (18)	○	○	○	○	○	○	○

My company effectively ensures that all managers and employees share the same vision of the future (19)	○	○	○	○	○	○	○
My company conveys a clear sense of future direction to employees (20)	○	○	○	○	○	○	○
My company has a realistic vision of the future for all departments and employees (21)	○	○	○	○	○	○	○

Q12 The next set of questions asks you to consider the environment external to your company which includes customers and competitors. For each statement below, rate your organization on a scale of 1-7 (1- strongly disagree, 2- disagree, 3-somewhat disagree, 4- neither agree or disagree, 5- somewhat agree, 6- agree, 7- strongly agree)

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
In our market, customers regularly ask for new products and services (1)	○	○	○	○	○	○	○
In our market, nothing has changed in the past year (2)	○	○	○	○	○	○	○
In our market, the volumes of products and services to be delivered change fast and often (3)	○	○	○	○	○	○	○
Our company has relatively strong competition (4)	○	○	○	○	○	○	○
Competition in our local market is extremely high (5)	○	○	○	○	○	○	○

Price competition is a hallmark of our market (6)	○	○	○	○	○	○	○

Page Break

Q14 The following questions ask you to consider how your organization functions and what it values. For each statement below, rate your organization on a scale of 1-7 (1- strongly disagree, 2- disagree, 3-somewhat disagree, 4- neither agree or disagree, 5- somewhat agree, 6- agree, 7- strongly agree)

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
My company is characterized by teamwork, consensus, and participation (1)	○	○	○	○	○	○	○
My company emphasizes human development. High trust, openness, and participation persist (2)	○	○	○	○	○	○	○
My company shows concern for individuals (3)	○	○	○	○	○	○	○
My company values teamwork (4)	○	○	○	○	○	○	○
My company emphasizes permanence and stability (5)	○	○	○	○	○	○	○
In my company, efficiency, control and smooth operations are important (6)	○	○	○	○	○	○	○
My company values formal policies and procedures (7)	○	○	○	○	○	○	○

My company is characterized by security of employment, conformity, predictability, and stability in relationships (8)	○	○	○	○	○	○	○
My company is characterized by individual risk-taking, innovation, freedom, and uniqueness (9)	○	○	○	○	○	○	○
My company emphasizes acquiring new resources and creating new challenges (10)	○	○	○	○	○	○	○
My company values trying new things and prospecting for opportunities (11)	○	○	○	○	○	○	○
In my company, growth and change are important (12)	○	○	○	○	○	○	○
My company is characterized by hard-driving competitiveness, high demands, and achievement (13)	○	○	○	○	○	○	○
In my company, success and goal accomplishment are emphasized (14)	○	○	○	○	○	○	○

My company values efficiency and quality (15)	○	○	○	○	○	○	○
My company frequently introduces new processes to our organization or industry (16)	○	○	○	○	○	○	○
My company frequently launches new products or services to our organization or industry (17)	○	○	○	○	○	○	○
My company frequently contributes new ideas to our industry (18)	○	○	○	○	○	○	○

Page Break

Q15 What are some of the biggest challenges to innovation in your company?

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Q16 What industry trends will drive innovation in the next three years?

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Q17 What actions would you recommend for your company to be more innovative? What are the current barriers to making that a reality?

