E-Commerce Growth and Tariff Impacts

Kansas City Regional Freight Study

CONNECTED FREIGHT KC 2050

A Plan in Action

Prepared for:

Mid-America Regional Council

In coordination with

Lawrence-Douglas County Metropolitan Planning Organization

And

Pioneer Trails Regional Planning Commission

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Acronyms and Abbreviations

AI	Artificial Intelligence
B2B	Business-to-Business
B2C	Business to Customer
FAF	Freight Analysis Framework
FedEx	Federal Express
GPS	Global Positioning System
KCI	Kansas City International Airport
MARC	Mid-America Regional Council
MSA	Metropolitan Statistical Area
STEM	Science, Technology, Engineering, and Mathematics
UAV	Unmanned Aerial Vehicle
UPS	United Parcel Service
USPS	United States Postal Service
VMT	Vehicle Miles Traveled

1. E-Commerce Business Growth

1.1. What is E-Commerce

E-commerce refers to the delivery of goods by motorized and non-motorized vehicles to homes, compared to traditional retail where customers drive to a store. It involves ordering products online or by phone, with delivery to the home or business, often in smaller consignments with higher frequency. E-commerce includes retail deliveries and has expanded to business-to-business (B2B) services, offering quick pick-up and direct delivery. Customers can order a wide range of products from nationwide and local retailers using third-party carriers. Initially, delivery times were 1 to 3 days, but now 1+ hour services are available in many urban areas. Major carriers like United States Postal Service (USPS), United Parcel Service (UPS), Federal Express (FedEx), Amazon, and UniUni handle these deliveries.

1.2. Regional E-Commerce Business

The Connected Freight KC 2050 Plan study area is like other major metropolitan statistical areas (MSA) in the U.S. with a wide range of e-commerce services and delivery by major carriers. The study area has many employers offering e-commerce services serving the region as well as nationwide with a wide range of products. A sample of these firms operating in the study area includes:

1. Amazon (fulfillment center)
2. UPS (delivery services)
3. FedEx (delivery services and call center)
4. Urban Outfitters (clothing distribution and fulfillment center)
5. JC Penney (catalog fulfillment and store distribution center)
6. OptumRx (pharmaceutical call center and fulfillment center)
7. Jet.com–Walmart (fulfillment center)
8. Chewy (pet supply distributor)

2. Emerging Technologies in E-Commerce

The e-commerce industry has witnessed exponential growth over the past decade, driving demand for innovative and efficient delivery solutions. Emerging technologies are reshaping how goods are transported from warehouses to consumers' doorsteps, with key advancements promising faster, safer, and more sustainable delivery systems. Among these, unmanned drone

deliveries, autonomous vehicles, robotic couriers, and smart delivery lockers stand out as transformative innovations.

2.1. Unmanned Drone Deliveries

Unmanned aerial vehicles (UAV), commonly referred to as drones, are at the forefront of e-commerce last-mile delivery solutions. UAVs are designed to transport packages by avoiding ground traffic. Companies such as Amazon, with its Prime Air initiative, and Google's Wing project, have pioneered this technology, aiming to deliver parcels in under 30 minutes.

The advantages of drone deliveries include:

- Speed
- Cost-efficiency
- Lower carbon emissions

However, challenges remain. Air cargo stakeholders, such as Kansas City International (KCI) Airport staff and the Mid-America Regional Council (MARC) that regulatory hurdles, such as airspace restrictions and safety concerns, need to be addressed. Additionally, drones are currently limited in their payload capacity, typically handling packages under five kilograms. Despite these challenges, the potential for drones to revolutionize last-mile delivery remains immense, with solutions being tested globally included the United States.

2.2. Autonomous Delivery Vehicles

Ground-based autonomous vehicles are another major technological leap. These self-driving cars, vans, and robots are equipped with advanced sensors, cameras, and artificial intelligence (AI) to navigate roads and pedestrian areas without human intervention.

These compact vehicles are ideal for transporting groceries, meals, and small e-commerce packages. Major automotive players, including Tesla and Ford, are also exploring autonomous vans capable of covering longer distances.

As with drones, regulatory frameworks and public acceptance are critical barriers. Nevertheless, autonomous delivery vehicles are expected to play a significant role in the future of e-commerce logistics.

2.3. Robotic Couriers

Robotic couriers are redefining last-mile delivery by providing a contactless and efficient solution. These ground-based robots, often small and agile, travel on sidewalks to deliver packages directly to consumers.

Amazon's Scout and Postmates' Serve are notable examples of robotic couriers. These robots are integrated with global positioning systems (GPS) and advanced AI to navigate urban landscapes. They can detect obstacles, communicate with pedestrians, and even use crosswalks safely. The adoption of robotic couriers is accelerating, particularly in cities where compact and sustainable delivery options are in high demand.

