

Socioeconomic and Freight Trends and Forecasts

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

ACS	American Community Survey
BEA	Bureau of Economic Analysis
BLS	U.S. Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
FAF	Freight Analysis Framework
FAZ	Freight Analysis Zone
FHWA	Federal Highway Administration
GDP	Gross Domestic Product
GIS	Geographic Information System
KC	Kansas City
LDCMPO	Lawrence-Douglas County Metropolitan Planning Organization
LEHD	Longitudinal Employer-Household Dynamics
MARC	Mid-America Regional Council
MTP	Metropolitan Transportation Plan
PTRCP	Pioneer Trails Regional Planning Commission
TAZ	Traffic Analysis Zone
TDM	Travel Demand Model

1. Introduction

The Mid-America Regional Council (MARC),¹ in coordination with the Lawrence-Douglas County Metropolitan Planning Organization (LDCMPO) in Kansas and Pioneer Trails Regional Planning Commission (PTRPC) in Missouri, developed a freight plan, Connected Freight KC 2050: A Plan in Action. The study region encompasses 14 counties in Kansas and Missouri – MARC’s nine counties², LDCMPO’s one county³, and PTRPC’s four counties⁴, as shown in **Figure 1**.

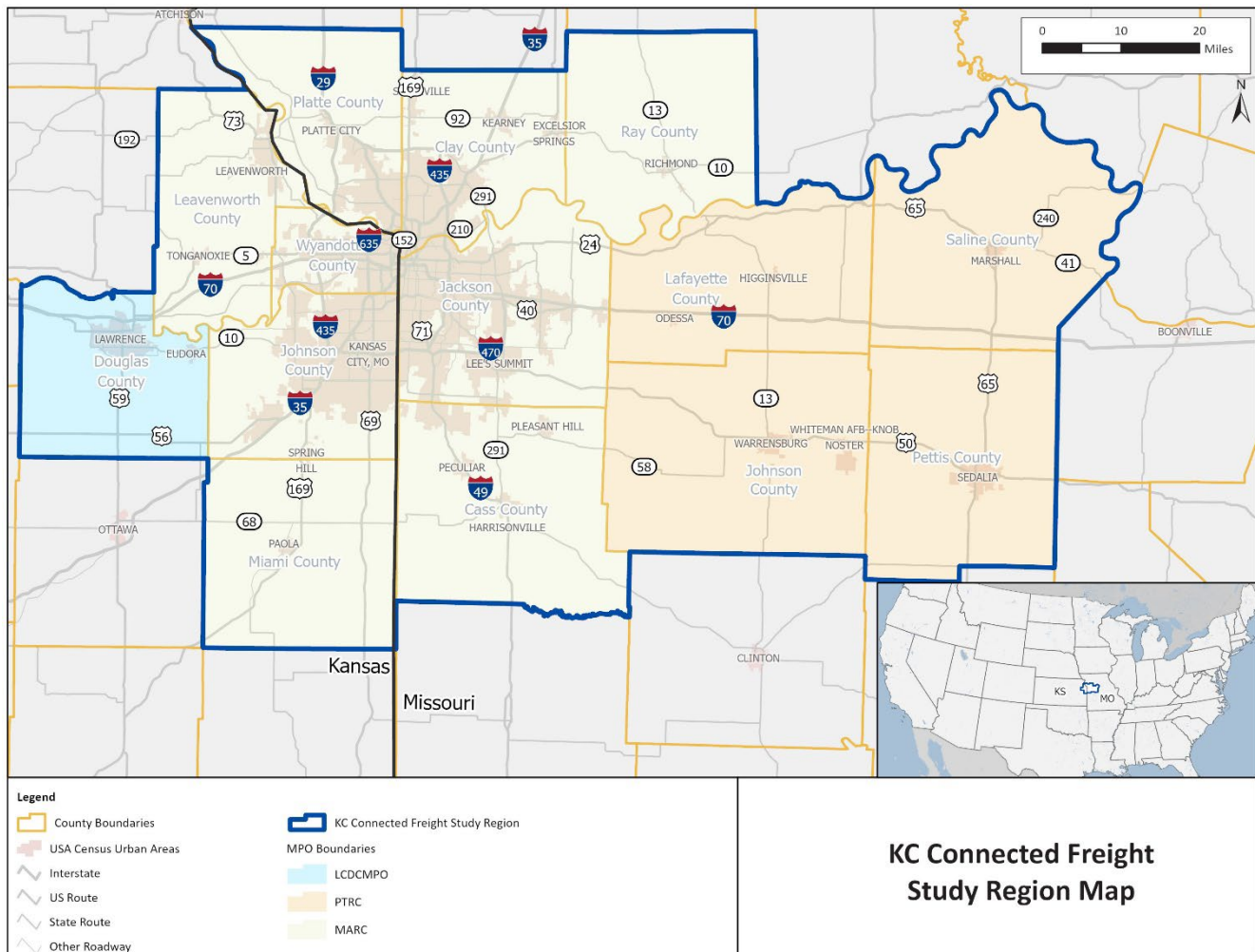


Figure 1. Study Region Map

This document identifies key socioeconomic and freight planning factors that can be used to support the development and evaluation of future multimodal freight transportation system

¹ A nonprofit association of city and county governments and the metropolitan planning organization for the bistate Kansas City region.

² Johnson, Leavenworth, Miami and Wyandotte counties in Kansas, and Cass, Clay, Jackson, Platte, and Ray counties in Missouri.

³ Douglas County in Kansas.

⁴ Johnson, Lafayette, Pettis, and Saline counties in Missouri.

scenarios in the Kansas City (KC) study region and to identify a high-level set of policy recommendations for the Connected Freight KC 2050 Plan.