_____

_____

_____

_____

_____

End of Block: Informed Consent

Appendix B: Email Permission

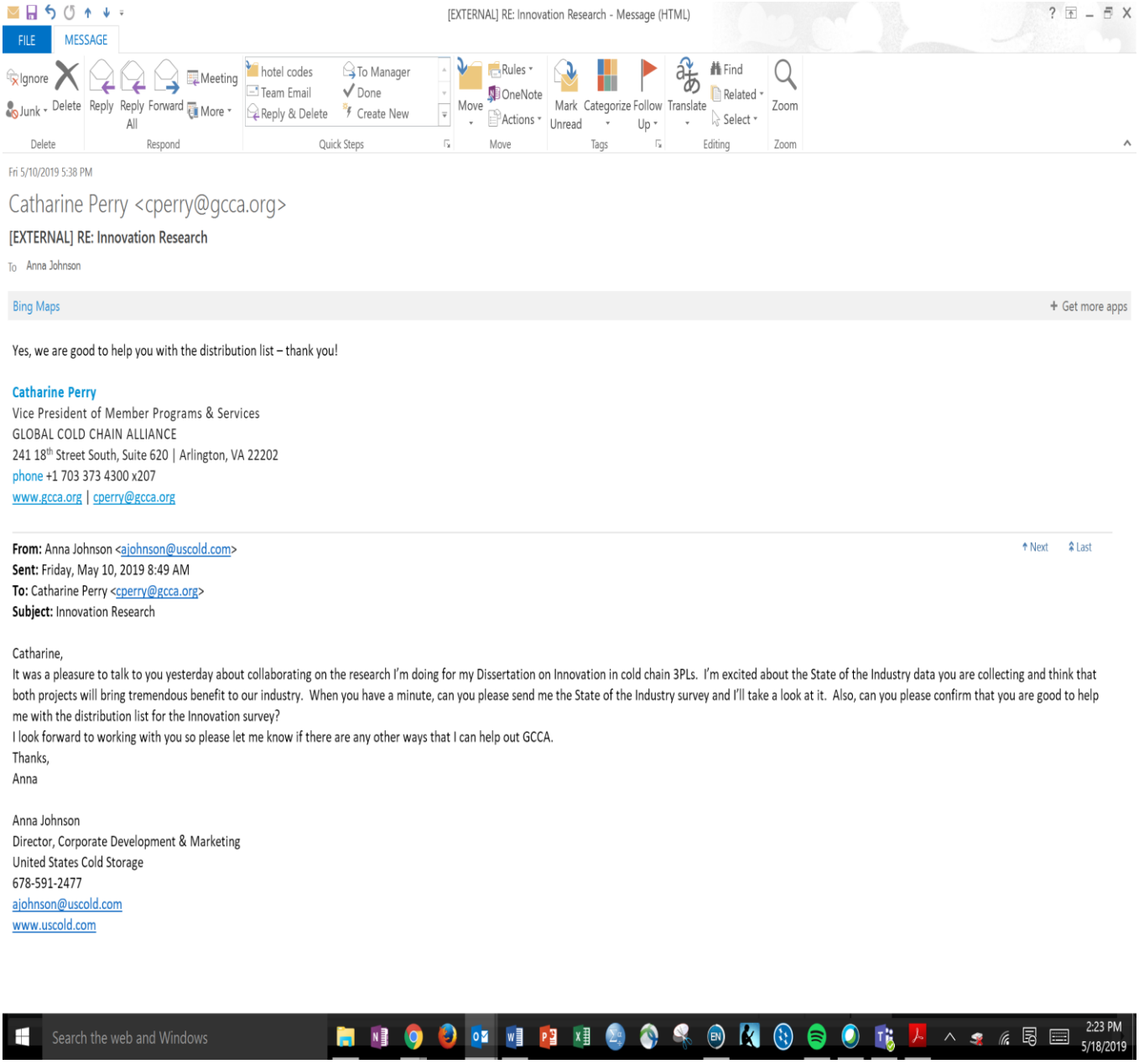

Figure 9. Email Permission.