Advantages include:

- Reduced delivery costs
- Environmental benefits
- Scalability

2.4. Smart Delivery Lockers

Smart delivery lockers are revolutionizing how consumers receive their packages, offering an alternative to traditional home deliveries. These lockers are secure stations where shoppers can retrieve their orders at their convenience, often by scanning a code sent to their smartphone.

Companies like Amazon (with Amazon Hub) have popularized this technology. Lockers are strategically placed in residential areas, offices, and public spaces, making them accessible to a broad range of customers.

Benefits of smart delivery lockers:

- Convenience: Consumers can pick up parcels on their schedule, avoiding missed deliveries.
- Security: Lockers reduce the risk of package theft, especially in urban areas.
- Cost savings: Consolidating multiple deliveries to a single locker location reduces logistical expenses.

2.5. The Future of E-Commerce Deliveries

The integration of these emerging technologies is transforming e-commerce logistics, making it faster, more reliable, and environmentally friendly. As advancements continue, a future where deliveries are not only quicker and more affordable but also highly personalized is anticipated. For consumers, this means enhanced convenience and satisfaction. For businesses, it represents an opportunity to streamline operations and gain a competitive edge.

2.6. Workforce Impacts

The rapid adoption of emerging technologies in e-commerce is reshaping the workforce landscape, presenting both opportunities and challenges. Automation, in the form of robotic couriers, autonomous delivery vehicles, and drone systems, has streamlined logistics

operations, reducing the reliance on manual labor for repetitive tasks. While this shift enhances efficiency and lowers costs, it has led to concerns about job displacement, particularly in roles traditionally associated with warehouse operations and delivery services.

Counter to that, the rise of these technologies has generated demand for highly skilled professionals in fields such as robotics, artificial intelligence, and supply chain management. E-commerce companies are increasingly investing in training and development programs to equip workers with the expertise needed to manage and maintain advanced systems. This transformation is driving a redefinition of the workforce, emphasizing adaptability and technological proficiency as key attributes for future employment in the sector.

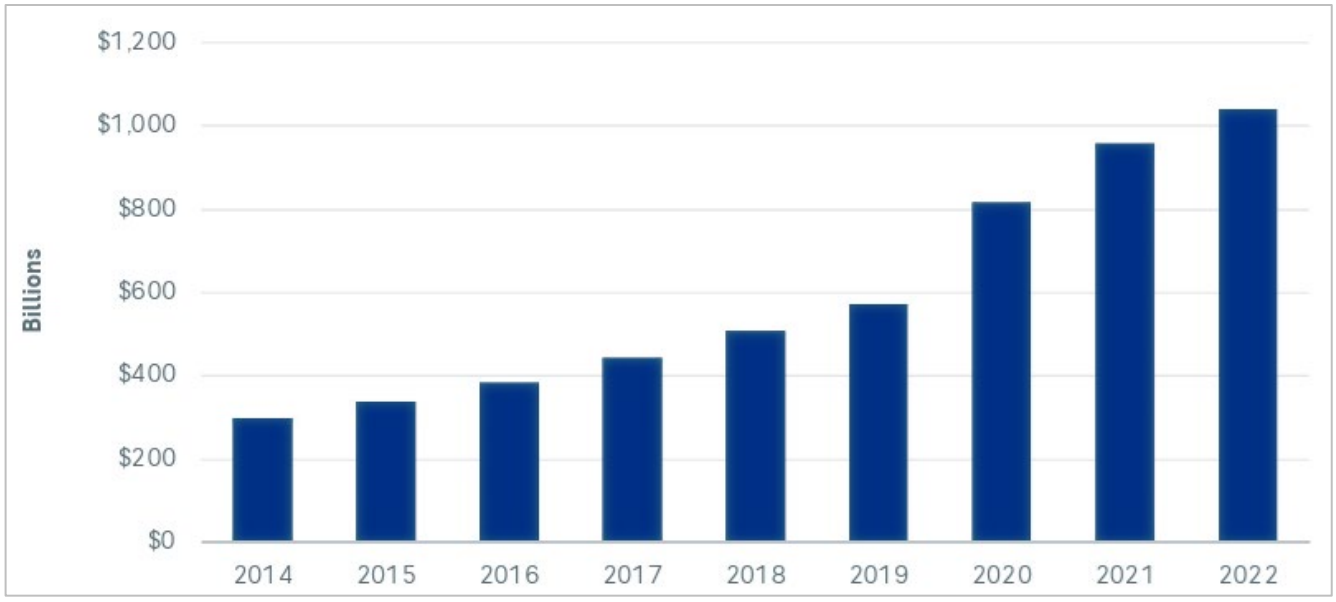
2.7. "The Amazon Effect"

