# Hyperlocal Supply Chains: A Case-Based Framework for Establishing and Transitioning to Local Supply Chains

by

Jorge Alejandro Requena
BS in Industrial Engineering, Penn State University, 2016

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Signature of Author: _____
Department of Supply Chain Management
May 9, 2025

Certified by: _____
Dr. Inma Borrella
Research Scientist, Center for Transportation and Logistics
Academic Lead, MITx MicroMasters® Program in Supply Chain Management
Capstone Advisor

Accepted by: _____
Prof. Yossi Sheffi
Director, Center for Transportation and Logistics
Elisha Gray II Professor of Engineering Systems
Professor, Civil and Environmental Engineering

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ABSTRACT

Recent disruptions to global supply chains – from the COVID-19 pandemic to shifting tariff policies – have prompted companies to reevaluate their operational strategies. This capstone provides a practical, evidence-based framework to help organizations build or transition toward more resilient, sustainable, and community-oriented supply chains. Through methodical case study analysis across four critical supply chain segments, this research establishes a foundational framework for implementing hyper-local supply chain operations. The investigation examines nine case studies spanning diverse industries, from fast-casual restaurant chains (Chipotle, Salad and Go) and food and beverage producers (Relocalize, Niagara Bottling) to retailers (Fillogic, Walmart, Amazon) and consumer goods companies (Algramo, Patagonia), to identify patterns in motivations, implementation strategies, challenges, and impacts of localization. The resulting framework defines hyper-locality across three dimensions: geographic proximity (30-400 miles), supply chain segment, and percentage of local operations. This dimensional approach addresses the ambiguity in existing literature regarding what constitutes "local" or "hyper-local" in supply chain contexts. The research further develops a quantitative self-assessment tool enabling organizations to benchmark their hyper-local maturity against industry standards and competitor practices. Key findings demonstrate that localized supply chains deliver substantial environmental benefits (reduced emissions), economic advantages (cost savings), operational improvements (enhanced resilience), and social contributions (community engagement). These benefits vary by industry and supply chain segment, necessitating tailored localization strategies. By integrating GS1 standards with the proposed framework, the capstone provides organizations with a structured methodology for evaluating current operations and developing strategic roadmaps for transitioning to more localized supply chain models in response to evolving market demands.

Capstone Advisor: Dr. Inma Borrella

Title: Research Scientist, Center for Transportation and Logistics

Academic Lead, MITx MicroMasters® Program in Supply Chain Management

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# Table of Contents

# 1 Introduction

## 1.1 Motivation

Given the recent rise in disruptions to global supply chains (for example, the COVID-19 pandemic, the Suez Canal Evergreen blockage, global tariffs), it is time to consider alternatives to traditional linear supply chains. While these linear supply chains were once essential in creating the global economy we have today, evolving customer needs may prompt some companies to re-evaluate their supply chain operations. The shift from in-person to online purchasing, accelerated by these disruptions, has increased the demand for faster service and delivery (Allied Market Research, 2023). Moreover, the growing demand for "green" products and environmentally sustainable practices further highlights how shifting customer expectations are prompting changes that favor more localized support networks. Hyper-local[1] supply chains, which focus on local sourcing, production and delivery of goods to a limited geographic area, may offer a solution for companies willing to adapt.

GS1 US, a not-for-profit identification standards organization, aims to help their industry members uncover supply chain challenges that can leverage standards as part of the solution. It also works with companies to understand changes in the business landscape and helps them adapt their supply chain processes accordingly. To support their members, the Innovation team at GS1 US is investigating a future in which companies may benefit from transitioning to hyper-localized supply chains instead of maintaining their extended, linear operations. Although many companies are intrigued by the concept, it can be difficult to measure and prove the value hyper-local supply chains can provide.

## 1.2 Problem Statement

In the face of uncertainty, most companies may resist adopting a hyper-localized approach to their supply chain operations. For large companies, their initial concern may be that such a shift could diminish the competitive advantage they gain from economies of scale, ultimately impacting their bottom line (Parseghian, 2010). However, when the definition of benefits is expanded, there are significant advantages to transforming the way they operate. These include the potential to reduce capital costs, increase operational agility and flexibility, enhance customer loyalty, and ultimately reap the benefits of running an environmentally conscious business.

By operating locally, supply chain operations may no longer rely solely on mile-long warehouses and lengthy leases for operating space. Companies can run operations from smaller facilities located closer to the end customer, reducing the reliance on extensive fleets of trucks. Additionally, the flexibility of local



[1] "Hyper-local" is hyphenated throughout this document following style guidelines, hyphen is omitted from title to enhance searchability.

operations allows companies to adapt to changes in customer preferences or even population shifts, making it easier to adjust to new markets or relocate if necessary.

Customer loyalty also increases when companies tailor services to meet the specific needs of local customers. This approach can help businesses thrive by focusing on retaining their current customer base. In markets where acquiring new customers is costly (e.g. Manufacturing, Automotive, MedTech), this loyalty offers a major advantage (Farooq, 2024). Additionally, increased sustainability comes from focusing on local markets. Just as there are economic benefits to streamlining operations, there are environmental benefits from reducing the size of transportation networks and shortening the distance between products and end customers. As mentioned earlier, this reduction in transportation can be a key differentiator in attracting and keeping the growing base of environmentally conscious customers.

Ultimately, the challenge lies in determining how a company can establish local supply chain operations and whether they can be convinced this is an operational change worth exploring. To better assist GS1 US and companies interested in this change, this capstone answers the following questions:

1. What are the key components of hyper-localized supply chains?
2. What strategies can companies leverage to localize supply chains?
3. What challenges could they face transitioning to local and operating locally?
4. What are the economic, environmental, operational and social impacts of operating a hyper-localized supply chain and what metrics are used to measure them?
5. How can companies measure “hyper-localization” in their supply chain?

**1.3 Project Outcomes**

The goal of this capstone is to provide GS1 US with a framework they can present to their member partners to inspire them to consider adopting hyper-localized supply chain operations for some or all their business. GS1 US will share this framework with partners interested in exploring a different, local supply chain structure.

The project deliverables also include a self-assessment tool that enables organizations to quantify their hyper-local maturity and benchmark their performance against competitors and industry standards. This evaluation tool allows companies to identify their current position on the hyper-local spectrum and prioritize areas for improvement. Furthermore, the capstone provides evidence-based recommendations and identifies potential challenges for organizations embarking on hyper-local transitions, drawing insights

from multiple case studies of companies that have successfully implemented localized supply chain strategies across various industries and operational segments.

Due to limited data availability, the scope of the project focused on industries with readily accessible public data. The industries evaluated were based on GS1 US's key sectors: pharma and healthcare, apparel and general merchandise, food services and retail grocery. The deliverables to the company include:

1. A framework outlining key components of hyper-localized supply chains
2. A self-assessment tool for companies to evaluate their hyper-local supply chain operations

These deliverables along with GS1 US's existing data standards, will serve as a toolkit for GS1 US to engage companies that may be interested but uncertain about the benefits of hyper-localized supply chains.

# 2 State of the Practice

This section explores the existing literature around hyper-localized supply chains through four critical lenses: defining what qualifies as hyper-local, identifying the key motivators that encourage companies to adopt such models, examining the obstacles to transitioning from global to local supply chains, and highlighting industry examples that demonstrate these concepts in action. This analysis was used to support the capstone's goal of providing GS1 US with a framework to help their partners evaluate and implement hyper-localized supply chains that align with evolving business and consumer needs.

## 2.1 Definition

Local, regional, short, or hyper-local: these terms are all often used to describe supply chains that serve business and customers in a specific region. With no clear definition of each, however, these terms are often used interchangeably. One approach to defining and measuring local supply chains is to look at distances. The US Congress takes this approach and provides the following two definitions of local: "(I) the locality or region in which the final product is marketed, so that the total distance that the product is transported is less than 400 miles from the origin of the product''; or ''(II) the State in which the product is produced'' (U.S. Congress, 2008). Similarly, Smith and Mackinnon (2007) use distance to define local foods; however, they shorten their distance and define local foods as those grown within a 100-mile radius. Although all three definitions use distance to classify supply chains and their products as "local", their definitions vary by a large margin and are inconsistent in how they measure distance.

Perhaps Duerfeldt (2014) puts it best when he states that the geographic component of "local" could be defined by a host of factors including; community, region, state, distance and transportation time as well

as combinations of these. He even introduces the concept of “flexible localism” to demonstrate how the term “local” can vary greatly due to population density differences; local supply chains in rural areas need to travel longer distances to serve customers than those in more dense, urban areas (Duerfeldt, 2014).

As seen above, the definition of hyper-local cannot depend solely on the region or distance that a supply chain serves. To better define hyper-local supply chains, it is important to note that supply chains consist of different segments, some of which could be hyper-local while the others not. Although industry terminology may vary, supply chain operations typically consist of five primary segments: sourcing, production, warehousing, delivery, post-consumer. In their definition of hyper-local, De Chabert-Rios and Deale (2018) focus on the sourcing in a supply chain: “The term hyper-local refers to hyper-local sourcing, referring to foods sourced from the restaurant’s own properties”. This definition maintains the dimension of distance; however it only focuses on the distance for one of the segments of the restaurant’s supply chain. Alternatively, Narashimman (2021) chooses to focus on the delivery segment of a supply chain and explains how the “[h]yper-local delivery model is an on-demand delivery service that focuses on delivering goods from local merchants to customers within a small geographical area”. Once again, this definition focuses on the delivery component of the supply chain, ignoring how the products are sourced, produced or stored. Still, they use the dimension of distance in their definition by calling out the small area where local merchants serve their customers. This new dimension, which allows a focus on individual segments of a supply chain rather than the whole, extends the use of the “hyper-local” label to more supply chain operations while also allowing for a more nuanced estimation of how “hyper-local” a supply chain truly is.

The varying definitions and multiple dimensions of hyper-local supply chains make it challenging to adopt a single definition that applies universally across an entire supply chain. This complexity is compounded by the fact that the definition of “hyper-local” often changes from one industry to another, which likely explains the use of broad or vague language in existing research. Additionally, the majority of the literature focuses on existing “local” supply chains, leaving a noticeable gap regarding supply chains transitioning their operations from global to local or even hyper-local. This leaves questions unanswered as to how business can shift their global operations and how they can measure where they are in their hyper-local journey. This lack of guidance poses a challenge for companies seeking to localize their operations.

For this capstone, understanding this transition is essential, as it will help companies envision the steps needed to become hyper-localized. Equally important is exploring the rationale behind adopting hyper-local supply chains and assessing the impacts of implementing such models.

**2.2 Drivers**

The most prominent motivators for adopting a hyper-localized supply chain approach, as identified in the literature, are customer preferences, operational resilience, and sustainability demands. Although each driver can motivate companies to consider a hyper-localized model, it is important to note that there is ambiguity as to exactly how hyper-localization addresses each of these drivers (Doiron, 2021; Chiaverina et al., 2023).

Customer preferences have been changing in the last decade, pointing towards more local goods and services being provided faster and more conveniently (Narashimman, 2021; Cole, 2023; Campbell et al., 2014; Campbell, 2024). This shift is evident from the expected growth in the global hyper-local services market from $1.5 trillion in 2021 to $5.9 trillion by 2031 (Allied Market Research, 2024). These hyper-local services range from goods like personal items, medicines, groceries to services such as plumbing, lawn care and electrical work, all serving "local" areas (Allied Market Research, 2024). In the US, the USDA, National Agricultural Statistics Service (NASS) estimates there was $9 billion in local food sales in 2020, increasing by $300 million from 2015. Of these, a little less than half, $4.1 billion sales, were done through intermediaries and institutions such as farmers markets and retail grocers. The market's appetite for more local foods has grown and, with it, the potential to attract more customers. Customers have self-reported multiple reasons for wanting local goods, the main reasons being health, quality, sustainability and economics (Doiron, 2021; Martinez, 2010, pg.29). Hyper-local supply chains are uniquely positioned to meet these evolving customer needs by connecting local producers to consumers. In bringing these products closer to consumers, they also reduce the delivery distance and time to provide them the goods and services they need. Hughes and Boys (2015) explain how this practice can increase consumer willingness to pay for local products, thereby driving company sales.