This document presents existing and anticipated future annual change values for planning factors using readily available regional and national sources of data. It qualitatively discusses likely impacts the planning factors will have on future multimodal freight transportation system usage. Other factors that may affect future multimodal freight transportation system usage not discussed include land use, emerging freight services/technologies, supply chain resiliency, and environmental (e.g., climate change) factors.

2. Planning Factors Identification

The following ten socioeconomic and freight planning factors were identified by the project team. For each factor, the data type available to describe the anticipated future factor levels is indicated in terms of **temporal scope** (“projection” or “historical trend” or “existing only”) and **geographical scope** (“study region” or Kansas City freight analysis framework⁵ or “KC Freight Analysis Framework [FAF] regions”⁶ or “national”):

Socioeconomic Factors

1. Population (projection, study region)
2. Per capita income (historical trend, study region)
3. Employment (projection, study region)
4. Economic productivity (output in constant dollars per employee) (projection, study region)
5. Real gross domestic product (GDP) (historical trend, study region)

Freight Factors

6. Value and value per ton (in constant dollars) of freight moved by commodity (projection, KC FAF regions)
7. Value and value per ton (in constant dollars) of freight moved by mode (projection, KC FAF regions)
8. Value and value per ton (in constant dollars) of freight moved by trade partner (projection, KC FAF regions)

⁵ U.S. Bureau of Transportation Statistics, Freight Analysis Framework Version 5.6.1 Website, available: <https://www.bts.gov/faf> (last accessed on Oct 28, 2024)