2.7.1. Regional Growth

The e-commerce business is growing both nationwide and in the study area. The "Amazon Effect" term is used to describe e-commerce businesses using online for shopping and requesting services without traveling to a physical building/establishment for in-store purchases. Based on the Economic Impact Analysis of the study area, the population from 2021 to 2050 will increase by 547,000 people and the number of jobs by 2050 in the study region is estimated at 1.2 million. E-commerce is expected to continue to grow with these regional indicators. Additionally, the transportation related employment rate (2020–2050) greatly exceeds overall employment growth and is expected to generate about 43,000 new transportation jobs by 2050. This jobs growth supports the expansion of e-commerce business in the region.

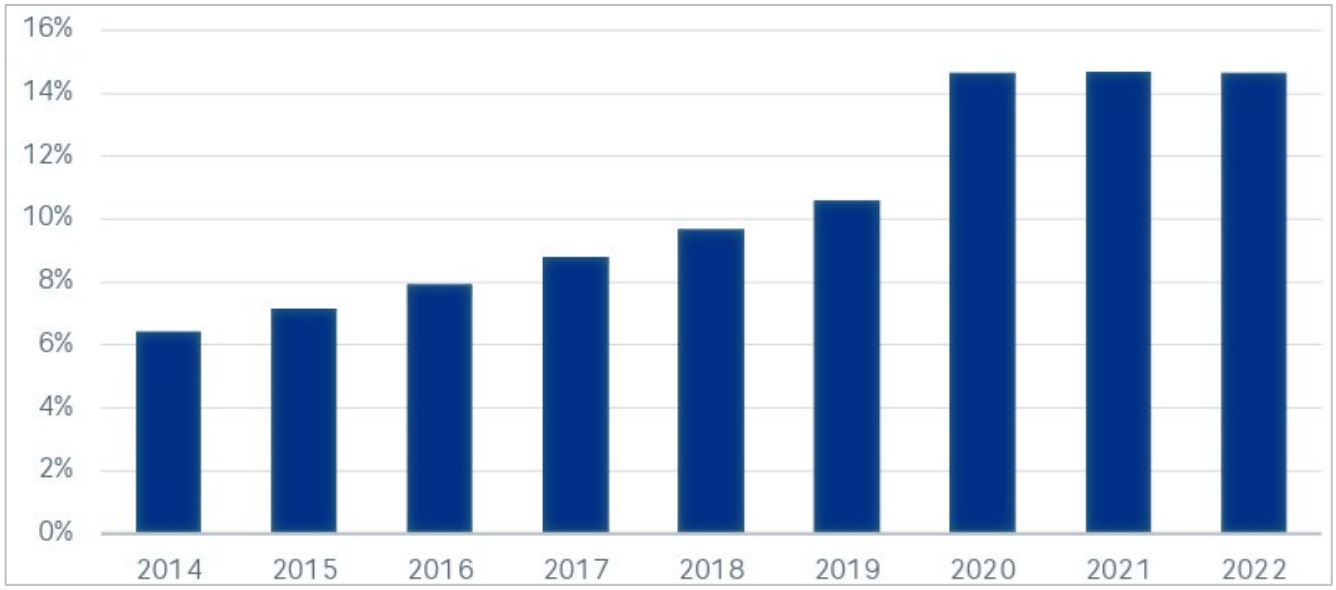
2.7.2. Historical and Forecasted Growth of E-Commerce

Over the last 20 years, retail spending has shifted from in-store purchases to an increasing share of e-commerce (online purchases). This trend includes both business to customer (B2C) and B2B services. The study area's use of e-commerce is assumed to be like national online purchasing and home-delivery trends. Since 2014, national retail e-commerce sales have increased from about $300 billion to slightly over $1,000 billion in 2022 with about a 17 percent annual growth rate, as shown in **Figure 1**. As a percent of retail sales, the nationwide e-commerce share grew from 2014 to 2022 with a noticeable jump reflecting the start of COVID restrictions in (2019/2020) and a flatlining with COVID restrictions lifted, as shown in **Figure 2**.



Source: Washington State Joint Transportation Committee, Retail Delivery Fee Analysis, June 2024

Figure 1. U.S. Retail E-Commerce Sales, 2014–2022



Source: Washington State Joint Transportation Committee, Retail Delivery Fee Analysis, June 2024

Figure 2. E-Commerce Share of U.S. Retail Sales, 2014–2022

Another measure of national e-commerce for B2C and B2B can be found in **Table 1** and **Table 2** with modest growth from 2018 to 2022 and 2018 to 2024, respectively; B2C experienced noticeable growth from 2018 to 2024 during COVID.