Resiliency became a critical focus during the COVID-19 pandemic and continues to hold importance for supply chain stability. Companies still recovering from the pandemic's effects have had to adopt costly practices like over-stocking inventory to maintain their operations (Colehower, 2023). Just from March to May 2020, Thilmany et al. (2020) estimate a national loss of $1.32B to US local and regional food systems due to the pandemic. Hyper-localized supply chains offer enhanced resiliency through their shorter, leaner supply chain structures. Thilmany et al. (2021) recognize that "…some characteristics inherent to local and regional food systems have permitted LRFS [Local and Regional Food Systems] to be resilient and nimbly respond to the COVID pandemic". Boys and Hughes (2013) introduce the concept of "agglomeration

economies," where firms operating within a smaller region benefit from increased interactions with other businesses, fostering greater information exchange and stronger business relationships. Hyper-localized supply chains take advantage of these agglomeration economies and benefit companies by reducing costs and increasing resiliency all while having a positive impact on the region they serve.

Lastly, sustainability demands are a prevalent driver for getting supply chains to operate more locally. Governments are incentivizing sustainability through regulations ranging from taxes on carbon emissions, such as the EU's proposed Carbon Border Adjustment Mechanism (Shih, 2022) to stimulus programs such as the US's 2014 Farm Bill which provides funds to support local food systems (Martinez, 2016). For the latter, the new bill included an additional $500 million compared to its 2008 predecessor (Martinez, 2016). In Europe, logistics providers are seeing customer and regulatory pressures to reduce their carbon footprint. In the U.S., approximately two-thirds of corporations now tie compensation to environmental, social, and governance (ESG) goals, while the Securities and Exchange Commission works on developing disclosure requirements (Shih, 2022). Although hyper-localized supply chains alone will not eliminate a company's environmental impact, they can significantly reduce the distance and time products travel to reach customers. Pirog (2001) quantifies this reduction by showing how transportation in a conventional supply chain uses 4 to 17 times more fuel and 5 to 17 times more carbon dioxide than that in a local system.

### 2.3 Roadblocks to Transitioning

Despite the benefits, some hurdles can come from changing from global to hyper-local supply chains. As Doiron (2021) states "...the requirements of hyper-local sourcing put maximum strain on grocers in terms of labor cost and supply chain complexity". Some reasons for this added complexity are the limited suppliers in their region, dealing with multiple suppliers (instead of one large one), unreliability with smaller suppliers and overall inconsistencies in product quality (Martinez, 2016).

Dealing with more local suppliers also introduces more complexity for hyper-localized supply chains when it comes to planning. This complexity is due to the introduced variability that comes with dealing with more and smaller providers. Planners need to shorten their planning horizons to keep up with the changes in supply, thereby fundamentally changing how they do their jobs. Grady-Smith and McCourtie (2019) observe: "Because hyper-localization [for customer assortments] changes how planners work, change management is a key factor to success". This concern also affects planners' abilities to fulfill this new demand and is only compounded with greater supplier unreliability.

Still a major obstacle for some customers accessing these foods at places such as farmer's markets is the inconvenience and limited accessibility (Martinez et al, 2010). Although grocery retailers and larger institutions can leverage their scale to overcome this obstacle, they must still address their customers' desire for a wider variety of products at competitive prices (Cole, 2023).

**2.4 Examples by Industry**

The food service and food retail industries have shown significant traction toward adopting hyper-localized supply chains. For example, global brands like Chipotle and Walmart have made notable commitments to increasing their sourcing of local products (De Chabert-Rios and Deale, 2018; Hughes and Boys, 2015). These companies recognize the importance of understanding their customers and have adapted their operations to meet the growing demand for locally sourced goods.

3D printing operations also pose a very interesting approach to shortening supply chains. Braziotis et al. (2019) shares how 3D printers in "standalone configurations" allow aerospace companies to produce the spare parts they need close to their manufacturing operations. Not only is this helpful when these parts are needed in remote places such as outer space, it also significantly shortens the end-to-end supply chain from sourcing to end customer. This 3D technology has even seen applications in the food industry, with companies and consumers being able to print their own foods (Verma et al, 2023). This innovation in how products are sourced and produced fundamentally alters the supply chain by removing unnecessary complexity.

Another example of this concept of eliminating or significantly reducing steps in the supply chain is Relocalize, a company looking to build hyper-localized supply chains by closing the gap between the production and distribution points. They have focused on building ice producing micro-factories closer to the grocery and convenient stores they serve. In doing so they meet their goal of "eliminating inefficient steps in supply chains" (Relocalize, 2024).

In retail, we see some companies using some novel approaches to adopt hyper-local deliveries. Fillogic, for example, collaborates with retailers to streamline last-mile delivery by repurposing unused mall space into "micro distribution hubs" located closer to consumers (Michel, 2021). Another is start-up Almagro, which provides household goods such as detergents and cleaners in different stations where customers refill their reusable containers (Algramo, 2022a). By strategically placing these refill stations close to their customers, Algramo are fulfilling demand in each region while reducing transportation distances to their customers.

Beyond large corporations, smaller-scale initiatives also illustrate the diverse ways hyper-local supply chains are being implemented. Maryanne Hedrick started mypersonalfarmers.com to connect food service operators to farmers and artisan producers. The site expanded restaurants' access to locally produced goods by coordinating and delivering orders from local producers right to the customer's door (De Chabert-Rios and Deale, 2018). Similarly, Mad River Community Hospital in California grows fresh produce in its own vegetable garden, to supply its café with hyper-local ingredients (De Chabert-Rios and Deale, 2018). De Chabert-Rios and Deale (2018) also went deeper and conducted interviews and built case studies for three restaurants in southeastern US which use hyper-local sourcing practices by growing crops in their own farmlands.

These examples collectively demonstrate how hyper-localized supply chains can operate at different scales, from multinational corporations to community-focused initiatives, addressing customer demand for local products and fostering sustainability.

# 3 Methodology

The methodology section provides an overview of the how case studies were developed along with how these cases informed the framework and self-assessment tool. These dimensions currently include distance/region and different supply chain segments. To refine the proposed framework, I employed a case study methodology, focusing on examining real-world examples of hyper-local supply chains to understand their operations, interrelations, and impacts. The methodology used a tailored approach using some of Yin's (2014) proposed elements: (1) establish research questions, (2) identifying cases, (3) linking cases to research questions and (4) analyzing aggregated findings.

## 3.1 Case Study Selection

The selection process for case studies began by identifying companies or initiatives that demonstrated hyper-local supply chain practices in one or more dimensions of the framework. To ensure a diverse and meaningful set of examples, the following selection criteria was used:

1. Geographic proximity or local impact: Organizations with a clear focus on reducing supply chain distances or serving a defined regional area.
2. Industry diversity: Case studies covering a range of industries (e.g., food, manufacturing, and retail) to explore different implementations of hyper-local practices.
3. Availability of data: Companies with accessible publicly available data, or a willingness to participate in interviews, will be prioritized.

4. Scale of operations: A mix of small-scale, medium, and large enterprises was included to highlight diverse approaches and challenges.

The target was to have two to three case studies per supply chain segment, ensuring sufficient depth for analysis while maintaining feasibility. Final case studies shown in Figure 1.

Figure 1. Supply chain segments with industry examples of hyper-locality


### 3.2 Data Collection and Analysis

Due the nascency of the topic, the case study methodology primarily relied on qualitative data. However, it incorporated quantitative elements where feasible. Sources of data included:

- Primary sources such as company reports, press releases, and company websites.
- Secondary sources such as academic papers, articles and industry analyses.
- Interviews with current and former key stakeholders

The analysis involved coding and thematic analysis to identify patterns and align findings with the dimensions of the proposed framework. I also used Yin's (2014) guidelines for linking case studies to research questions and assessing the validity and reliability of findings.

### 3.3 Contribution to Framework and Self-Assessment Tool

The insights gained from the literature review and case studies informed the development of the framework, ensuring it was grounded in practical, real-world examples. The framework was built and refined to present a clear definition of hyper-localized supply chains as well as provide companies with guidance on how and why they should implement local supply chain operations themselves. The elements of motivation, strategy, challenges and impacts were developed by extracting common themes and insights seen across

multiple companies. These insights allowed for a broad framework, applicable across supply chain segments and multiple industries. Similarly, the self-assessment tool was developed using real life distances and local supply chain practices found in the research to provide companies a way to evaluate their local supply chain operations. This data informed the calculations in the tool, ensuring it accurately captures supply chain processes and current local operations.

# 4 Case Studies

The following sections will present and analyze examples of companies with local supply chain operations, focusing on sourcing, production, distribution and post-consumer recycling and repairing. Each section will consist of 2-3 case studies with companies in different stages of maturity to show the motivation, strategy, challenges and impacts associated to their local operations.

## 4.1 Local Sourcing: Case Studies on Chipotle Mexican Grill and Salad and Go

Local sourcing has become a key strategic focus for major companies aiming to bolster supply chain resilience while meeting sustainability objectives. This case study explores how two fast-casual restaurant chains—Chipotle Mexican Grill and Salad and Go—have adopted localized procurement practices to enhance traceability, reduce environmental impact, and meet consumer demand for transparency. By examining their operational frameworks, challenges, and outcomes, we see that the definition of “local” and “hyper-local” varies widely, making it difficult to quantify these concepts universally.

**Company Background and Current Local Supply Chain Operations**

Chipotle Mexican Grill, founded in 1993, has grown into a fast-casual chain with more than 3,000 locations. Their core philosophy, “Food With Integrity,” emphasizes sourcing local and organic ingredients whenever possible. The company defines “local” as ingredients procured within 350 miles of their distribution centers. In 2020, Chipotle sourced 31 million pounds of local produce, which represented around 11% of their total produce spend at the time (Brown, 2021). According to their latest sustainability report, this figure increased to 40 million pounds (Chipotle, n.d.), highlighting Chipotle’s ongoing commitment to local sourcing. To support this effort, the company’s Cultivate Foundation offers grants to farmers to help them transition to organic and sustainable practices.

Salad and Go, launched in 2013, operates a drive-thru-focused model that prioritizes affordability and hyper-local sourcing. The company runs two central kitchens, located in Phoenix and Dallas, to streamline preparation and distribution. From their inception, Salad and Go was guided by a founder-led vision that

emphasizes sourcing ingredients close to each kitchen. Per Mike Fabrizio, an ex-Salad and Go employee in the Food Safety and Procurement department, romaine lettuce is typically sourced within 20–24 miles of the Phoenix facility, and milk is acquired within 40 miles of the Dallas kitchen (personal communication, February 25, 2025). However, as the company expands, certain compromises have been necessary. Tortillas that only travelled 15 miles to Salad and Go's Phoenix facility, now travel over 1,000 miles to reach Dallas, indicating a divergence from the original hyper-local vision in favor of practical operational needs.

**Motivations for Localizing Supply Chains**

Both Chipotle and Salad and Go consider food safety and quality control the primary drivers of their local sourcing initiatives. In addition, both chains must comply with strict regulatory requirements, including FSMA 204, which mandates more rigorous traceability measures—such as implementing Traceability Lot Code sourcing—by late 2028 (Trustwell, n.d.). Beyond these shared concerns, they differ slightly in their secondary motivations for local sourcing. Chipotle's sustainability reports emphasize the goal of reducing transportation emissions and supporting local communities (Chipotle, n.d.). In contrast, Salad and Go prioritizes culinary objectives and marketing differentiation. According to the executive chef, stringent freshness metrics were introduced to ensure a high-quality product, achievable only through partnerships with nearby farms (M. Fabrizio, personal communication, February 25, 2025). This emphasis on local relationships also aligns with the company's founding mission in Phoenix, which sought to foster community ties and source ingredients locally whenever possible (Amato-McCoy, 2023).

**Journey to Localization**

Chipotle and Salad and Go employ distinct operational frameworks shaped by their scale, market positioning, and brand promises. Chipotle's approach is heavily influenced by their Cultivate Foundation, which offers grants to help farmers adopt organic practices. The company maintains an extensive network of regional suppliers and distribution centers equipped with advanced technology for tracking and compliance, including GS1 US labeling and RFID sensors.