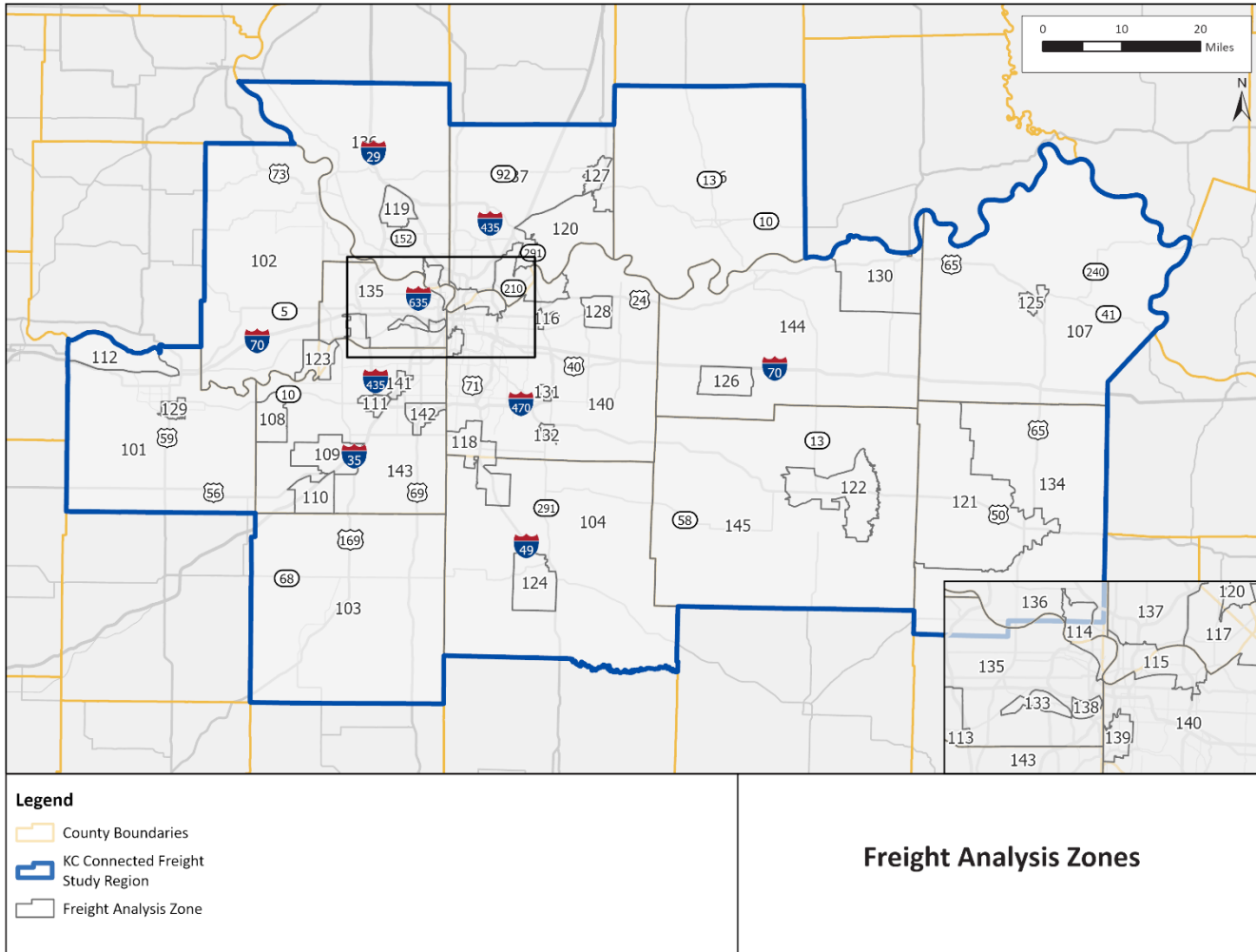
⁶ FAF zone 201 includes not only the five study region counties on Kansas side, but also four other counties of Atchison, Doniphan, Franklin, and Linn in Kansas. FAF zone 291 includes all except Pettis and Saline counties of the nine study region counties on Missouri side. It also includes six other counties of Andrew, Bates, Buchanan, Caldwell, Clinton, and DeKalb counties in Missouri.

9. Truck trip production rate (in truck trips per employee) (existing only, study region)

10. Truck trip attraction rate (in truck trips per person) (existing only, study region)

For some of the planning factors, we found multiple data sources or projections. This document includes these multiple values for the development of alternate future scenarios. The temporal and spatial resolution of the data sources and projections also vary. The standardized temporal and spatial data is as follows:

- **Temporal standardization:** “Projection” and “historical trend” were standardized, where the data permitted, to annual change values.
- **Spatial standardization:** The geographical decision unit was standardized, where the data permitted, to 44 zones defined for the interregional truck travel patterns using Geotab data (**Figure 2**), as they also formed the basis for the estimation of existing truck trip production and attraction rates (#9 and #10 in the planning factors list). This document titles and refers to these 44 zones as “freight analysis zones (FAZs)”.