Table 1. Percent E-Commerce Sales for Wholesale Trade using U.S. Census, Annual Wholesale Trade Survey – U.S. Merchant Wholesalers – Total and E-Commerce Sales Data

By Year	2018	2019	2020	2021	2022
E-Commerce % for Wholesale Trade (B2B)	32.6%	33.6%	35.6%	33.8%	33.0%

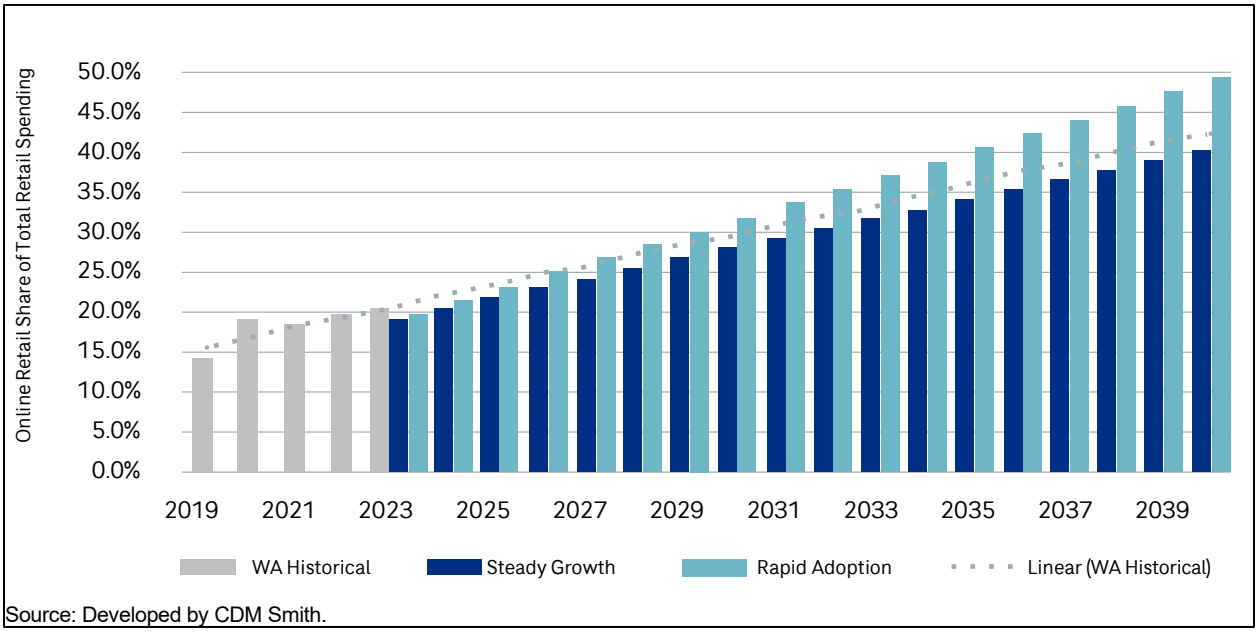
Source: Vtrans, OIPI VTrans Project, Ongoing

Table 2. Percent E-Commerce for Retail Trade using U.S. Census, Quarterly E-Commerce Report, Supplemental Tables

By Year	2018	2019	2020	2021	2022	2023	2024
E-Commerce % for Retail Trade (B2C)	9.7%	10.6%	14.6%	14.6%	14.4%	15.3%	16.1%

Source: Vtrans, OIPI VTrans Project, Ongoing

As for e-commerce forecasts, specific e-commerce forecasts are not available for the study region, but there are several other datasets that can be utilized. The first is an estimate of e-commerce as a percentage of retail sales for the State of Washington which is projected to grow from 18 percent in 2022, to 28 percent in 2030, and 40 percent in 2040, as shown in **Figure 3**. Also, a Bloomberg Intelligence Report projected e-commerce's share of retail sales at 33 percent in 2027 (Source: www.bloomberg.com/company/press/e-commerce-to-account-for-33-of-us-retail-sales-by-2027-finds-l=bloomberg-intelligence/).