Salad and Go, being a younger and smaller chain, adopts a more pragmatic approach. In Phoenix, for instance, the company can purchase lemon juice in bulk from a supplier located just 15 miles away, while the Dallas location procures smaller quantities due to the higher transportation costs and more limited supplier options (M. Fabrizio, personal communication, February 25, 2025). When hyper-local sourcing is not feasible, the restaurant chain adjusts recipes. This reality is evident in the decision to ship tortillas for Dallas locations from Phoenix, reflecting the practical challenges of meeting hyper-local ideals at scale.

**Impacts of Local Supply Chains**

Local sourcing initiatives offer clear benefits while also introducing logistical and financial complexities. For instance, Chipotle's adoption of GS1 US labeling and comprehensive supplier training incurs an annual cost of approximately $2.3 million. However, these investments have enabled the company to save an estimated $18 million each year by reducing recall-related expenses per Mike Fabrizio who also worked in Supply Chain Compliance at Chipotle (personal communication, February 25, 2025). After facing significant food safety incidents in 2015, Chipotle committed tens of millions of dollars to enhancing their traceability systems. These improvements, which include enabling batch-level tracking, have led to a 68% reduction in recall response times (M. Fabrizio, personal communication, February 25, 2025).

Salad and Go similarly benefits from reduced spoilage, thanks to shorter travel times for locally sourced products. Nevertheless, Mike Fabrizio (personal communication, February 25, 2025) notes that sourcing process is not uniform across the chain's two central kitchens. Products like lettuce and lemonade exhibit different shelf lives depending on their proximity to the respective central kitchen or drive-thru location they serve. As the company expanded into their Dallas central kitchen, maintaining the same level of local sourcing proved challenging. Although Salad and Go attempted to onboard more local suppliers, the effort has not always been successful due to reliability concerns. As a result, the company has had to rely on their Phoenix suppliers for the Dallas operations, despite the long transportation distances involved. This reliance has led to higher logistics costs in Dallas due to a more fragmented network of regional suppliers (M. Fabrizio, personal communication, February 25, 2025).

**Measuring Success & Future Outlook**

Chipotle measures their success by closely tracking the local sourcing targets outlined in their annual sustainability report (Chipotle, n.d.). The company has taken their commitment a step further by tying executive compensation to these local sourcing and broader sustainability goals, a move implemented in 2023 (Segal, 2023). Looking ahead, Chipotle intends to continue expanding their local food sourcing initiatives, as they have done every year. To further engage their customers, Chipotle has introduced the Real Foodprint tool (see Appendix figure A1), which allows consumers to see the environmental impact of their orders and understand how the company's local sourcing efforts are reducing that impact (Chipotle, n.d.).

Salad and Go, on the other hand, monitors the mileage associated with each ingredient category as a key performance indicator (M. Fabrizio, personal communication, February 25, 2025). One of their specific objectives is to reduce the distance that tortillas, lettuce, and spices travel for their Dallas location by forging

partnerships with suppliers located closer to their Dallas central kitchen. Additionally, the company plans to pilot regional soup production hubs within 10 miles of both their Phoenix and Dallas kitchens. According to Mike Fabrizio, the critical takeaway is finding the right balance between idealism and practicality. In some cases, shipping tortillas 1,000 miles remains necessary to maintain business viability while local alternatives are developed (M. Fabrizio, personal communication, February 25, 2025).

**Key Takeaways**

Chipotle Mexican Grill and Salad and Go represent two companies with different levels of maturity that have distinctive yet complementary approaches to local sourcing. Their experiences highlight the complexities involved in defining "local," as well as the operational and financial trade-offs inherent in adopting such strategies. Similar challenges are evident in the supermarket sector, where companies like Walmart and Meijer set different criteria for local suppliers—Walmart favoring U.S.-based sources and Meijer focusing on those in the Midwest (Walmart, 2024; Redman, 2022b).

As consumer demand for transparency grows and supply chain disruptions continue to challenge the industry, an increasing number of food companies are integrating local sourcing into their core operations. These case studies illustrate that local procurement has evolved from being merely a marketing tool into a fundamental component of both resilience and sustainability.

### 4.2 Local Production: Case Studies on Relocalize and Niagara Bottling

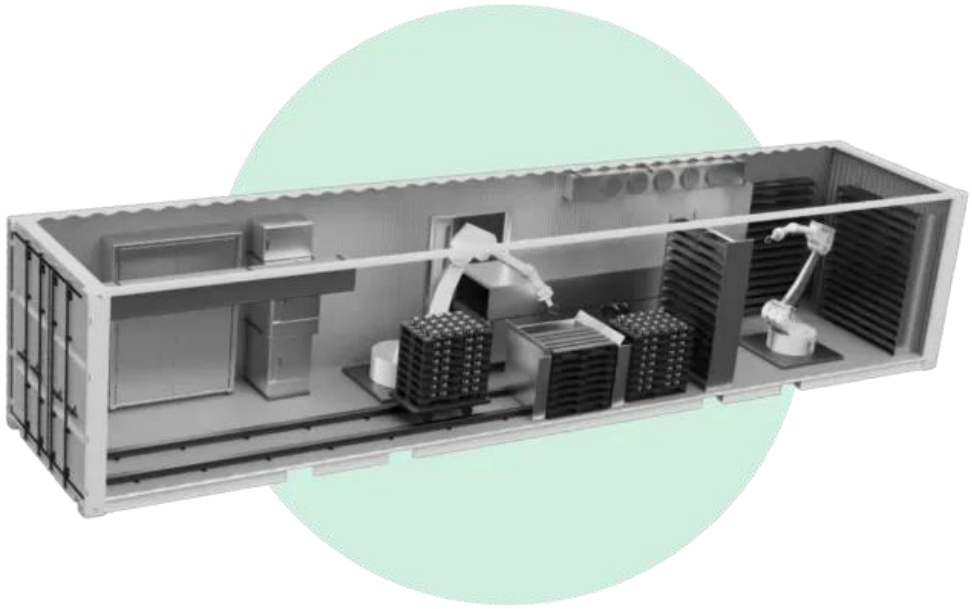
Local manufacturing offers companies that own their production facilities greater operational control while delivering multiple strategic benefits. By establishing manufacturing hubs closer to end consumers, organizations can reduce environmental impact, enhance supply chain resilience, and lower overall costs. Unlike centralized production models, localized manufacturing leverages micro-factories or regional facilities strategically positioned near demand centers. The following case studies examine two innovators in this space: Relocalize, which deploys autonomous micro-factories for ice production, and Niagara Bottling, a leader in regionalized beverage manufacturing. Both companies exemplify how localized production can align profitability with sustainability while addressing modern supply chain challenges.

**Company Background and Current Local Supply Chain Operations**

Founded in 2020, Relocalize disrupted traditional ice production by installing autonomous micro-factories (see Figure 2) at grocery distribution centers. They partner with grocers to install and operate micro-factory units that produce a premium ice product, on-demand and on-premise allowing for the elimination

of middle-mile transportation (Relocalize, 2024). Relocalize have proven their business model via a successful pilot with Southeastern Grocers showing that their approach to hyper-localization is economically and operationally feasible while reducing up to 90% of transportation CO2 emissions (Mohan, 2023). Relocalize use their local presence to eliminate the transport time, planning and emissions between them as ice producers and the grocers who purchase the ice.

Figure 2. Rendering of Relocalize's ice-producing micro-factory unit (Relocalize, n.d.)



Niagara Bottling, established in 1963, is a large family-owned company that operates over 30 regional bottling plants across the U.S., each serving a section of the country. Niagara partners with beverage brands and retailer stores to provide high quality and affordable beverages. Though known for their water products, they produce a larger group of beverages such as flavored drinks, teas and ready-to-drink coffee. By localizing production in strategic regions, Niagara is able to leverage their ample network to reduce transportation distances for their products.

**Motivations for Localizing Supply Chains**

Both companies have embraced local production for a variety of strategic reasons. For Relocalize, sustainability is a primary driver. Their company website highlights that food production is responsible for

37% of global greenhouse gas emissions, with more than 48% of food being wasted (Niagara Bottling, n.d.-b). Relocalize believes that their innovative approach to micro-factories can help address a portion of these critical issues by embedding ice-making operations directly within their customers' facilities. This strategy effectively removes the middle-mile transportation typically required for product delivery, thereby significantly reducing both emissions and waste. According to Gordon So, the Sustainability & Business Development Manager at Relocalize, the regulatory push for supermarket chains to report their scope 3 emissions from suppliers presents a substantial opportunity (personal communication, February 28, 2025). By offering a service with lower emissions than traditional ice producers, Relocalize is able to entice customers with a product that is not only price competitive but also carries a much smaller carbon footprint.

In contrast, while Niagara Bottling is also committed to environmental stewardship, their primary motivation for localizing production lies in the cost reduction opportunities it presents. By operating a network of regional plants, Niagara Bottling leverages their deep logistics expertise to optimize supply chain expenses (Niagara Bottling, n.d.-c). This approach is particularly significant in the bottled water industry, where the product is relatively inexpensive ($1.44 per the International Bottled Water Association (n.d.)) but inherently heavy. Minimizing the distance between production facilities and retail endpoints allows Niagara Bottling to keep transportation costs low, ensuring that they remain competitive while meeting the demand from grocers, supermarkets, and other retailers.

**Journey to Localization**

Although Relocalize is inherently a hyper-localized production company, their journey has focused on forming partnerships with grocers. During their pilot phase, Relocalize collaborated with Southeastern Grocers to test the viability of their micro-factory concept. While the project implementation was executed successfully, Gordon So explained that obtaining pilot approval required extensive coordination across multiple departments. Once the necessary approvals were secured, Relocalize was allocated around 1,000-square-foot of outdoor space with access to water and electricity to start delivering supplies to Southeastern Grocers (personal communication, February 28, 2025). This initial success has paved the way for the next phase, during which Relocalize plans to deploy next-generation micro-factories with increased production capacity.

In contrast, while the exact starting point of Niagara Bottling's journey toward decentralization remains unclear, the company's expansion over the past years continues to support their local manufacturing efforts. Since 2018, Niagara Bottling has opened or expanded 10 locations (Niagara Bottling, n.d.-c). This

strategic shift has reduced the average delivery distance by hundreds of miles, thereby lowering transportation costs and emissions considerably. This expansion has been bolstered by Niagara Bottling's investments in advanced technology and vertical integration. By incorporating automated bottling lines, lightweight packaging solutions, and integrated processes for injecting, filling, and labeling, the company has further enhanced their production efficiency and supported their localization efforts (Niagara Bottling, n.d.-a).

**Impacts of Local Supply Chains**

The localized production strategies of both companies have resulted in measurable benefits. Relocalize's elimination of middle-mile logistics has led to a 90% reduction in transportation emissions, drastically lowering the environmental impact associated with their operations (Mohan, 2023). To measure the environmental improvements at the product level, Relocalize is currently working with third-party climate experts on a greenhouse gas emissions report covering the entire product life cycle (S. Gordon, personal communication, February 28, 2025). Retailers working with Relocalize have also reaped economic benefits, including a 30% reduction in costs attributed to the elimination of several logistics' steps, reduced warehousing needs, and minimal product loss. Additionally, the company emphasizes the enhanced operational resilience achieved through the dedicated on-site production of their micro-factories (Mohan, 2023).

For Niagara Bottling, their regional model has led to a 70% reduction in their "average length of haul" since 2009, as noted in their 2024 Water Quality Report. Although this reduction in transportation is not solely responsible for the total decrease in greenhouse gas emissions, it plays a significant role. The strategic placement of Niagara Bottling's plants has not only minimized transportation distances but also reduced the company's reliance on extended supply chains, thereby bolstering their operational resilience. Furthermore, Niagara Bottling measures their impact on local economies where their factories are located. On average, these facilities contribute approximately $12 million in annual earnings to the local economy, support over 180 local jobs, and generate an additional $1 million in local taxes (Niagara Bottling, n.d.-c).