Appendix C: Email invitation to participate

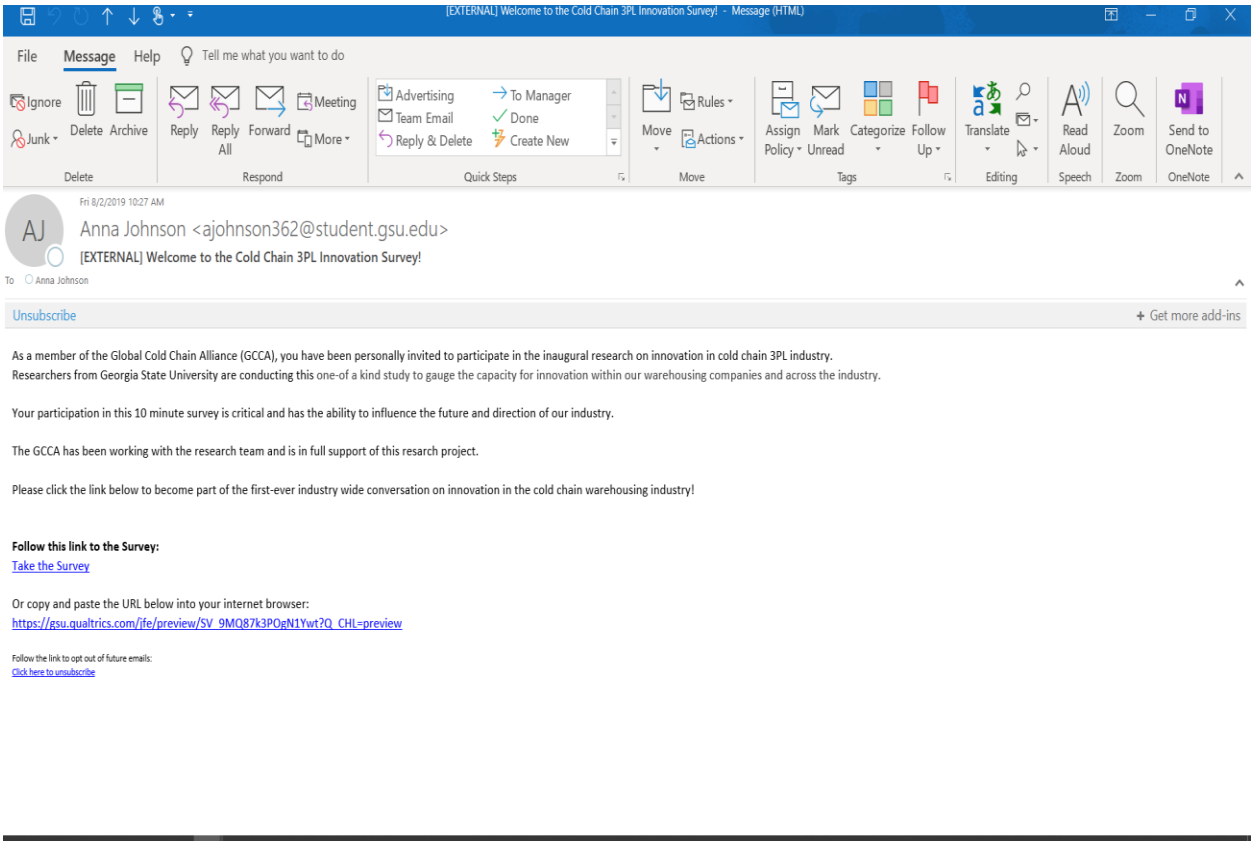

Figure 10. Email invitation to participate.

Appendix D: Descriptive Statistics

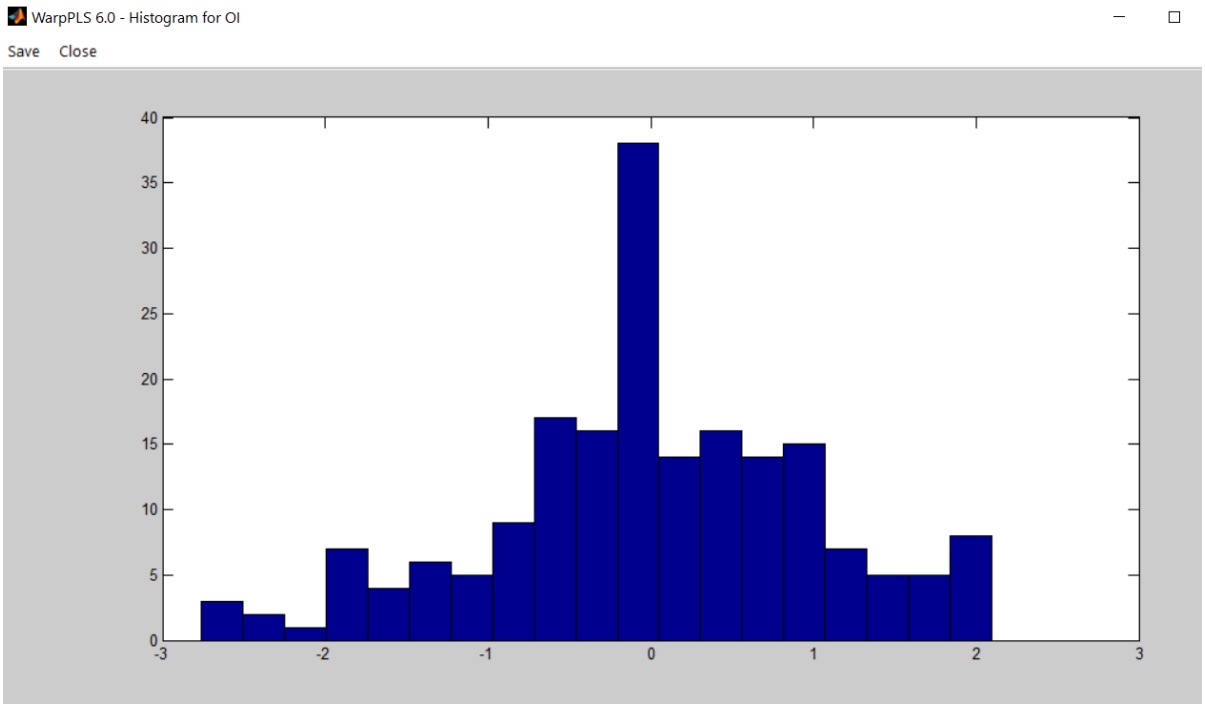

Figure 11. Histogram for OI.