Source: Washington State Joint Transportation Committee, Retail Delivery Fee Analysis, June 2024

Figure 3. E-Commerce Forecast as Percentage of Retail Sales

Lastly, using Intra/Multiple Modes & Mail (movement type and mode from Freight Analysis Framework (FAF)) as an indicator for e-commerce and parcel delivery (B2C home delivery of light weight but high value freight) in the study area, freight tonnage is projected to grow about 4.6 percent (medium forecast) annually from 2020 to 2050, as shown in **Table 3** (last row). All these forecasts of e-commerce (nationwide and the study area) growth are bullish and suggest that e-commerce is not simply a COVID pandemic phenomenon but a long-term shift in purchasing and delivery of goods and services. This shift will result in a growing number of delivery vehicles and freight vehicle miles traveled in the study area region.

Table 3. Regional E-Commerce Indicator Forecast

Movement Type / Mode	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020-2050
Freight Value (in millions of 2017$)					
Intra / Multiple modes & mail	27,559	28,985	28,725	28,456	0.11%(L), 0.14%(M), 0.17%(H)
Freight Weight (in 000s of Tons)					
Intra / Multiple modes & mail	60	134	143	148	4.13%(L), 4.63%(M), 4.88%(H)
Freight Value per Ton (in 2017$/ton)					
Intra / Multiple modes & mail	1,653	3,891	4,116	4,202	4.51%(L), 4.97%(M), 5.14%(H)

With the expected 4 percent to 5 percent growth of e-commerce/home delivery business in the study region, there will be several impacts including increased congestion, employment, and vehicle related emissions. The negative impacts of increased congestion and vehicle emissions include truck vehicle miles traveled (VMT) associated with supporting e-commerce activities including trips to and from distribution centers and fulfillment centers and home delivery of goods and services. These negative impacts will occur near delivery centers and fulfillment centers that will use heavier/larger trucks and in residential/commercial areas where time sensitive home deliveries will use single unit trucks/cargo vans. There will be impacts associated with increasing employment and economic development in the study area. These benefits are contingent upon a capable and available workforce.

2.8. Potential E-Commerce and Home Delivery Actions

Monitoring e-commerce and home delivery business growth could be worthwhile to understand the negative impacts (increased congestion, increased vehicle emissions) and the positive impact of increased employment. This growth could result in additional delivery centers and fulfillment centers being built that will require mitigating land use compatibility issues and developing the necessary additional workforce. Being aware of trends in e-commerce and home

delivery over the next decade will be important to managing the negative and positive impacts tied to growth in these sectors of the economy.

2.8.1. Potential Actions

There are several potential proactive actions to consider related to e-commerce and home delivery:

- **Micro Hubs** (small logistics facilities that serve as a go-between larger warehouses and final delivery points): In the denser portions of the study area, the potential use of micro-hubs in residential/commercial areas for home delivery services could be a solution to reduce the increasing number of vehicles and VMT.
- **Consider a Home Delivery Fee:** The potential use of a new state level/regional level home delivery fee to support transportation related projects may be beneficial. Several states (Colorado, Minnesota) have recently started to assess fees on taxable retail items delivered to addresses in their respective states.
- **Distribution/Fulfillment Center Building:** With the expected growth of e-commerce and home delivery, additional distribution centers and fulfillment centers will need to be built. From an awareness standpoint, the location of these new centers and related impacts needs to be understood and anticipated with a land use/location strategy and willingness to negotiate mitigation of negative impacts with developers.
- **Warehouse Automation:** Understanding warehouse automation technology trends and potential workforce needs to maintain automated warehouses could be part of the regional workforce strategy. This includes communicating with industry stakeholders to understand supply chain trends and impacts on workforce needs.

3. National Tariff Policy Impacts

3.1. Introduction to Tariffs

Tariffs are a form of taxation imposed on imports or exports that are used to regulate foreign trade, generate tax revenue, and influence domestic or foreign production of goods. They are generally imposed to either protect domestic industries, as a form of policy negotiation, or retaliation against a trade partner.[1] Tariffs increase costs for importers, resulting in higher prices on any foreign goods that are then largely passed on to consumers in the importing country through higher purchasing prices. Because of the imposed price increase, tariffs are generally considered a regressive tax that mostly harms the purchasing power of low- to middle-income consumers while reducing economic development. In response to tariffs, exporting countries

[1] https://www.cfr.org/backgrounder/what-are-tariffs

will often issue their own retaliatory trade measures that further harm economic development in both the importing and exporting countries.[2]

3.2. Tariff Impacts on Freight

New tariffs are an economic priority of the current Presidential administration. While the specific details continue to shift, different scenarios have been proposed by the current administration that may have impacts on the regional, national, and global freight system. Scenarios that have been proposed include a new series of tariffs includes a 25 percent tax on materials imported from Mexico and Canada and a 20 percent tariff on all Chinese imports (previous proposals indicated Chinese tariffs to reach up to 60 percent).[3] President Trump has proposed additional tariffs for European countries and other major trading partners such as India.[4] As of March 6, 2025 some tariffs on goods (particularly those used in automobile manufacturing) from Mexico and Canada have been suspended until April 2, 2025.