**Measuring Success & Future Outlook**

Relocalize has established several internal key performance indicators (KPIs) to assess the success of their localized production model, particularly in terms of emissions reduction. However, as Gordon So noted, these figures remain internal for now (personal communication, February 28, 2025). While not publicly disclosed, Relocalize shares these metrics with their clients to demonstrate the environmental and economic

benefits of their micro-factories. For the company, the primary focus moving forward is expanding the deployment of their micro-factories, which they are expecting will be aided by the completion of the next generation of these units. For now, Relocalize is scaling up their presence within Southeastern Grocers, with potential expansions into other North American grocery chains. Looking ahead, the company plans to diversify into new product categories, such as food products and drinks, while maintaining their hyper-local, micro-factory-driven model. Due to the nature of their business model, So believes that growth will not compromise Relocalize's commitment to working locally.

Similarly, Niagara Bottling also appears to keep most of their operational metrics internal. However, the company consistently reports on their greenhouse gas (GHG) emissions and the various initiatives undertaken to mitigate them. Given Niagara Bottling's extensive presence across the U.S., it is likely that the company tracks the geographic reach of each bottling facility, though no specific data was available at the time of writing. What is clear is that Niagara remains committed to expansion, with two large manufacturing facilities planned for 2025 in Florida and Kentucky (Samora, 2024). The Kentucky facility, a $130 million plant, is strategically located within Elsmere's logistics center, offering proximity to an international airport, major highways, and a key logistics hub (Samora, 2024). This continued investment in regional production infrastructure suggests that Niagara Bottling will further reinforce their localized supply chain strategy in the years to come.

**Key Takeaways**

Local manufacturing represents a fundamental shift in supply chain strategy, as demonstrated by both Relocalize and Niagara Bottling. These companies show that producing goods close to end consumers not only reduces environmental impacts by cutting transportation emissions and minimizing waste, but also enhances overall operational resilience and lowers costs. Relocalize's hyper-local model, which embeds micro-factories directly within grocery facilities, offers a clear example of how reducing the middle mile can significantly diminish greenhouse gas emissions and logistics expenses. Similarly, Niagara Bottling's regional approach leverages their network of plants and advanced technologies to minimize delivery distances, improve efficiency, and drive substantial economic benefits for local communities.

### 4.3 Local Distribution: Case Studies on Fillogic's Micro-Logistic Centers and Micro-Fulfillment Centers at Walmart and Amazon

Local distribution is a strategic approach where retailers position inventory closer to consumers, improving delivery speed while optimizing operational efficiency. Companies like Fillogic transform unused mall spaces into tech-enabled logistics hubs, while Amazon and Walmart implement micro-fulfillment centers within or adjacent to their existing retail locations. Though challenges exist in implementation—including space constraints and technology integration costs—the potential benefits of local distribution are substantial: reduced delivery times, cost savings on fulfillment operations, lower carbon emissions from shorter transportation routes, and enhanced inventory management across channels. The following case studies examine how these companies leverage different local distribution strategies to meet rising consumer expectations for rapid delivery while maintaining competitive advantages in an increasingly changing retail environment.

**Company Background and Current Local Supply Chain Operations**

Fillogic, a logistics-as-a-service company in New York, provides retailers shipping services to get products to customers by locating micro-logistic hubs in vacant retail space close to those customers. Since their start in 2018, they have partnered with major U.S. mall owners to establish 6 hub locations and working on establishing 25 more locations in the US (Fillogic, n.d.-b). Fillogic provide retailers, brands and e-commerce companies the technology they need to fulfill their customer orders while ensuring visibility of their inventory across all channels. Most recently they have established partnerships with reverse-logistics companies Loop Returns and Narvar to optimize the product returns process for the retailers they serve.

Micro-fulfillment centers (MFCs) have been one of many approaches companies have taken to meet customers' fast delivery expectations. Unlike Fillogic's hubs, MFCs are often automated facilities, operated by inventory owners and configured either as store-integrated or stand-alone units for fulfilling online orders. Dr. Eva Ponce, Director for MIT Omnichannel Strategies Lab, shares how they can be found across multiple retail industries with notable companies Walmart and Amazon (personal communication, April 3, 2025). Walmart tested their first MFC in 2019 and have since built multiple automated MFCs inside their stores to ensure they are able to handle increased online order volumes (Redman, 2022a). Similarly, Amazon's automated MFC operations for groceries from their Whole Foods supermarkets but have now expanded to other Amazon.com and Amazon Fresh products (Inklebarger, 2024).

**Motivations for Localizing Supply Chains**

Fillogic's motivation for localizing fulfillment stems from both operational necessity and market opportunity. The company recognized that modern consumers have increasingly high expectations for rapid fulfillment options, while traditional retail spaces were becoming underutilized. This created an ideal opportunity to transform "excess space in malls/retail centers into fully functional, channel-free local market logistics hubs" (Fillogic, n.d.-c). These strategically positioned mall-based hubs enable Fillogic to reduce last-mile delivery costs significantly while ensuring client orders are fulfilled faster (Fillogic, n.d.-a). Whether orders are shipped directly from or picked up at Fillogic's fulfillment hubs, proximity to end customers remains the cornerstone of their operational model and competitive advantage.

Much like Fillogic's micro-logistics hubs, micro-fulfillment facilities capitalize on their proximity to the final consumer to ensure fast deliveries. For companies with large customer bases, localized fulfillment is essential to meeting tight delivery windows—whether two-hour or same-day—as demand for speed intensifies (E. Ponce, personal communication, April 3, 2025). For Walmart, MFCs complement their sprawling network of stores (90% of Americans live within 10 miles of a Walmart store) to build a last-mile strategy that can reach more customers. (Redman, 2022a; Walmart, n.d.). By pairing prime store locations with automated MFCs, the retailer achieves cost-efficient demand fulfillment while maintaining rapid service (Ponce, 2023).

**Journey to Localization**

Fillogic's strategy is built on its ability to transform underutilized mall spaces into tech-enabled micro-logistics hubs. By partnering with six major American mall owners, including Simon Property Group, Brookfield, Macerich, and Tanger Outlets, Fillogic has gained access to over 450 locations nationwide, many in densely populated areas (Daleo, 2021). One such location is Tanger's Deer Park, NY outlet, where Fillogic offers same-day deliveries within a 15-mile radius (Moin, 2021). For Tanger, the partnership allows them to provide deliveries for new items such as furniture while also offering logistics services for returns (Moin, 2021). As Fillogic continues to expand, these types of partnerships will be essential for maintaining proximity to customers. Distinguishing themselves from traditional micro-fulfillment models, Fillogic hubs deliberately avoid automation, granting them remarkable flexibility to process e-commerce orders of all shapes and sizes. For example, their 4,000-square-foot hub in New Jersey demonstrates this capability by efficiently completing 1,700 orders in a single day (Daleo, 2021). This low-automation approach highlights Fillogic's

ability to deliver localized fulfillment solutions quickly and cost-effectively while leveraging existing infrastructure.

In contrast to Fillogic's low-automation model, micro-fulfillment centers (MFCs) have emerged as a strategic response to growing e-commerce volumes due to their superior operational speed and efficiency (Ponce, 2021). To achieve this accelerated fulfillment capability, MFCs typically require sophisticated automation systems that involve substantial capital investments. These investments can range from $3-5 million (Tobias, n.d.) to $50-100 million—depending on the size of the MFC and the complexity of the automated solution (E. Ponce, personal communication, April 3, 2025). As Dr. Ponce points out, companies must analyze their order volumes and operational needs carefully to determine whether MFCs align with their overall strategy (personal communication, April 3, 2025).

For Walmart and Amazon, both companies began their journey toward MFC adoption by running pilots at single stores to test automated solutions. Walmart has tested technologies from providers such as Fabric, Alert Innovation, and Dematic across their pilots (Redman, 2022a). This phased approach allows large retailers like Walmart and Amazon to evaluate multiple technologies with varying levels of automation before scaling up operations—an advantage smaller retailers may not have due to resource constraints.

**Impacts of Local Supply Chains**

Through their local logistics model, Fillogic delivers significant operational and environmental benefits for its retail partners. Their local hub model paired with the technology platform enable retailers to reduce fulfillment costs by 20-30% annually while achieving 98% same-day fulfillment rates (Fillogic, n.d.-a). These hubs position inventory closer to end consumers, reducing last-mile delivery distances by up to 50% while also reaching 98% of the US in 3 days or less (Fillogic, 2024; Fillogic, n.d.-b). With Fillogic's return process, products are also returned in 3 days, 70% better than traditional models while saving on reverse shipping costs (Fillogic, 2024). All of these benefits create operational and financial impacts by allowing customers to better manage their inventory, improving inventory accuracy and reducing stockouts. Their local operations also create environmental benefits such as cutting transportation emissions by 20% compared to traditional centralized fulfillment models (Fillogic, 2024). Additionally, Fillogic's local returns process facilitates product returns to shelves, ensuring the products do not become waste. Per Closed Loop Partners, this returns process kept over 500 million tons of materials in circulation in 2024, preventing the associated emissions of their disposal (Long, 2025). Overall, Fillogic's decentralized model enables retailers to streamline operations while contributing to a more sustainable retail ecosystem.

Similarly, MFCs also provide substantial financial, operational and environmental advantages to retailers by placing inventory strategically close to the end consumer. To quantify these costs, MWPVL International compared the fulfillment costs for a bottle of ketchup using an automated MFC vs a manual traditional fulfillment center and found the lowest fulfillment costs where for the MFC – $0.43 vs $0.66 (Tobias, n.d.). Though some of this cost reduction should be attributed automation, the cheapest results where for in-store purchases ($0.08) where the last-mile delivery steps were eliminated. Dr. Ponce also reminds us that MFCs can be built modularly to best match a company's order volume (personal communication, April 3, 2025). This feature provides retailers with much needed flexibility, especially for those companies who experience big changes in the demand for their products. For Walmart, their trial MFC in Salem, NH allowed them to fulfill the pandemic boom of online grocery orders in the area while competitors dealt with major backlogs (Verdon, 2021). From an environmental perspective, a study by Accenture found that fulfilling just half of e-commerce orders via MFCs could reduce delivery vehicle-related emissions between 16% and 25% by 2025. Cities like London and Chicago could see major impacts—144,000 and 68,000 fewer tons of $CO_2$, respectively—through this reduced delivery traffic (Straight, 2021). These findings suggest that broader adoption of MFCs can benefit individual companies while contributing to a reduced environmental footprint.

**Measuring Success & Future Outlook**

Fillogic's success depends on growing their distribution network to serve more customers closer to their homes. Their strategic partnerships with major mall owners demonstrate Fillogic's understanding of their need for more retail space. As of 2021, the company had ambitious plans to add 25 new hubs, all across major US markets by year's end as seen in Appendix figure A2 (Daleo, 2021). However, these plans appear to have faced challenges as their current footprint only shows 6 open hubs today, 2 fewer than in 2021 (Daleo, 2021; Fillogic, n.d.-b). Still, Fillogic's partnerships with returns providers Narvar and LoopReturns indicate potential for new service offerings that could drive future hub expansion and retailer acquisition (Fillogic, 2024). While Fillogic faces the typical growth uncertainties of many startups, their focus on cost-effective, sustainability-oriented services positions them well for potential long-term success in the retail space.

The future for MFCs may not be so ambiguous. Per Research and Markets worldwide report, the global MCF market was $6.2 billion in 2024 with projections to grow to $31.6 billion by 2030 indicating substantial expansion (2025). More specifically, Interact Analysis predicts that, by 2025, nearly half of global MFC installations (961 of 2126) will be built within existing retail stores (2021). Their latest projections

anticipate 1200 automated MCFs will be deployed in the American grocers between 2025 and 2030 (see appendix figure A3 for projections) with Walmart's ambitious plan of deploying 400 automated MCFs serving as a major driver for this growth (Scriven, 2025). Amazon has been more reserved about their expansion plans since their pilot automated MCF. The company has however stated they, "…continue to expand to more locations as we test and learn with this model," signaling their intentions to expand (Inklebarger, 2024). Though the futures of Amazon's and Walmart's MCF operations will depend on the success of their early investments, MCFs as a whole appear to have a long future. Dr. Ponce states that while the MCF model is "a product of pandemic-related omnichannel fulfilment, it will have a long-lasting impact on the retail landscape" (Ponce, 2023).