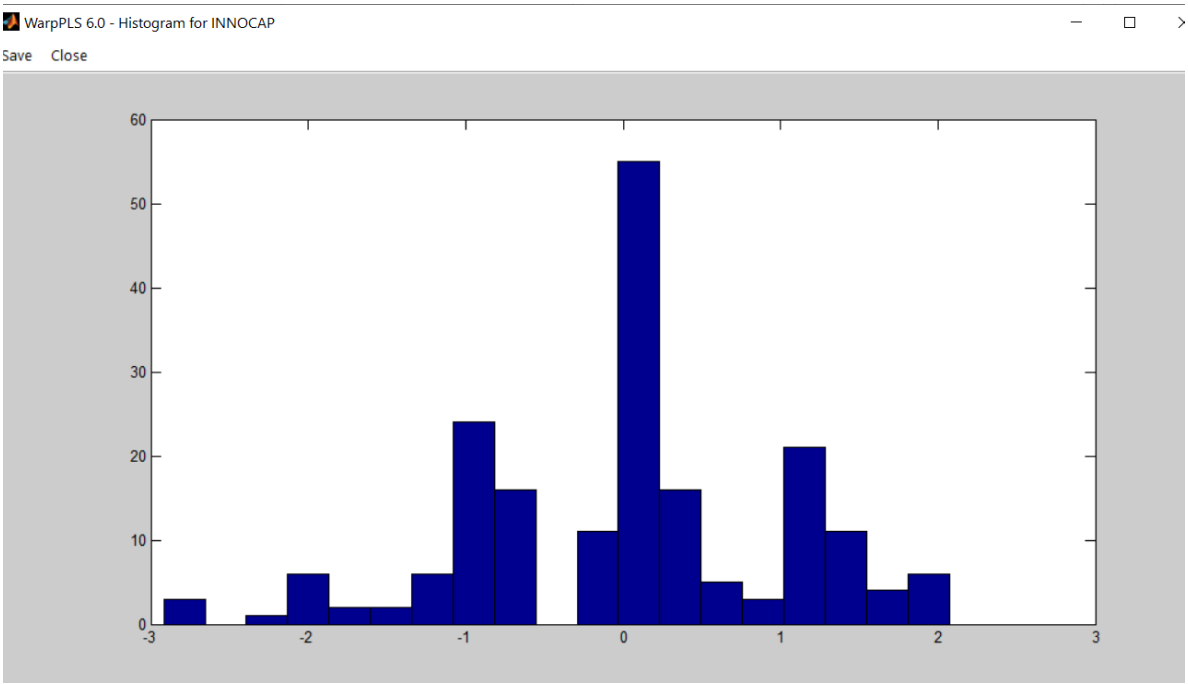

Figure 12. Histogram for IC.

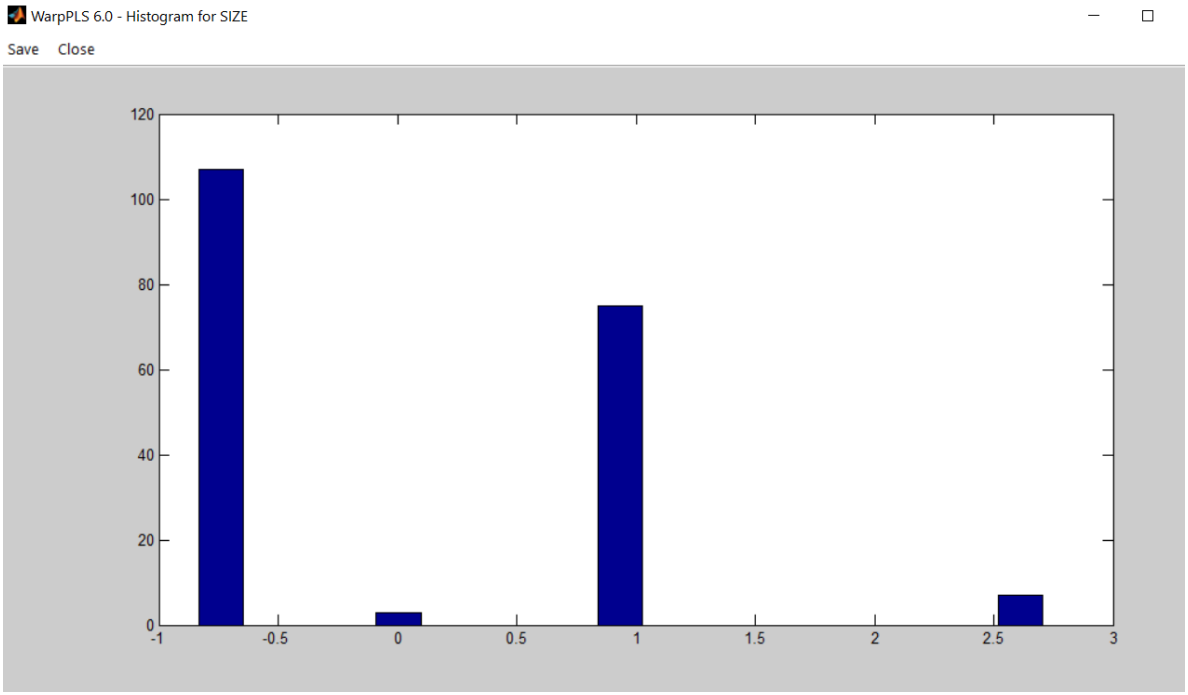

Figure 13. Histogram for Size.

REFERENCES

About the Cold Chain. (2020). Retrieved from https://www.gcca.org/about/about-cold-chain

Alliance, G. C. C. (2017). About the Cold Chain. Retrieved from https://www.gcca.org/about/about-cold-chain

Alliance, G. C. C. (2018). *Cold Chain Customer Research Report*. Retrieved from

Alliance, G. C. C. (2019). IARW GLOBAL TOP 25 LIST OF REFRIGERATED WAREHOUSING AND LOGISTICS PROVIDERS. Retrieved from https://www.gcca.org/about/resources/about-industry/technical-publications/surveys-market-research/iarw-global-top-25

Alliance, T. G. C. C. (2016). 2016 Global Cold Storage Capacity Report. In. http://www.gcca.org.