These taxes will impact a variety of industries through downstream price increases on imported raw materials such as steel, lumber, and others used in various production processes. Industries using these materials, such as automobile manufacturing, construction, infrastructure development, and similar manufacturing industries, will face increased production costs that will ultimately be passed on to consumers. Price increases from tariffs imposed by the U.S. will likely be exacerbated by retaliatory tariffs from the affected countries. China has already imposed a series of tariffs ranging from 10 percent to 15 percent on various goods imported and exported to the U.S. such as oil and farming equipment. Canada announced a series of tariffs on $100 billion of American imports, and Mexico has promised unspecified retaliatory tariffs as well.[5]

Tariffs imposed in 2019 had significant impacts on the movement of goods, and new tariffs are expected to disrupt the current supply chain in a similar fashion. The expected price increases will affect the overall demand for imported goods and ultimately hamper trucking and transnational freight shipping while likely reducing freight employment and the overall growth of the freight industry.[6]

3.3. Potential Tariff Scenarios

With uncertainty regarding how tariffs will impact supply chains, the following potential tariff response scenarios have been identified using the current understanding of historical tariff-induced price increases and/or subsequent trade policies.

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[2] https://news.law.fordham.edu/jcfl/2019/03/17/a-brief-history-of-tariffs-in-the-united-states-and-the-dangers-of-their-use-today/
[3] https://www.hklaw.com/en/insights/publications/2025/01/impact-of-anticipated-trump-administration-tariffs-on-infrastructure
[4] https://time.com/7266112/trump-trade-war-timeline-of-how-we-got-here/
[5] Ibid.
[6] https://www.reuters.com/business/autos-transportation/trump-tariffs-could-intensify-us-trucking-industry-slump-experts-say-2024-12-13/

3.3.1. Private Sector Solutions

Firms relying on imports from potentially impacted countries have reportedly begun efforts to mitigate cost increases and supply chain disruptions. Some firms are assessing the source locations of parts of their supply chains and are seeking suppliers in countries that are unaffected by potential tariffs. It is unclear how variables such as changes in material or production cost, resource availability, and potential for additional tariffs could further impact these supply chain shifts.[7] Relocating production could also prove too costly or time-consuming for some industries. Relocation could also permanently or temporarily reduce freight demand in certain regions while manufacturers adapt to new prices and supply chain changes.

Other import-reliant businesses have also reportedly stockpiled resources used in their production processes in preparation for potential tariffs to reduce the price of their goods and materials. Stockpiling could still result in a long-term reduction of freight demand if supply eventually dwindles, and this solution may not mitigate the overall impact on freight after tariffs are in effect.

3.3.2. Domestic Manufacturing Changes

It is uncertain whether tariffs will ultimately increase onshore manufacturing as intended, or if potential inflation and subsequent price hikes will ultimately prevent an increase in domestic production.[8] While long-term freight demand will likely decrease regardless of the scenario, a return of some domestic manufacturing could mitigate some of the impacts. However, it is uncertain how quickly firms can adjust their supply chains accordingly with domestic production increases, and if a potential overcapacity of goods due to stockpiling and/or higher domestic production could further impact freight systems and costs due to a sudden increase in domestic shipping demand.

3.3.3. Tariff Application and Magnitude

Some newly imposed tariffs have been targeted at specific industries, particularly those that produce raw materials such as steel, metals, lumber, oil, and agricultural goods.[9] Retaliatory tariffs have also been made or proposed on similar domestic exported goods such as raw materials used for goods manufacturing. However, future exceptions could be made for certain goods with limited availability or industry-specific uses. For example, tariffs instituted under President Trump's previous administration included exceptions for firms such as Apple for components that could only be produced in China, and the U.S. has already indicated that tariffs impacting domestic automobile production will be temporarily suspended.[10]

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[7] https://news.bloomberglaw.com/in-house-counsel/looming-tariffs-prompt-companies-to-protect-supply-chains
[8] https://www.freightwaves.com/news/freight-markets-brace-for-impact-of-proposed-tariffs
[9] https://abcnews.go.com/Business/tariffs-effect/story?id=119380711
[10] https://www.thescxchange.com/finance-strategy/plan/navigating-uncertainty-the-impact-of-trump-s-proposed-tariffs-on-global-supply-chains

The exact long-term magnitude of potential tariffs remains uncertain. The varying levels of tariffs imposed on certain countries could significantly affect economic growth, with some estimates ranging from $400 billion to $900 billion in cost to the U.S. economy.[11] It is likely that the squeeze on freight demand will be impacted by the magnitude of imposed tariffs.