**Key Takeaways**

This case study demonstrates how local distribution strategies can transform retail operations by positioning inventory closer to consumers, thereby enhancing delivery speed and operational efficiency. Fillogic's approach of converting underutilized mall spaces into logistics hubs offers retailers cost reductions of 20-30% and 98% same-day fulfillment rates, while their minimal-automation model maintains flexibility for processing diverse orders. Meanwhile, automated micro-fulfillment centers (MFCs) employed by Amazon and Walmart deliver superior operational efficiencies with lower per-order costs despite requiring higher initial capital investments of $3-5 million or more. Both local fulfilment models also yield substantial environmental benefits by reducing transportation emissions via shortened delivery distances and ensuring less waste from returns. These distribution strategies showcase logistics operations that balances consumer demands for rapid delivery with operational efficiency and environmental sustainability.

### 4.4 Local Post-Consumer: Case Studies on Algramo and Patagonia

Reusing and repair operations expand on the traditional supply chain framework by adding a step that re-integrates salvageable materials back into the supply chain process. Local reusing and repairs, or post-consumer, expand this idea to emphasize proximity to consumers to further minimize waste, reduce carbon footprints, and foster community engagement. Algramo and Patagonia exemplify this shift through distinct yet complementary approaches: Algramo eliminates single-use packaging via hyper-local refill systems, while Patagonia extends garment lifespans through repair services of their products. Both companies challenge linear consumption patterns while attempting to focus on local operations.

**Company Background and Current Local Supply Chain Operations**

Algramo is a Chilean company started in 2013 with a focus on providing household products at affordable prices while reducing packaging waste. Their business model consists of providing products, ranging from detergents and soaps to pantry staples like rice, sugar, lentils, and having customers refill using the original containers they used. In doing so they remove the costs of new packaging, which reduces the selling price of products and prevents needless plastic waste (Algramo, 2022a). Since their start working with family neighborhood stores or "almacenes" in Chile, they have grown their business to develop and operate smart vending machines that measure, dispense and charge customers for the products they refill (see Figures 3). By the nature of their operations, Algramo promotes local reusing since they require users to come to them to refill their products, something they have ensured with the 4,400 family-neighborhood stores they have partnered with and the 80 dispensers deployed close to their customers (Algramo, 2022a; Global Private Capital, 2021).

Figure 3. Pictures of Algramo's vending machines operated at local "almacenes" (Enviu, n.d.)


Patagonia is a well-known apparel company that has been making and selling high-quality, durable products in the United States since 1973. From their inception, Patagonia has focused on making environmentally conscious products. Certified as a B Corporation since 2012, the company prioritizes product durability and circularity, as outlined in their 2023–2024 Annual Benefit Corporation Report: "We endeavor to build the best products, while causing no unnecessary harm to the planet or its inhabitants…". To reach

their sustainability commitments, Patagonia has launched multiple recycling programs such as Worn Wear and Rethread to limit textile waste by allowing customers to mend or trade-in used Patagonia products (Madrigal, 2020). They have taken approaches of localizing their recycling efforts by way of the Worn Wear Road Tour where mobile repair units visited major markets across the US (Collier, 2018) or Patagonia Rethread, a program piloted in the greater LA area to collect, recycle and re-distribute clothing all within the LA community (Madrigal, 2020).

**Motivations for Localizing Supply Chains**

Algramo's motivations are to minimize plastic waste while providing affordable products to consumers. By drastically reducing packaging costs, the company is able to charge a uniform price per weight that does not penalize smaller order sizes. This "poverty tax", as Algramo founders refer to it, can be as high as 40% and usually affects lower-income consumers who cannot always afford to buy in bulk (Fajardo Cabello, n.d.). By adopting a local model for their business, they are able to provide lower-income consumers these affordable essentials right in their communities. Tying back to their environmental goal of minimizing plastic waste, local refill stations also allow Algramo to reach a broader user base and have a bigger impact on plastic waste reduction.

Patagonia has a strong commitment to preserving the outdoor environments in which their products are designed to be used. This commitment is an important driver of their numerous recycling initiatives; however, it also pushes them to operate these programs more locally. Similar to Algramo, Patagonia increases their positive environmental impact by reaching as many people as possible. Their Worn Wear Road trips do this by travelling to both major and prospective customer markets to provide their garment repair services locally to customers (Amp Agency, n.d.). Patagonia also realizes their operations with global partners make the shipping of recycled products a significant source of emissions (Ram, 2021). In their analysis of their Common Threads Initiative, Patagonia share how shipping recycled Capilene garments from the US to Japan increased total CO2 emissions by about 23% (Patagonia, n.d.-b). Though recycling already provides a positive environmental impact, doing so locally further reduces Patagonia's environmental impact.

**Journey to Localization**

From their start, Algramo has worked with local communities to provide them essential products at affordable prices. Since then, they have expanded their partnerships to work with major supermarkets such as Walmart, Lidl and Target as well as global brands such as Unilever and Nestle to increase the reach of their reusable packages (Algramo, 2022b). These partnerships have allowed them to expand to new, potentially

more affluent sectors. For Algramo, these expansions have been implemented via pilot programs in the United States and the United Kingdom (Algramo, 2022b). Brian Bauer, who led Algramo's Circular Economy and institutional partnership work, noted that this growth caused some challenges due to the multiple stakeholders involved. As they expanded their partnerships to include larger, multinational companies for their vending machines services, Algramo began experiencing more product availability delays (B. Bauer, personal communication, March 13, 2025). These supply disruptions likely stemmed from the misalignment of priorities, which caused Algramo's core vending machine business to receive lower precedence within their larger partners' operations.

Patagonia's journey to local recycling has been different. With a focus on doing "no unnecessary harm to the planet", their recycling programs focused on reducing textile waste wherever it could be found. As mentioned above, their Common Threads initiative had recycled product being shipped half-way across the world (Patagonia, n.d.-b). Even when operating in the United States, their Worn Wear program ships products from all over the United States to and from Patagonia's sorting center in Reno, Nevada. Shipments could travel up to 2,999 miles to reach the furthest Patagonia stores (Madrigal, 2020). Gary Madrigal, developed a pilot program with Patagonia while at California State Polytechnic University to operate local recycling programs from Patagonia's stores in Pasadena and Santa Monica in an effort to reduce transportation emissions. Though the project was ultimately stopped due the COVID-19 pandemic, the project's approval shows Patagonia's interest in running local recycling operations. Perhaps their best tool to "localize" is one that avoids shipments altogether. Patagonia has trained employees to perform in-store repairs as well as partnered with iFixit to provide at-home repair videos, thereby limiting emissions associated to transportation (Brady, 2025).

**Impacts of Local Supply Chains**

Algramo's partnerships with local stores, especially in lower-income neighborhoods, create a positive social impact in these communities. By working with neighborhood retailers, Algramo boosts local economic activity by making its products more financially accessible. In addition to attracting customers, the company supports these stores with free Wi-Fi access and space-maximizing floor redesigns (Oželienė et al, 2017). As co-founder Salvador Achondo explains, "...all the research and development that our teams are carrying out is focused on promoting local stores as neighborhood meeting places…" (Fajardo Cabello, n.d.). Through partnerships with large companies, such as Walmart and Unilever, Algramo helps them reduce their Scope 3 emissions, those indirect emissions related to an organization's suppliers, preparing for stricter ESG reporting

requirements (Global Private Capital, 2021). By operating locally, Algramo is able to lower their transportation-related emissions, further reducing Scope 3 emissions for its global partners. Finally, these initiatives improve resilience against labor shortages and global disruptions. During the COVID-19 pandemic, Algramo had a 356% increase in cleaning product sales in Santiago when the city was in full lockdown (Ellen Macarthur Foundation, 2022). This success was driven by the automation of Algramo's refill system and the strategic placement of its vending machines.

For Patagonia, their foray into local recycling with the Worn Wear road trips was "a smashing success" according to Amp Agency who partnered with Patagonia on the mobile repair service (Amp Agency, n.d.). In their 42-day trip, the Worn Wear truck had over 11,000 attendees and 88% of Worn Wear used merchandise sold. Perhaps most importantly though, over 60,000 people visited the Worn Wear website to learn about the repair and recycling services and products Patagonia offers, growing the reach of the program (Amp Agency, n.d.). In meeting customers close to their homes, they facilitate that first connection with Patagonia's recycling service and possibly the Patagonia brand. According to Clara Redwood, global repair experience manager at Patagonia, getting customers to try the program proves to be helpful as Patagonia's "…customers come back for repairs. The repair service really instills a sense of trust in the customer base," (Brady, 2025). As for Patagonia's Rethread pilot, although the program never took off, Madrigal estimates that emissions could be cut by 95% per trip by working with local LA-based recyclers instead of shipping to their Nevada center (Madrigal, 2020). In establishing multiple recycling centers, Patagonia could realize further reduction in emissions associated to their business.

**Measuring Success & Future Outlook**

Per Jose Manuel Moller, Algramo's co-founder, the company's goal is to "eliminate the need for single-use plastics" (Global Private Capital, 2021). On their company site, Algramo shares the 750,000 reused packages, 360,00 kg of CO2 avoided and 2.8 million liters of water all with their 80 deployed dispensers to date (Algramo's global impact, 2022). The ambitious goal of eliminating plastic waste perhaps explains Algramo's aggressive expansion strategy with pilot programs in the UK, US and Indonesia and further expansions plans to countries like Mexico (Algramo, 2022b; Global Private Capital, 2021). Beyond geographical expansion, Algramo has diversified its product portfolio, adding household cleaning products and pet food to complement its initial pantry staples offerings (Algramo, 2022b). To achieve their mission of eliminating plastic waste, Algramo will need to balance strengthening their core Santiago operations while continuing their strategic expansion into new global markets.

Patagonia proudly touts the success of their repair operations using the 583,000 items they have kept out of landfills — the number a mix of resold and repaired garments managed via the Worn Wear program (Patagonia, n.d.-c). The company's commitment to circularity is further underscored by its broader environmental goals, including becoming carbon neutral by 2025 (Zekoff, 2021). Patagonia's future outlook involves expanding its repair and reuse initiatives, potentially scaling its Worn Wear program to further reduce waste and promote sustainable consumption patterns (Ram, 2021). Additionally, the company aims to reduce their scope 3 emissions from transportation by 55% by 2030 (Patagonia, n.d.-a). To do so, Patagonia will need to continue enhancing product design to ensure durability and repairability but also operate more locally to reduce the distance traveled of their products. This strategic approach aligns with Patagonia's broader mission to reduce its carbon footprint across its entire supply chain (Patagonia, n.d.-a).

**Key Takeaways**

There are inherent tensions in localizing post-consumption in supply chains, as companies must balance the environmental benefits of reduced transportation emissions against the limited reach of strictly local operations. Although quantifying the specific environmental impact differences between standard recycling and localized recycling presents challenges, the economic stimulus to local communities and the reduction in transportation-related emissions remain clear advantages of hyper-local models. Algramo and Patagonia both demonstrate localization strategies must carefully weigh global expansion opportunities against the sustainability benefits of proximity to consumers, ultimately requiring a tailored approach that aligns with each company's core mission and stakeholder needs.

# 5 Discussion

## 5.1 Case Study Analysis

Across the case studies we see that there are different elements in play as to why, how, and when companies choose to embark on their hyper-local journeys. Some, like Relocalize and Algramo, operate locally from their inception to meet a need that traditional, global supply chains were not meeting. Others, like Chipotle and Walmart, transition to operating locally as a response to evolving market and customer expectations. In the case studies, patterns emerge concerning the motivations for companies to adopt local supply chains. Companies that have the general public as direct customers (Chipotle, Algramo and Patagonia) tend to focus on the environmental aspect of fewer emissions and reduced waste as drivers for operating locally. In contrast, companies like Relocalize, Niagara Bottling and Fillogic, which are B2B companies, choose

to operate more locally for business reasons such as reduced operational costs or as a response to incoming regulations on emissions. Nevertheless, all but one company (Niagara Bottling) had multiple motivations for seeking local capabilities, showing how most companies view local operations as a way to address multiple matters.