Brettel, M., Chomik, C., & Flatten, T. C. (2015). How Organizational Culture Influences Innovativeness, Proactiveness, and Risk-Taking: Fostering Entrepreneurial Orientation in SMEs. *Journal of Small Business Management, 53*(4), 868-885. doi:10.1111/jsbm.12108

Brettel, M., & Cleven, N. J. (2011). Innovation Culture, Collaboration with External Partners and NPD Performance. *Creativity & Innovation Management, 20*(4), 253-272. Retrieved from https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=bsu&AN=67196444&site=ehost-live&scope=site&custid=gsu1

Carvalho, G., Cruz, J., Carvalho, H., Duclós, L., & Stankowitz, R. (2017). Innovativeness measures: A bibliometric review and a classification proposal. *International Journal of Innovation Science, 9*, 81-101. doi:10.1108/IJIS-10-2016-0038

Christensen, C. M. (1997). *The Innovator's Dilemma : When New Technologies Cause Great Firms to Fail*. Boston, Mass: Harvard Business Review Press [Perseus]_Legacy.

Christopher, J. M. a. M. (2005). Management development and the supply chain manager of the future. *The International Journal of Logistics Management, 16*(2), 178-191. doi:doi:10.1108/09574090510634494

Dadzie, K., Johnston, W., & Sadchev, H. (2015). Organizational Characteristics and the Adoption of Innovative Warehouse Automation Technologies. In (pp. 581-583).

Damanpour, F., & Gopalakrishnan, S. (2001). The Dynamics of the Adoption of Product and Process Innovations in Organizations. *Journal of Management Studies, 38*(1), 45-65. doi:10.1111/1467-6486.00227

Damanpour, F., Walker, R. M., & Avellaneda, C. N. (2009). Combinative Effects of Innovation Types and Organizational Performance: A Longitudinal Study of Service Organizations. *Journal of Management Studies, 46*(4), 650-675. doi:10.1111/j.1467-6486.2008.00814.x

Daugherty, P. J., Stank, T. P., & Rogers, D. S. (1996, 1996 Spring). Third-party logistics service providers: purchasers' perceptions. *International Journal of Purchasing and Materials Management, 32(2),* 23+. Retrieved from http://link.galegroup.com/apps/doc/A18400173/AONE?u=tamp44898&sid=AONE&xid=78f7cfcc

Davenport, T. H. (1992). Process Innovation: Reengineering Work Through Information Technology (Hardcover). In (pp. 1). Boston, Mass: Harvard Business School Press.

Deepen, J., Goldsby, T., Knemeyer, A., & Wallenburg, C. M. (2008). Beyond Expectations: An Examination of Logistics Outsourcing Goal Achievement and Goal Exceedance. *Journal of Business Logistics, 29,* 75-105. doi:10.1002/j.2158-1592.2008.tb00088.x

Dobni, C. B., & Sand, C. (2018). Strategy shift: Integrating strategy and the firm's capability to innovate. *Business Horizons, 61*(5), 797-808. doi:10.1016/j.bushor.2018.06.002

Doroodian, M., Ab Rahman, M. N., Kamarulzaman, Y., & Norhamidi, M. (2014). Designing and Validating a Model for Measuring Innovation Capacity Construct. *Advances in Decision Sciences, 2014*. doi:http://dx.doi.org/10.1155/2014/576596

Fidel, P., Cervera, A., & Schlesinger, W. (2016). Customer's role in knowledge management and in the innovation process: effects on innovation capacity and marketing results. *Knowledge Management Research & Practice, 14*(2), 195-203. doi:http://dx.doi.org/10.1057/kmrp.2015.19

Gabler, C. B., Richey, R. G., Jr., & Rapp, A. (2015a). Developing an eco-capability through environmental orientation and
organizational innovativeness.

Gabler, C. B., Richey, R. G., & Rapp, A. (2015b). Developing an eco-capability through environmental orientation and organizational innovativeness. *Industrial Marketing Management, 45*, 151-161. doi:https://doi.org/10.1016/j.indmarman.2015.02.014

Gilmore, D. (2017). Supply Chain Comment: Did Walmart's Failed Case Tagging Program Set RFID Back or Move it Forward? Retrieved from http://www.scdigest.com/experts/Gilmore_Impact_Walmart_RFID_Program.php?cid=12273

Gunders, D. (2012). Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill. *Natural Resources Defense Council, IP:12-06-B.*

Hair, J., F., Risher, J., J., Sarstedt, M., & Ringle, C., M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2-24. doi:10.1108/EBR-11-2018-0203