Source: Geotab September-November 2023 Data Analysis

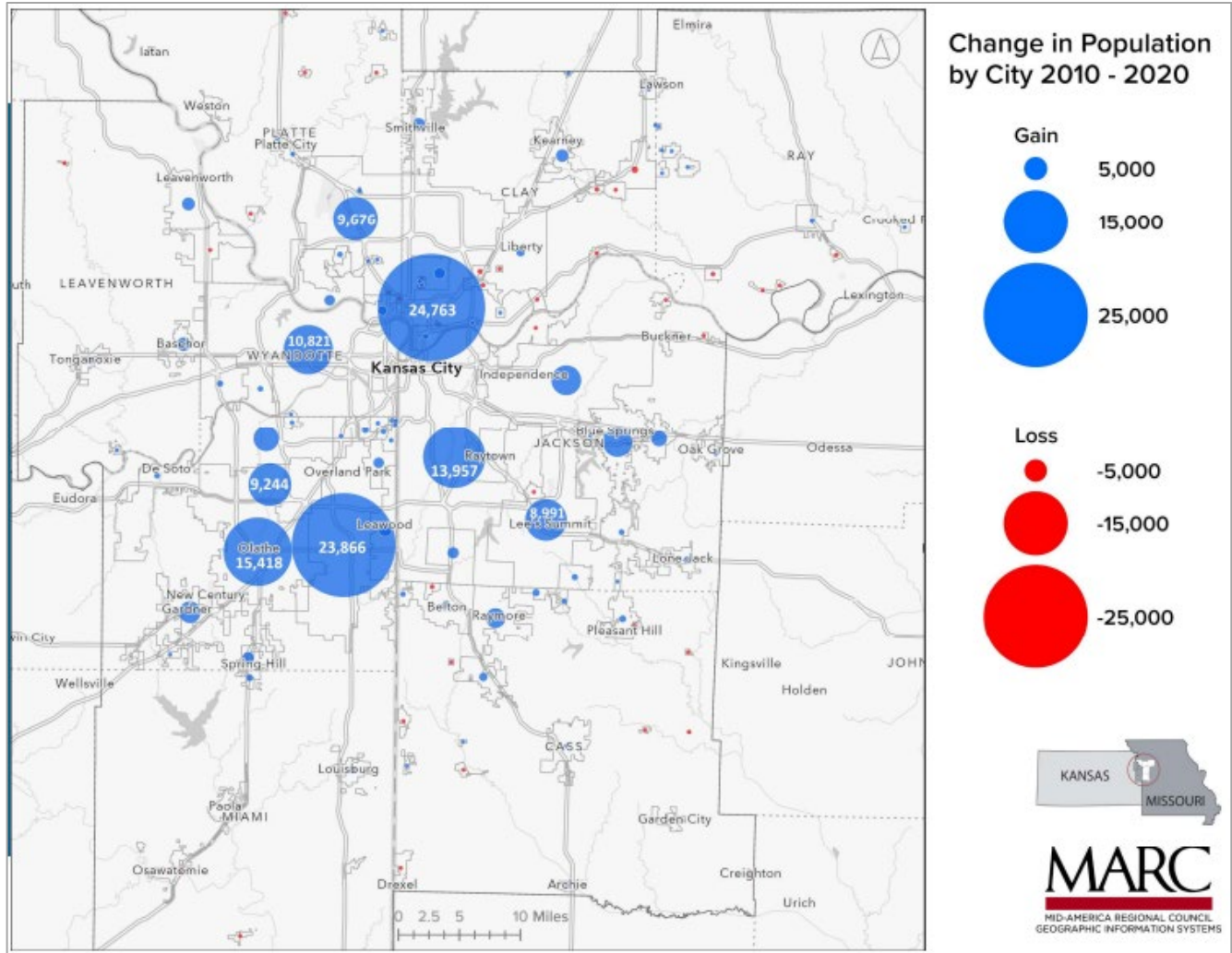
Note: FAZ identification numbers are shown in the map above, their names are included in Table 2.

Figure 2. Freight Analysis Zones Map

3. Socioeconomic Factor Values

3.1. Population

The project team researched historical population trends in the study region using MARC's city level population changes between the 2010 and 2020 Census cycles (**Figure 3**). Kansas City, Leawood, and Olathe gained over 15,000 residents each between 2010 and 2020. Small reductions in population were seen in the rural areas of the study region.



Source: Frank Lenk, Director of Research Services, MARC Presentation on "DRAFT Regional 2050 Population and Employment Forecasts", September 12, 2024 to MARC Model Users Group, available: <https://www.marc.org/sites/default/files/2024-09/DRAFT-Long-Run-Population-Employment-Forecast.pdf> (accessed on October 28, 2024)

Figure 3. Historical Population Changes by City in Mid-American Regional Council Region, 2010–2020