Though the case studies represent a broad range of industries from fast-casual restaurant chains and beverage producers to retailers and consumer goods firms, the companies have similar approaches to starting local operations. Since local supply chains introduce a new way of working, the cases show how companies will often run pilot programs to test the viability of local operations before expanding. Once they do expand, their focus is on locations that are strategically closest to their customers. This is as much the case for Niagara, which expanded their factories closer to dense population areas, as it is for Salad and Go, which focused on establishing suppliers closest to their newer Dallas customers. As they expand, companies also share the common approach of establishing new partnerships that allow them to grow locally. For Relocalize and Fillogic, these partnerships are critical to their business as they depend on mall operators and grocers to provide them the space and business opportunity to continue growing their company footprints. For others, like Chipotle and Patagonia, their strategy is to partner with and empower suppliers and service providers so that these partners can grow as fast as local demand grows.

Analyzing the challenges companies faced while transitioning or growing their local capabilities revealed patterns based on company maturity and the part of the supply chain being localized. Established companies tended to face operational issues, such as needing significant technological investments across the supply chain, not finding enough suppliers when sourcing, or facing space limitations for fulfillment centers. Smaller companies encountered roadblocks getting buy-in from partners and customers across all segments, leading to growth goals not being met.

The impacts of hyper-local supply chains observed across the case studies confirm the benefits identified in the literature review while offering quantifiable evidence of their magnitude. Environmental benefits were substantial, with Relocalize achieving a 90% reduction in transportation emissions, Fillogic cutting delivery-related emissions by 20%, and Niagara Bottling reducing their "average length of haul" by 70%. Economic advantages were equally compelling. Fillogic enabled retailers to reduce fulfillment costs by 20-30%, while Chipotle's traceability systems saved approximately $18 million annually by preventing recall-related expenses. Operational resilience improvements were evident when Walmart's micro-fulfillment centers successfully handled pandemic-driven online orders while competitors struggled with backlogs, and

Algramo experienced a 356% increase in cleaning product sales during lockdowns. Social impacts, though less extensively documented, were significant for Algramo, which supported neighborhood retailers in underserved communities, and Niagara Bottling, whose regional facilities created hundreds of local jobs and contributed over $10 million to local economies annually.

### 5.2 Hyper-local Framework

Building on the initial definition and breakdown of supply chain segments in the methodology chapter, the hyper-local framework was designed with findings from the 9 case studies. At the center of the framework, the definition of hyper-local supply chains uses the elements of:

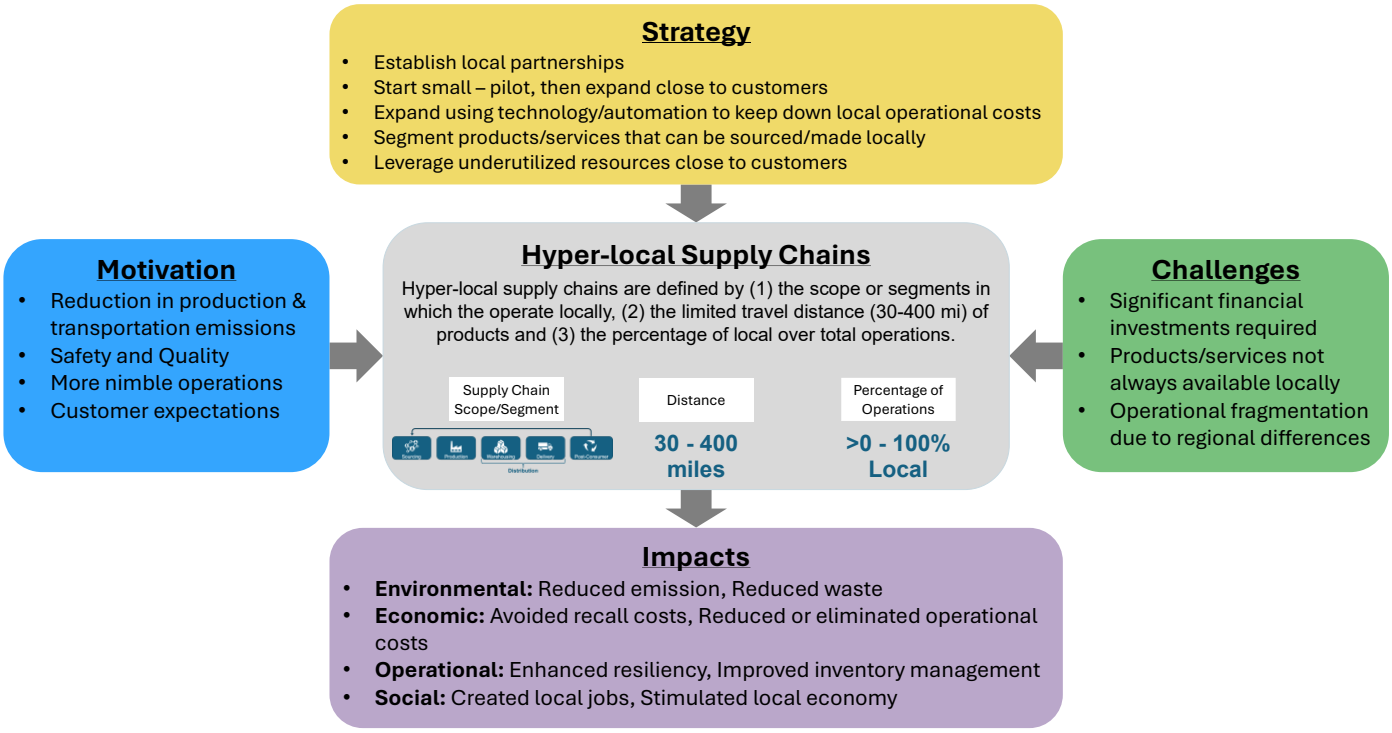
1. **Supply chain scope:** Sourcing, Production, Distribution (Warehousing & Delivery) and Post-Consumer
2. **Distance travelled:** range from 30-400 miles derived from companies in case studies
3. **Percentage of operations:** range from greater than zero to 100%

Each of the elements purposefully has a range of values to allow for nuanced identification of companies operating local across industries and within industry niches. These flexible ranges acknowledge that 'hyper-local' may mean different things in different contexts. For example, technology hardware companies that cannot source rare-earth minerals locally can still qualify as implementing hyper-local practices in their post-consumption operations when their products reach end-of-life. This flexibility allows organizations to appropriately contextualize their hyper-local initiatives based on their specific operational constraints.

Surrounding this definition to the left, top and right are the various components that make hyper-local supply chains possible (see framework in Figure 4). Starting with Motivation to the left, this section includes the drivers that prompt companies to establish local capabilities. Motivations include desires to reduce emissions, achieve higher safety and quality, obtain operational nimbleness, and meet customer expectations. These motivational factors rarely operate in isolation, as evidenced by the case studies where multiple drivers typically influence the hyper-local decision. The Strategy component outlines implementation approaches across different supply chain segments, from sourcing and production to warehousing, delivery and post-consumer. These include industry-agnostic measures such as establishing local partnerships and starting with pilots. However, they also include strategies such as using technology and automation that may not be applicable to all business cases or industries. Like motivations, complementing strategies are often deployed together. Lastly, the Challenges component acknowledges the

obstacles organizations may encounter, including capital expenditure requirements, supplier availability and reliability issues, and internal as well as partner alignment difficulties due to decentralization.

Figure 4. Hyper-local supply chain framework with definition and accompanying elements




Once an organization establishes their local/hyper-local operations, the last piece of the framework shares the Impacts they can expect due to their operational change. These outcomes are measured across four dimensions: environmental benefits (emissions reductions, waste elimination), economic advantages (cost savings), operational improvements (enhanced resilience, increased responsiveness), and social contributions (job creation, community engagement). Together, these five components create a holistic framework that organizations can use to evaluate their current state, identify opportunities for hyper-localization, and develop strategic roadmaps for implementation.

### 5.3 Using Standards to Assess Local Operations

GS1 standards can significantly enhance hyper-local supply chain initiatives by providing the fundamental infrastructure for visibility and traceability across operations. Their identification framework, including Global Location Numbers (GLNs) for facilities and Global Trade Item Numbers (GTINs) for products, enables companies to precisely map their operational footprint and measure local versus non-local inventory

percentages (GS1 US, n.d.). GS1 transport standards and Logistics Labels incorporating Serial Shipping Container Codes allow real-time tracking of goods throughout their journey, providing critical data for calculating precise transportation distances against hyper-local thresholds. The Global Data Synchronization Network further supports localization by facilitating accurate sharing of origin information, manufacturing locations, and distribution capabilities between trading partners.

For companies implementing strategic components of the hyper-local framework, GS1's standards create a common language for collaboration across diverse partner ecosystems. Their product code standard addresses challenges related to supplier reliability and operational fragmentation by enabling structured sharing of supply chain event data, creating a single authoritative data source across trading partners. As demonstrated by Chipotle's $18 million annual savings from implementing GS1 labeling for recall management, these standards deliver tangible benefits in localized contexts while helping companies enhance operational transparency. By integrating GS1 standards into hyper-local assessment and implementation efforts, organizations can build more resilient local supply chains across sourcing, production, distribution, and post-consumption operations.

### 5.4 Self-Assessment Tool and Additional Research

To support organizations in evaluating their progression toward hyper-local supply chains, this capstone proposes a quantitative, self-assessment tool based on the three core dimensions of the hyper-local definition established in the hyper-local framework: supply chain segments, distance, and percentage of operations. The proposed tool evaluates hyper-locality at increasing levels of aggregation starting at the unit/product level and later at the company level for each supply chain segment: sourcing, production, distribution (combining warehousing and delivery), and post-consumer.

#### Calculating Distance

The basis of the tool is the calculation of distance, represented as the average weighted distance:

$$average\ weighted\ distance\ = \sum distance_z * weight_z$$
$$where \sum weight_z = 1.$$

In the self-assessment tool, the formula calculates a weighted average distance by multiplying each transportation route's distance by the percentage of total product volume flowing through that route, then summing these weighted values. Using this formula, average distance is calculated for each supply chain segment either at the unit or product level.

For the "sourcing" supply chain segment, average weighted distance is first calculated for each material, weighing each supplier's distance by the percent of that material they provide and summing each weighted distance (formula 1). Then, materials are weighted by their proportional composition in the final product (formula 2a). These equations only provide a sourcing distance at the unit level since there may be different sourcing strategies for the same product across geographies. To obtain sourcing distance at the product level, an additional average weighted distance is needed to aggregate different unit-level sourcing distances (formula 2b). If there is only one sourcing strategy for a product, the unit-level distance equals the product-level distance.

Sourcing

$$(1)\ Distance_i = avg.\ weighted\ distance\ of\ sourced\ material\ i\ to\ company$$

$$(2a)\ Avg.\ Distance_{Sourcing\ (unit-level)} = \sum_{i \in I} (Distance_i * \%\ of\ material\ i\ in\ product\ A)$$

where $i$ is one of $I$ different sourced materials

$$(2b)\ Avg.\ Distance_{Sourcing\ (product-level)} = \sum_{s \in S} (Avg.Distance_s * \%\ of\ total\ units\ sourced\ with\ strategy\ s)$$

where $s$ is one of $S$ different sourcing strategies

For the "production" supply chain segment, distances similarly are estimated for one production center to multiple distribution centers (formula 3) and then aggregated across all factories, weighted by production volume (formula 4). For production, the distance calculation is done at the product level since the formula accounts for all production methods for a specific product.

Production

$$(3)\ Distance_j = avg.\ weighted\ distance\ production\ center\ j\ to\ distribution\ centers$$

$$(4)\ Avg.\ Distance_{Production} = \sum_{j \in J} (Distance_j * \%\ of\ total\ units\ A\ produced\ in\ j)$$

where $j$ is one of $J$ total production centers

For the "distribution" and "post-consumer" supply chain segments (formulas 5&6 and 7&8 respectively), the formulas follow the same mathematical structure as the production formulas, only varying due to the different origin-destination pairs they measure. Like the production formula, these four equations also measure average distance at the product level.