3.4. Potential Industry Impacts for the Study Area

3.4.1. Economic and Employment Impacts

Hypothetically, any major tariffs to critical industries can likely lead to workforce insecurity, fluctuation on the price of goods, and significantly impact on the U.S. economy.[12] The employment impact on the study area will likely vary and be widespread. Nearly one quarter of study area jobs are in industries directly connected to or reliant on freight and the movement of goods, the majority of which will be impacted by domestic and retaliatory tariffs. Historical tariff impacts have shown that overall productivity will likely experience a downturn, with employment cuts as one of the primary factors.[13] Service jobs tangentially connected to freight and goods movement will be impacted both inside and outside of the study area. These companies should expect difficulties from increased costs and disruption of supply chains that could affect their ability to complete projects or impact the overall cost of projects. This includes jobs in engineering, logistics, and similar industries.[14] Additionally, vulnerable communities in the region with historically higher employment in manufacturing and freight-adjacent sectors could be disproportionately affected.

Table 4. Most Affected Freight-Dependent Industries by Employment in Study Area

Industry	Jobs – 2023	% of total regional jobs
Total jobs – Freight dependent industries	274,550	23.7%
Manufacturing	47,734	4.1%
Retailers	93,374	8.1%
Specialty Contractors	40,826	3.5%
Warehousing	20,882	1.8%
Truck transportation	15,208	1.3%

Up to 43 percent of import freight value and 63 percent of export freight value within study area could be affected by currently imposed or suspended tariffs on China, Mexico, and Canada (**Table 5** and **Table 6**). If tariffs are levied on European and other East Asian imports and exports,

[11] https://agpolicyreview.card.iastate.edu/fall-2024/waging-global-trade-war-alone-cost-blanket-tariffs-friend-and-foe
[12] https://news.darden.virginia.edu/2025/02/04/qa-what-are-tariffs-and-how-will-they-affect-us/
[13] https://www.nber.org/digest/202502/tariffs-and-us-labor-productivity-evidence-gilded-age
[14] https://www.ucdavis.edu/magazine/how-could-tariffs-affect-consumers-business-and-economy

those figures could increase to 58 percent of import value and 80 percent of export value in the study area. While trade with affected countries accounts for only 3.3 percent and 4.5 percent of study area imports and exports, respectively, other freight hubs and goods from domestic trading partners will likely be impacted by supply and price changes from tariffs as well. In terms of economic value, reductions will likely occur through a series of downstream price changes in the domestic supply chain.

Table 5. Import Value by Trade Partner in Study Area

Country	Freight Value of 2020 Imports (millions of 2017 USD)	Percent of Total
Total	9,902	
Eastern Asia	2,320	23.4%
Europe	1,506	15.2%
Canada	1,044	10.5%
Mexico	918	9.3%
South-Eastern Asia and Oceania	582	5.9%
Other	531	5.4%
Domestic Trade (United States)	118,417	

Table 6. Export Value by Trade Partner in Study Area

Country	Freight Value of 2020 Exports (millions of 2017 USD)	Percent of Total
Total	6,654	
Canada	1,726	25.9%
Mexico	1,234	18.5%
Eastern Asia	1,226	18.4%
Europe	1,167	17.5%
Other	775	11.6%
South-Eastern Asia and Oceania	526	7.9%
Domestic Trade (United States)	85,491	

3.5. Manufacturing Industries

Domestic industries manufacturing goods in the study area, including distribution and retail distribution, could experience short-term economic contraction because of tariffs. These local

industries produce products such as construction materials, automobiles, various machinery, plastics, furniture, and electronics. Businesses such as wholesalers, contractors, retailers, and freight distributors are reliant on the supply chain of these manufactured goods and could anticipate supply-related price increases. These impacts will likely intensify if the targeted countries impose any form of retaliatory tariffs. Within the study area, approximately 17 percent of employment within freight-dependent industries is in industries that directly manufacture goods such as constructions materials, food, vehicle parts, plastics, GPS devices, or other electronics.

3.6. Warehousing and Logistics

Warehousing, fulfillment centers, and goods distribution in the study area could experience short-term impacts from tariffs affecting their supply chains. The initial magnitude of tariff effects is dependent upon the warehousing industry's potential to plan for and mitigate initial price increases through strategies such as front-loading or stockpiling their inventory. This is likely not a long-term solution if both U.S.-imposed or retaliatory tariffs are not eventually repealed. Furthermore, price increases could also squeeze freight and supply routes across the country, particularly those not connected to major ports.