Hartmann, E., & De Grahl, A. (2011). THE FLEXIBILITY OF LOGISTICS SERVICE PROVIDERS AND ITS IMPACT ON CUSTOMER LOYALTY: AN EMPIRICAL STUDY. *Journal of Supply Chain Management, 47*(3), 63-85. Retrieved from https://search.proquest.com/docview/1011483397?accountid=11226 http://galileo-usg-gsu-primo.hosted.exlibrisgroup.com/openurl/GSU/GSU_SP?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aabiglobal&atitle=THE+FLEXIBILITY+OF+LOGISTICS+SERVICE+PROVIDERS+AND+ITS+IMPACT+ON+CUSTOMER+LOYALTY%3A+AN+EMPIRICAL+STUDY&title=Journal+of+Supply+Chain+Management&issn=15232409&date=2011-07-01&volume=47&issue=3&spage=63&au=Hartmann%2C+Evi%3BDe+Grahl%2C+Alexander&isbn=&jtitle=Journal+of+Supply+Chain+Management&btitle=&rft_id=info:eric/&rft_id=info:doi/

Hernandez-Espallardo, M. (2018). Improving firm performance through inter-organizational collaborative innovations: The key mediating role of the employee's job-related attitudes. *Management Decision, 56*(6), 1167-1182. doi:10.1108/MD-02-2017-0151

Herrmann, A., Gassmann, O., & Eisert, U. (2007). An empirical study of the antecedents for radical product innovations and capabilities for transformation. *Journal of Engineering and Technology Management, 24*(1), 92-120. doi:https://doi.org/10.1016/j.jengtecman.2007.01.006

Hertz, S., & Alfredsson, M. (2003). Strategic development of third party logistics providers. *Industrial Marketing Management, 32*(2), 139-149. doi:10.1016/S0019-8501(02)00228-6

Hilletofth, P., & Hilmola, O.-P. (2010). Role of logistics outsourcing on supply chain strategy and management: Survey findings from Northern Europe. *Strategic Outsourcing: An International Journal, 3,* 46-61. doi:10.1108/17538291011023070

Hogan, S. J., & Coote, L. V. (2014). Organizational culture, innovation, and performance: A test of Schein's model. *Journal of Business Research, 67*(8), 1609-1621. doi:10.1016/j.jbusres.2013.09.007

Hoovers, I. (2018). Food Manufacturing Industry Profile. Retrieved from https://www.firstresearch.com/Industry-Research/Food-Manufacturing.html

Hsu, S.-H. (2007). Human Capital, Organizational Learning, Network Resources and Organizational Innovativeness. *Total Quality Management & Business Excellence, 18*(9), 983-998. doi:10.1080/14783360701592208

Hult, G. T. M., Hurley, R. F., & Knight, G. A. (2004a). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management, 33*(5), 429. doi:10.1016/j.indmarman.2003.08.015

Hult, G. T. M., Hurley, R. F., & Knight, G. A. (2004b). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management, 33*(5), 429-438. doi:10.1016/j.indmarman.2003.08.015

Hurley, R. F., & Hult, G. T. M. (1998). Innovation, Market Orientation, and Organizational Learning: An Integration and Empirical Examination. *Journal of Marketing, 62*(3), 42-54. doi:10.2307/1251742

Hurley, R. F., Hult, G. T. M., & Knight, G. A. (2005). Innovativeness and capacity to innovate in a complexity of firm-level relationships: A response to Woodside (2004). *Industrial*

Marketing Management, 34(3), 281-283. doi:https://doi.org/10.1016/j.indmarman.2004.07.006

IBISWorld. (2019). Refrigerated Storage in the US Market Size 2003–2025. Retrieved from https://www.ibisworld.com/industry-statistics/market-size/refrigerated-storage-united-states

Janadari, N., Subramaniam, S., Sri Ramalu, S., & Wei, C. (2016). *Evaluation of Measurement and Structural Model of the Reflective Model Constructs in PLS-SEM*.

Johnson, A., McCurdy, D., Schechter, D., & Loch, K. (2020). *Hot or Cold . . . How Ready are Third Party Logistics Cold Storage Companies to Implement Blockchain?* Paper presented at the Hawaiian International Conference on System Sciences. http://hdl.handle.net/10125/64395

Julián, B., & Camison, C. (2011). The complementary effect of internal learning capacity and absorptive capacity on performance: the mediating role of innovation capacity. *Int. J. of Technology Management, 55*, 56-81. doi:10.1504/IJTM.2011.041680

Kilcarr, S. (2017). Do shippers really desire more innovative freight service? *Fleet Owner Exclusive Insight*, 1. Retrieved from http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=121853542&site=bsi-live&scope=site

Kim, E. (2016, 2018). Internal Amazon documents reveal a vision of up to 2,000 grocery stores across the US. Retrieved from http://www.businessinsider.com/amazon-2000-grocery-stores-10-years-2016-10

Koc, T. (2007). Organizational determinants of innovation capacity in software companies. *Computers & Industrial Engineering*, *53*(3), 373. Retrieved from https://search.proquest.com/docview/213747925?accountid=11226 http://galileo-usg-gsu-primo.hosted.exlibrisgroup.com/openurl/GSU/GSU_SP?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aabiglobal&atitle=Organizational+determinants+of+innovation+capacity+in+software+companies&title=Computers+%26+Industrial+Engineering&issn=03608352&date=2007-10-01&volume=53&issue=3&spage=373&au=Koc%2C+Tufan&isbn=&jtitle=Computers+%26+Industrial+Engineering&btitle=&rft_id=info:eric/&rft_id=info:doi/

Koch, N. (2017). WarpPLS user manual: Version 6.0. In. Laredo, Texas: ScriptWarp System.