Distribution

$$(5)\ Distance_k = avg.\ weighted\ distance\ distribution\ center\ k\ to\ store\ or\ customer$$

$$(6)\ Avg.\ Distance_{Distribution} = \sum_{k \in K} (Distance_k * \%\ of\ units\ A\ sent\ from\ k)$$

where $k$ is one of $K$ total distribution centers

Post-Consumer

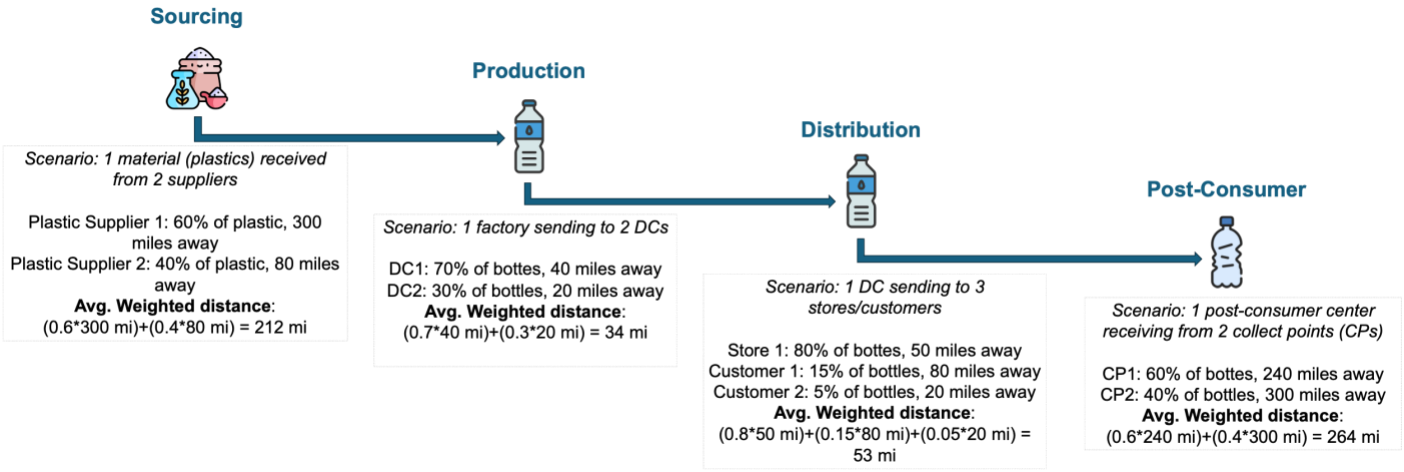
$$(7)\ Distance_l = avg.\ weighted\ distance\ from\ collection\ points\ to\ postconsumer\ center\ l$$

$$(8)\ Avg.\ Distance_{PostConsumer} = \sum_{l \in L} (Distance_l * \%\ of\ units\ A\ sent\ to\ l)$$

where $l$ is one of $L$ total post-consumer centers

Putting these formulas into practice, if Product A consists of 60% plastic sourced from 300 miles away and 40% plastic sourced from 80 miles away, the average weighted distance for plastic in Product A would be (0.6*300) +(0.4*80) = 212 miles. Figure 5 takes this simplified example of a water bottle and shows how to calculate average distance across each of the segments of the supply chain.

Figure 5. Simplified example of weighted average distance on water bottle supply chain




**Calculating Hyper-Local Score**

Once an average distance is derived per segment, a scoring methodology assigns a 1-10 hyper-local value based on this distance. This methodology draws on the hyper-local distances found in the literature and case studies, taken primarily from the US Congress's (2008) limit of hyper-local to a radius of 400 miles. Using this limit, average distance is divided by this 400-mile threshold to provide a proportional, continuous score out of 10. The lower the average distance, the higher the score.

$$\text{Score} = \left(1 - \frac{Average\ Distance}{400}\right) * 10$$

If a product A for example had a small average weighted distance of 35 miles, its hyper-local score would be (1-(35/400) *10 = 9.13. However, if the distance increased to 200 miles, exactly half of our 400-mile limit, this would decrease the score to a 5. Negative scores due to average distance being larger than 400 miles would default to 0, meaning operations are not hyper-local. Table 1 shows varying scores and the relationship between distances and scores.

Table 1. Example of hyper-local scores across segments for a single product

| Product | Segment | Average Distance | Score |
|---|---|---|---|
| **Product A** | Sourcing | 35 | 9.13 |
| **Product A** | Production | 120 | 7.00 |
| **Product A** | Distribution | 200 | 5.00 |
| **Product A** | Post-Consumer | 450 | 0.00 |

**Company Level Score**

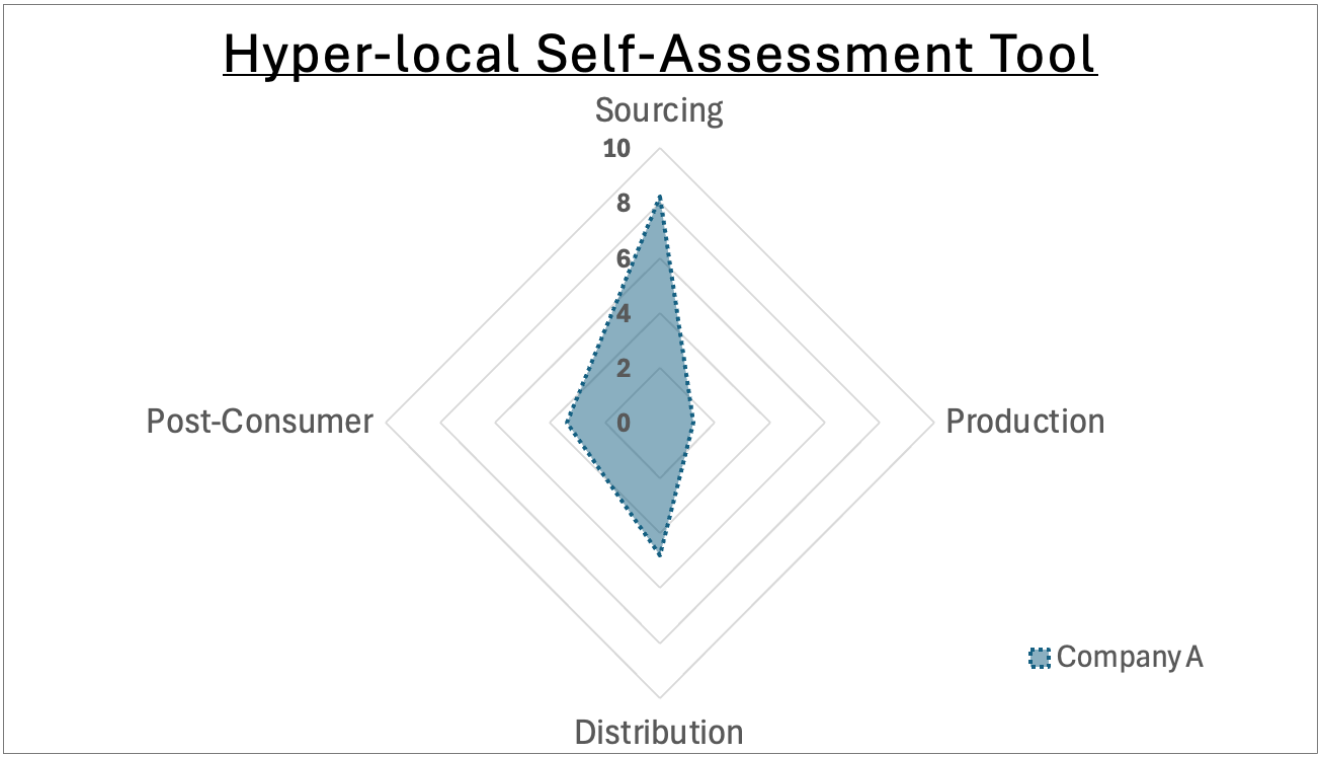
Once all of a company's products have been scored, a score can be calculated by supply chain segment for the overall company. This score comprises all products, weighting each by their percent of total dollar sales:

$$\text{Company Segment Score} = \sum_{x \in X} (Score_x * \%\ of\ total\ sales\ of\ product\ x)$$

where $x$ is one of $X$ different products made by company

A company's scores by segment, when plotted on the radar diagram, create a visual representation of a company's hyper-local maturity across the entire supply chain (Figure 6).

Figure 6. Radar plot for hyper-local self-assessment of example Company A

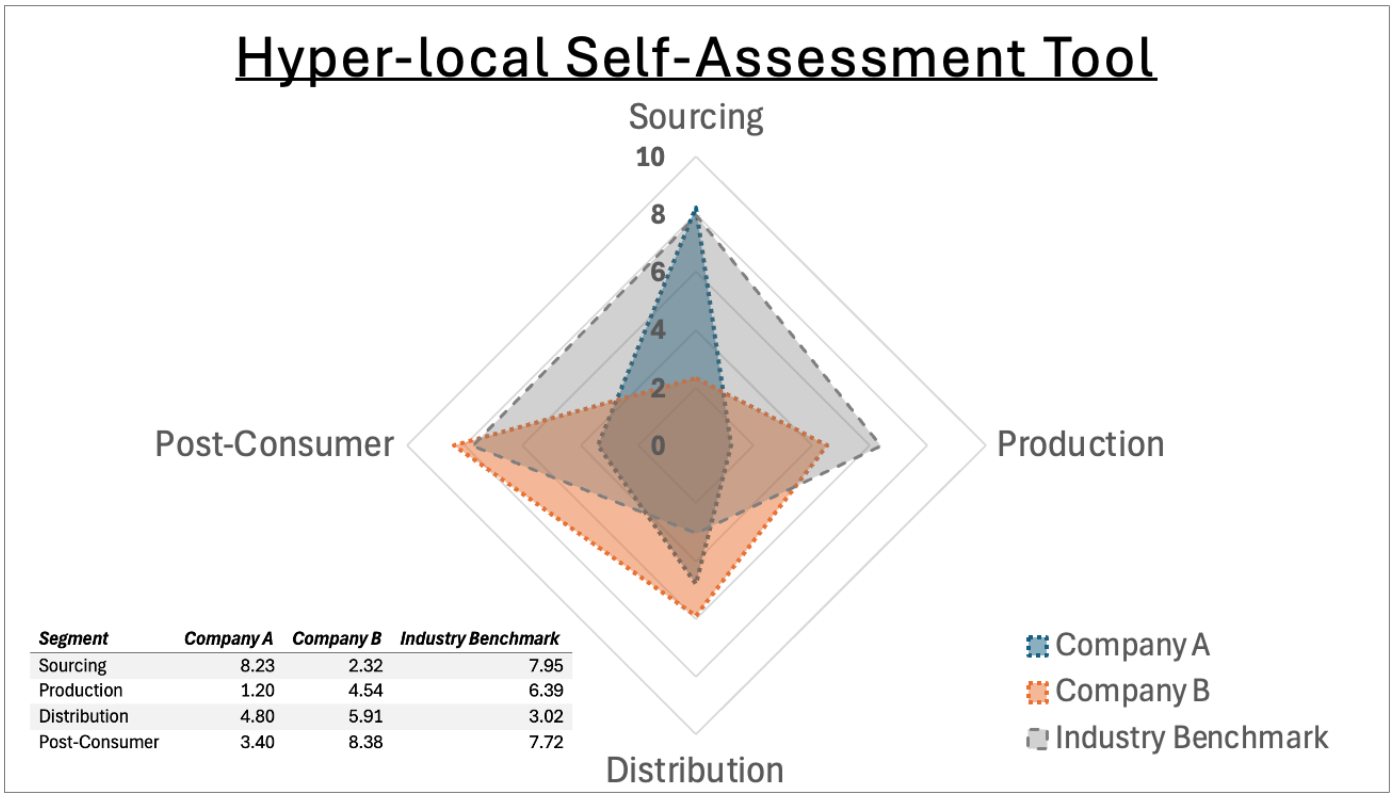



**Additional Research**

The distance calculations and scoring methodology presented in this self-assessment tool were demonstrated using simulated data to illustrate their application. To advance this framework, three critical research paths are recommended. First, validating the assessment tool through pilot implementations with companies across multiple industries would provide valuable insights into operational applicability and potential refinements. Companies participating in these pilots should prioritize product evaluation using established segmentation approaches such as ABC classification based on revenue contribution, profit margin, or existing localization potential.