4. Strengthening Local Economies Amid National and Global Challenges

Trade instability, driven by geopolitical tensions, tariff fluctuations, supply chain disruptions, and retaliatory trade policies, poses significant challenges to regions dependent on freight and manufacturing industries. Preparing for and mitigating the impacts of these disruptions requires a proactive approach to strengthen regional resilience and ensure economic stability in the face of national and global uncertainties. This section outlines key recommendations for regional resilience, focusing on economic diversification, technological innovation, and sustainable practices, alongside fostering collaboration and adaptation.

4.1. Economic Diversification

4.1.1. Encouraging Industry Variety

Regions heavily reliant on freight-dependent industries should actively diversify their economic base to reduce sensitivity to trade fluctuations. By fostering a broader range of industries, such as technology, renewable energy, healthcare, and small-scale manufacturing, regions can create a buffer against losses in any one sector.

4.1.2. Support for Local Businesses

Investing in small and medium-sized enterprises can help build a more dynamic and adaptable economy. Providing access to capital, training, and market opportunities for local enterprises ensures they are less vulnerable to external shocks and better equipped to weather global trade instability.

4.2. Building Export-Resilient Systems

Encouraging firms to explore alternative markets and diversify export destinations can reduce dependency on trade with specific countries. Programs that guide businesses in identifying opportunities in untapped global markets can help mitigate the risks of tariff impositions or geopolitical tensions.

4.3. Strengthening Supply Chain Resilience

4.3.1. Regionalized Supply Chains

Promoting the development of regional supply chains minimizes exposure to global disruptions. Investments in local production, warehousing, and transportation infrastructure can make supply chains more robust, reducing reliance on international logistics.

4.3.2. Stockpiling and Resource Management

Encouraging strategic stockpiling of critical raw materials and goods ensures businesses can maintain operations during periods of trade instability. However, stockpiling should be combined with efficient inventory management to avoid overcapacity and long-term freight reductions.

4.4. Leveraging Technological Innovation

4.4.1. Adopting Advanced Manufacturing Techniques

Regions can benefit from integrating advanced technologies such as automation, AI, and robotics into their manufacturing processes. These innovations help increase efficiency, lower production costs, and reduce reliance on external suppliers.

4.4.2. Data-Driven Decision Making

Establishing systems that utilize real-time data analytics enables businesses and policymakers to respond quickly to changes in trade dynamics. Access to accurate data allows for the identification of emerging challenges and the implementation of targeted solutions.

4.5. Fostering Collaboration and Partnerships

4.5.1. Public-Private Partnerships

Collaborative efforts between government entities and private businesses can address infrastructure gaps and promote economic growth. Public-private partnerships can fund projects that enhance supply chain resilience, improve transportation networks, and support workforce development.

4.5.2. Regional Trade Alliances

Establishing trade agreements and alliances with neighboring regions can provide mutual support during periods of economic turbulence. These partnerships promote shared resources and enable collective problem-solving strategies.

4.6. Investing in Workforce Development

4.6.1. Upskilling and Retraining Programs

Trade instability often results in job loss and shifts in employment demand. Regions must invest in workforce development programs that focus on upskilling and retraining workers for emerging industries. Vocational training, technical education, and certifications allow individuals to transition seamlessly into new roles.

4.6.2. Strengthening STEM Education

Promoting science, technology, engineering, and mathematics (STEM) education ensures a steady pipeline of talent for industries that drive innovation. Early investment in STEM initiatives helps build a workforce equipped to meet the demands of a rapidly changing economic landscape.

4.7. Promoting Sustainability Practices

4.7.1. Adopting Circular Economy Principles

Regions can increase resilience by adopting circular economic practices, which emphasize recycling, reusing, and minimizing waste. This approach reduces dependency on raw material imports and creates sustainable industries.

4.7.2. Investing in Renewable Energy

Reducing reliance on imported energy sources through the development of renewable energy infrastructure strengthens energy security. Wind, solar, and other clean energy projects also support job creation and long-term economic growth.

Table 7. Strengthening Local Economies Amid National and Global Challenges Strategies Overview

Strategy	Details
Economic Diversification	Encouraging industry variety, supporting local businesses, building export-resilient systems
Strengthening Supply Chain Resilience	Regionalized supply chains, stockpiling and resource management
Leveraging Technological Innovation	Adopting advanced manufacturing techniques, data-driven decision making
Fostering Collaboration and Partnerships	Public-private partnerships, regional trade alliances
Investing in Workforce Development	Upskilling and retraining programs, strengthening STEM education
Promoting Sustainability and Green Practices	Adopting circular economy principles, investing in renewable energy