Lempert, P. (2018). 10 Food Trends That Will Shape 2018. Retrieved from https://www.forbes.com/sites/phillempert/2017/12/13/10-food-trends-that-will-shape-2018/#77b9ad254104

Leximancer. Leximancer: From words to meaning to insight. Retrieved from https://info.leximancer.com/

Linton, J. D. (2018). Open innovation/integration versus disintermediation/disintegration. *Technovation, 78*, 1-3. doi:10.1016/j.technovation.2018.06.006

Logistics, A. (2018). REITweek Investor Presentation. Retrieved from http://s22.q4cdn.com/562438704/files/doc_presentations/COLD-NAREIT-Investor-Presentation-20180604-Final-(Update).pdf

Ltd, L. P. (2016). Leximancer 4 Manual. Release 4.5. Retrieved from https://info.leximancer.com/

McDermott, C. M., & Stock, G. N. (1999). Organizational culture and advanced manufacturing technology implementation. *Journal of Operations Management, 17*(5), 521-533. doi:10.1016/S0272-6963(99)00008-X

Mercier, S., Villeneuve, S., Mondor, M., & Uysal, I. (2017). Time–Temperature Management Along the Food Cold Chain: A Review of Recent Developments. *Comprehensive Reviews in Food Science and Food Safety, 16*(4), 647-667. doi:10.1111/1541-4337.12269

Moos, B., Beimborn, D., Wagner, H.-T., & Weitzel, T. (2010). *Suggestions for Measuring Organizational Innovativeness: A Review*. Paper presented at the HICSS '10, Proceedings of the 2010 43rd Hawaii International Conference on System Sciences.

Nassauer, S. (2016). Wal-Mart to Acquire Jet.com for $3.3 Billion in Cash, Stock. Retrieved from https://www.wsj.com/articles/wal-mart-to-acquire-jet-com-for-3-3-billion-in-cash-stock-1470659763

Neely, A., & Hii. (2014). The Innovative Capacity of Firms. *Nang Yan Business Journal, 1*. doi:10.2478/nybj-2014-0007

Neely, A., & Hii, J. (1998). *Innovation and Business Performance: A Literature Review*.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: what can be done? *Assessment & evaluation in higher education, 33*(3), 301-314.

O'Reilly, C. A., & Tushman, M. L. (2002). Winning Through Innovation: A Practical Guide to Leading Organizational Change and Renewal. *Harvard Business School Press Books*, 1. Retrieved from http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=88940091&site=bsi-live&scope=site

http://hbr.org/product/a/an/8210-HBK-ENG

Panayides, P. (2006). Enhancing Innovation Capability Through Relationship Management and Implications for Performance. *European Journal of Innovation Management, 9*, 466-483. doi:10.1108/14601060610707876

Prajogo, D. I., & Ahmed, P. K. (2006). Relationships between innovation stimulus, innovation capacity, and innovation performance. *R&D Management, 36*(5), 499-515. doi:10.1111/j.1467-9310.2006.00450.x

Puctait, R., Novelskait, A., Lämsä, A.-m., & Riivari, E. (2016). The Relationship Between Ethical Organisational Culture and Organisational Innovativeness: Comparison of Findings from Finland and Lithuania: JBE JBE. *Journal of Business Ethics, 139*(4), 685-700. doi:http://dx.doi.org/10.1007/s10551-016-3051-8

Richards, G. (2006). Innovation Barriers in Third-party Logistics. 18. Retrieved from https://www.icis.com/explore/resources/news/2006/05/12/2013965/innovation-barriers-in-third-party-logistics/

Riivari, E., Anna-Maija, L., Kujala, J., & Heiskanen, E. (2012). The ethical culture of organisations and organisational innovativeness. *European Journal of Innovation Management, 15*(3), 310-331. doi:http://dx.doi.org/10.1108/14601061211243657

Ruvio, A. A., Shoham, A., Vigoda-Gadot, E., & Schwabsky, N. (2014). Organizational Innovativeness: Construct Development and Cross-Cultural Validation. *Journal of Product Innovation Management, 31*(5), 1004-1022. doi:10.1111/jpim.12141

Salin, V. (2019). *2019 IARW North American Warehouse Employee Turnover Report*. Retrieved from https://www.gcca.org/sites/default/files/2019%20IARW%20Warehouse%20Facility%20Labor%20Turnover%20Survey%20Report%20FINAL_0.pdf:

Saunila, M., & Ukko, J. (2014). Intangible aspects of innovation capability in SMEs: Impacts of size and industry: JET-M JET-M. *Journal of Engineering and Technology Management JET-M*, *33*, 32.