Second, developing industry-specific benchmarks would significantly enhance comparative analysis capabilities. These benchmarks should be established through comprehensive market studies and collaborative industry working groups to define appropriate localization thresholds that reflect sector-specific constraints and opportunities. As evidenced in the case studies, "local" distances vary substantially across industries: from 30 miles for beverage production to 350 miles for restaurant sourcing-necessitating tailored standards. Providing industry benchmarks would allow companies to compare themselves to competitors as well as the overall industry (see Figure 7 for a visual comparison using a radar plot).

Figure 7. Radar plot for hyper-local self-assessment using example companies and industry benchmark




| Segment | Company A | Company B | Industry Benchmark |
|---|---|---|---|
| Sourcing | 8.23 | 2.32 | 7.95 |
| Production | 1.20 | 4.54 | 6.39 |
| Distribution | 4.80 | 5.91 | 3.02 |
| Post-Consumer | 3.40 | 8.38 | 7.72 |

Finally, longitudinal research tracking companies' hyper-local progressions over time would provide valuable data on transition patterns, implementation timeframes, and return-on-investment metrics that could inform more precise guidance for organizations at different stages of their hyper-local journey.

## 6 Conclusion

This capstone has developed a conceptual framework for understanding and implementing hyper-local supply chains across diverse industries. Through methodical analysis of nine case studies spanning different supply chain segments – sourcing, production, distribution, and post-consumer – the research identified consistent patterns in motivations, implementation strategies, challenges, and impacts. The framework establishes a dimensional approach to hyper-locality that incorporates geographic proximity (30-400 miles), supply chain segment, and percentage of local operations, providing organizations with a structured methodology for assessing their current state and identifying opportunities for localization. The self-assessment tool further enables companies to benchmark their hyper-local maturity against industry

standards and competitor practices, while the documented economic, environmental, operational, and social impacts offer tangible evidence of the benefits that can be achieved through strategic hyper-localization.

As global supply chains continue to face disruptions from geopolitical tensions, climate events, and shifting consumer expectations, the hyper-local framework presented in this research offers organizations an early roadmap to local operations to enhance resilience while simultaneously addressing sustainability objectives. Future research could build upon this foundation by developing industry-specific benchmarks for the self-assessment tool, quantifying the long-term economic impacts of hyper-local transitions, and exploring how emerging technologies might further enable localization across different supply chain segments. The integration of GS1 standards with hyper-local operations also presents an opportunity for deeper investigation, particularly regarding how standardized identification and data-sharing protocols can enhance visibility and traceability in decentralized supply networks. By embracing the principles outlined in this framework, organizations can not only mitigate operational vulnerabilities but also position themselves to capitalize on the growing consumer preference for local, sustainable, and transparent supply chains.

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## Appendix

Figure A1. Chipotle's Real Foodprint tool results for a veggie burrito bowl order (Chipotle, 2025)

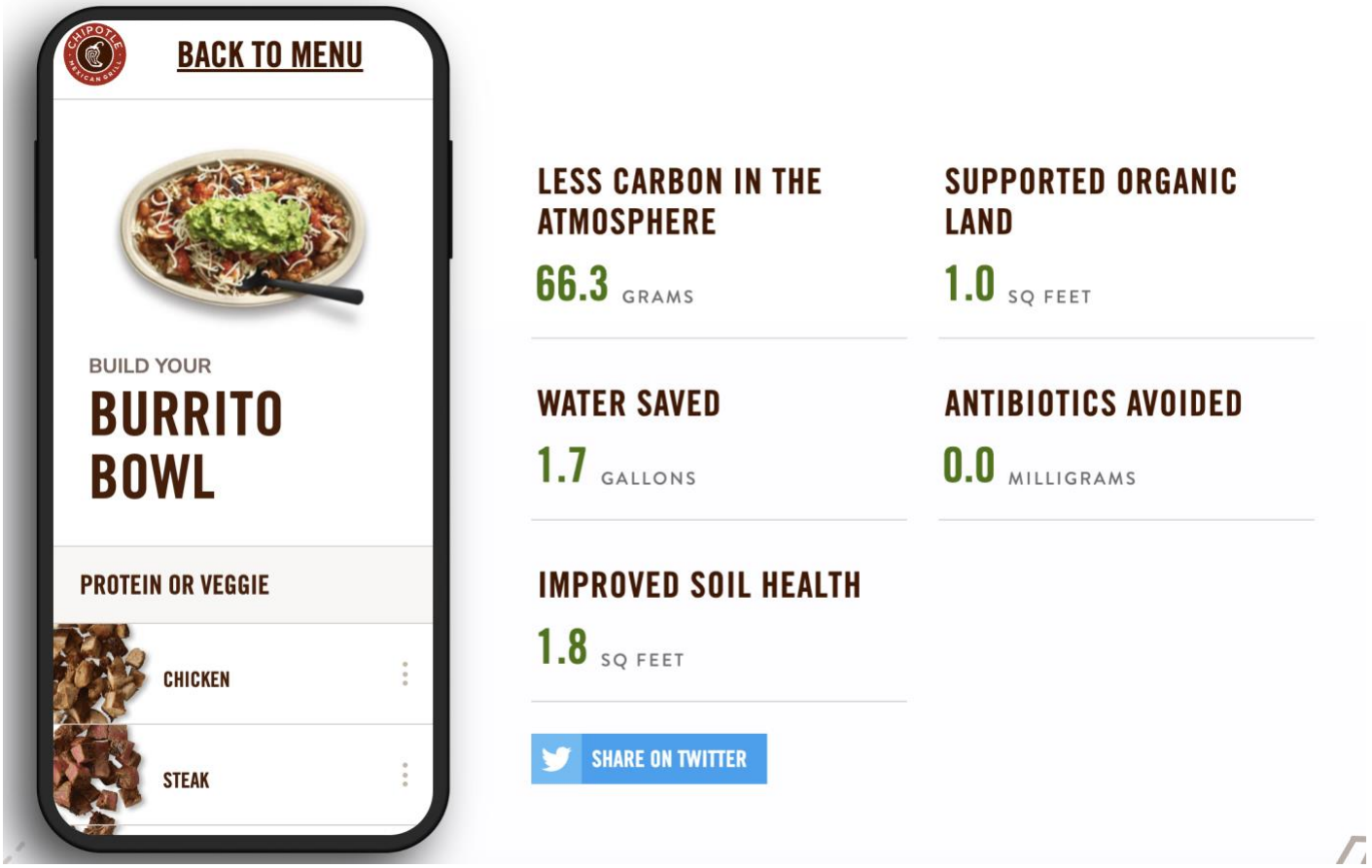



Figure A2. Layout of Fillogic's current and projected micro-logistics centers (Fillogic, n.d.-b)

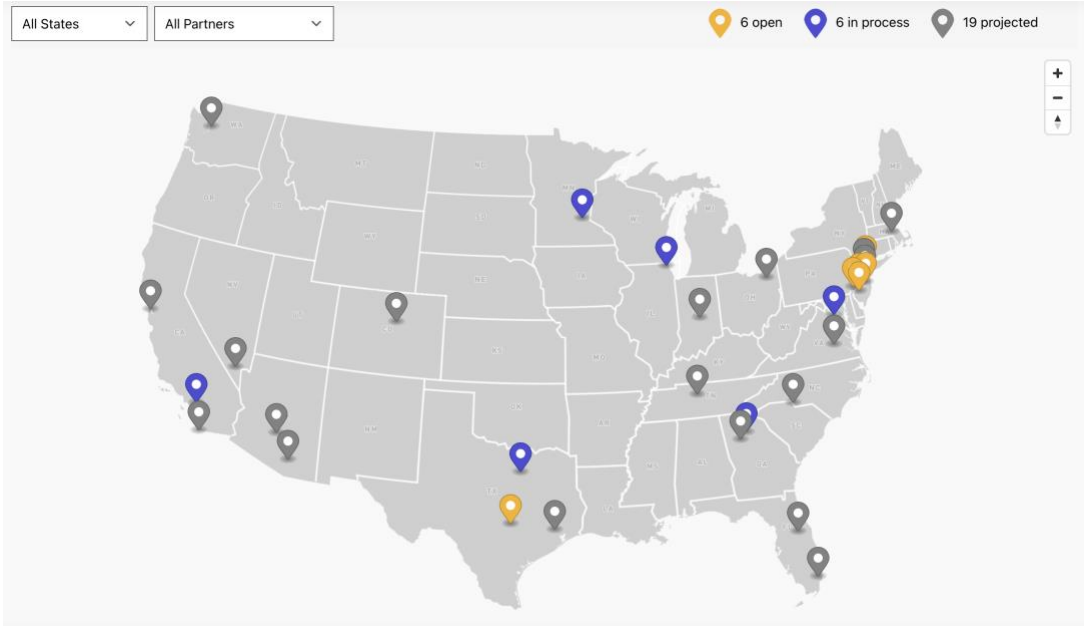
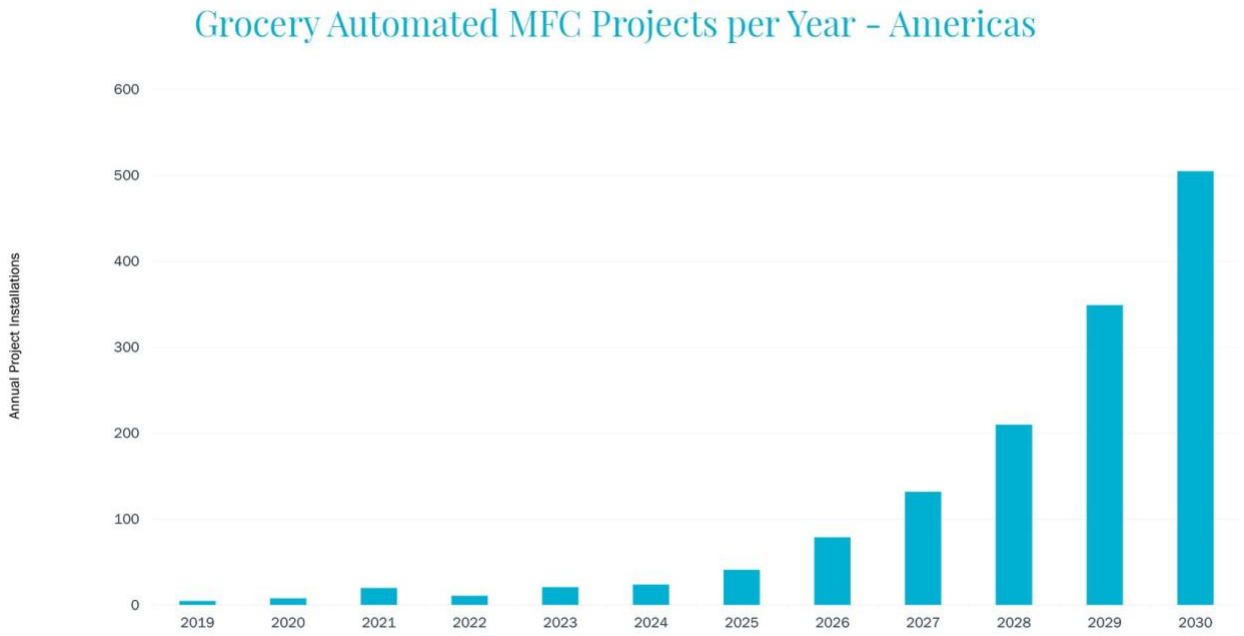


Figure A3. Projected grocery micro-fulfillment centers in the Americas by 2030 (Scriven, 2025)




Source: Interact Analysis