Siegner, C. (2018). 6 major food trends to watch in 2018. Retrieved from https://www.fooddive.com/news/6-major-food-trends-to-watch-in-2018/514333/

Siguaw, J., Simpson, P., & Enz, C. (2006). Conceptualizing Innovation Orientation: A Framework for Study and Integration of Innovation Research*. *Journal of Product Innovation Management*, *23*, 556-574. doi:10.1111/j.1540-5885.2006.00224.x

Silva, M. J. M., Simões, J., Sousa, G., Moreira, J., & Mainardes, E. W. (2014). Determinants of innovation capacity: Empirical evidence from services firms. *Innovation : Management, Policy & Practice*, *16*(3), 404-416. Retrieved from https://search.proquest.com/docview/1636384597?accountid=11226 http://galileo-usg-gsu-primo.hosted.exlibrisgroup.com/openurl/GSU/GSU_SP?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aabiglobal&atitle=Determinants+of+innovation+capacity%3A+Empirical+evidence+from+services+firms&title=Innovation+%3A+Management%2C+Policy+%26+Practice&issn=14479338&date=2014-12-01&volume=16&issue=3&spage=404&au=Silva%2C+Maria+Jose+Madeira%3BSim%C3%B5es%2C+Jorge%3BSousa%2C+Gast%C3%A3o%3BMoreira%2C+Jacinta%3BMainardes%2C+Emerson+Wagner&isbn=&jtitle=Innovation+%3A+Management%2C+Policy+%26+Practice&btitle=&rft_id=info:eric/&rft_id=info:doi/

Sohal, D. P. a. A. (2012). Supply chain professionals: A study of competencies, use of technologies, and future challenges. *International Journal of Operations & Production Management, 33*(11/12), 1532-1554.

Subramanian, A., & Nilakanta, S. (1996). Organizational Innovativeness: Exploring the Relationship Between Organizational Determinants of Innovation, Types of Innovations, and Measures of Organizational Performance. *Omega*, *24*, 631-647. doi:10.1016/S0305-0483(96)00031-X

Szeto, E. (2000). Innovation capacity: working towards a mechanism for improving innovation within an inter-organizational network. *The TQM Magazine, 12*(2), 149. doi:http://dx.doi.org/10.1108/09544780010318415

Tian, M., Deng, P., Zhang, Y., & Salmador, M. (2018). How does culture influence innovation? A systematic literature review. *Management Decision*.

Tushman, M. L. (1997). Winning through innovation. Strategy & Leadership. *Strategy & Leadership, 25(4)*, 14-19.

Ukko, J., & Saunila, M.

Vanhala, M., & Ritala, P. (2016). HRM practices, impersonal trust and organizational innovativeness. *Journal of Managerial Psychology, 31*(1), 95-109. doi:http://dx.doi.org/10.1108/JMP-03-2013-0084

Wallenburg, C. M. (2009). Innovation in Logistics Outsourcing Relationships: Proactive Improvement by Logistics Service Providers as a Driver of Customer Loyalty. *Journal of Supply Chain Management, 45*(2), 75-93.

Wang, C. (2004). The development and validation of the organisational innovativeness construct using confirmatory factor analysis. *European Journal of Innovation Management, 7*(4), 303-313. doi:10.1108/14601060410565056

What Customers Want…and Are Getting…From 3PLs. (2007). *World Trade, 20*(2), 22-22. Retrieved from http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=26600950&site=bsi-live&scope=site

Zammuto, R. F., & O'Connor, E. J. (1992). Gaining Advanced Manufacturing Technologies' Benefits: The Roles of Organziational Design and Culture. *Academy of Management Review, 17*(4), 701-728. doi:10.5465/AMR.1992.4279062

VITA

Anna Johnson is the Director of Corporate Development, Marketing, and the Program Management Office (PMO) at United States Cold Storage where she is the keeper of the culture and cultivator of the company's brand reputation by working across her organization to develop and drive marketing programs that enhance and strengthen customer relationships. Anna facilitates the corporate strategic planning process to broaden her organization's share in the cold chain 3PL industry and oversees the PMO to provide leadership, integration, and management of strategic projects throughout the company.

As a 12-year industry veteran, Anna has robust experience in Business Development, Product Management, IT Solutions, Operations Leadership, and Program Execution. Prior to her work in the cold chain 3PL industry, Anna held management positions at UPS and Arthur Andersen Business Consulting where she focused on developing innovative supply chain solutions for Fortune 500 clients.

Anna is a graduate of the University of Tennessee- Knoxville and received her MBA from Emory University in Atlanta. She also holds a Project Management Professional (PMP) certification and an Executive Doctorate Teaching Certificate from Georgia State University. In addition, she is a graduate of Leadership Buckhead and currently serves as a Board Member for the University of Florida Digital Marketing Certificate Program.

Anna's research includes the conference paper "Hot or Cold . . . How Ready are Third Party Logistics Cold Storage Companies to Implement Blockchain?" published in 2020.