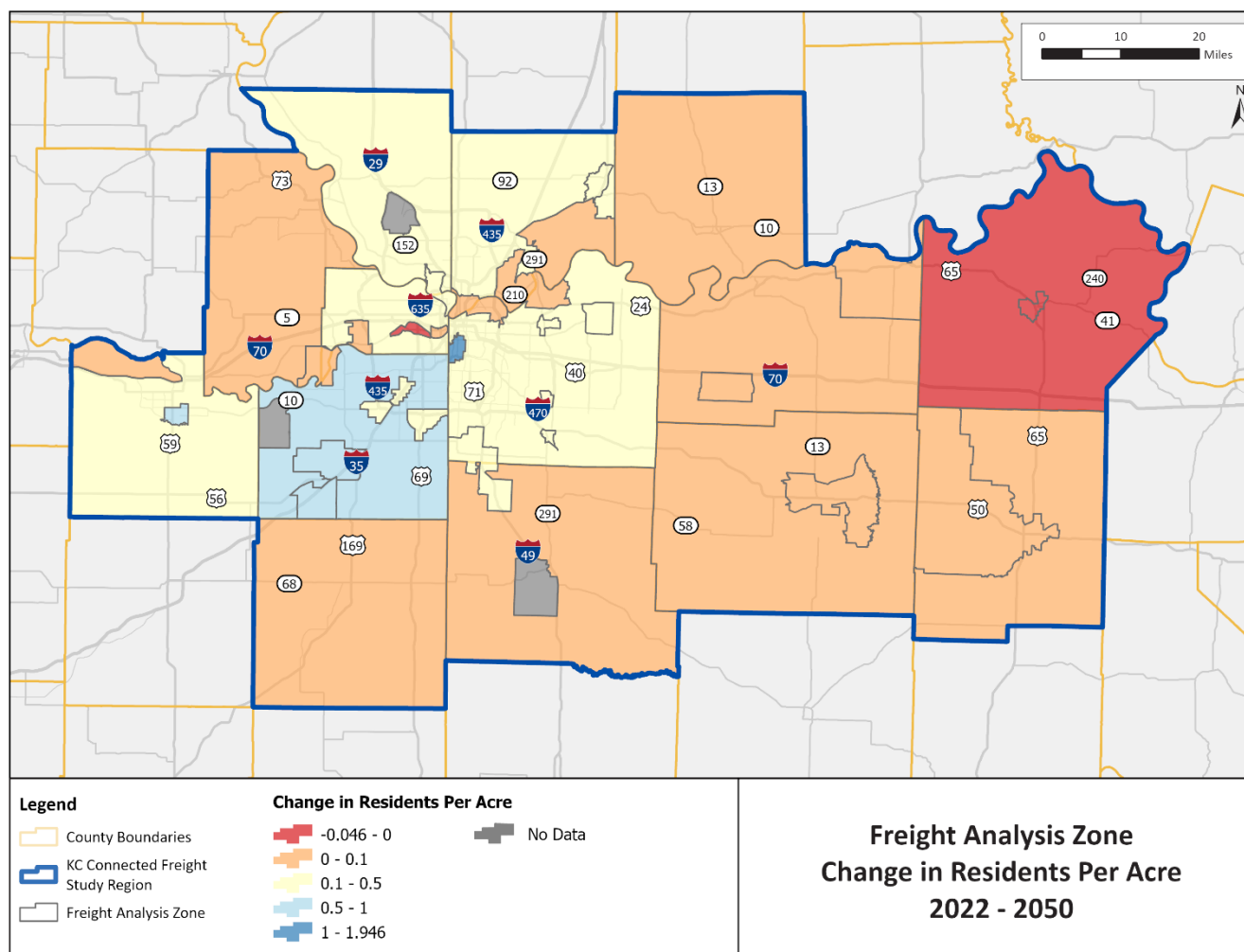
The study team gathered multiple sources of population forecasts as shown in **Table 1**. In the case of LDCMPO's Metropolitan Transportation Plan (MTP), multiple projections were observed.

Table 1. Population Forecast Data Sources

Data Source	Temporal Resolution	Spatial Resolution	Data Use
U.S. Census, 2022 American Community Survey (ACS) 5-year estimates	Current value (2018–2022 average)	Processed at source and aggregated to FAZs in full study region	Current value for population–full study region; and planning factor #10 (truck trip attraction rate) estimation
MARC’s travel demand model (TDM) forecast (2015–2050)	2015 and 2050 values	Processed at source and aggregated to FAZs in MARC region except Ray County	Base scenario forecast population change per year–MARC region except Ray County
MARC’s county level June 2020 projections (2020–2050) and ongoing updates (region level September 2024 DRAFT projections)	2020 and 2050 values	MARC’s nine-county region	Alternate scenario forecast population change per year–MARC’s nine-county region only
LDCMPO’s TDM Forecast (2050)	2050 values	Processed at source and aggregated to FAZs in Douglas County and calculated growth rate by comparing to 2022 data	Base scenario forecast population–Douglas County only
LDCMPO’s 2050 MTP county level projections (2020–2050)	2020 and 2050 values	Douglas County	Alternate scenario forecast population change per year–Douglas County only
University of Kansas, Institute for Policy & Social Research’s Kansas Statistical Abstract 2023–Kansas State’s county level projections (2021–2051)	2021 and 2051 values	Kansas side study region counties (Douglas, Johnson, Leavenworth, Miami, and Wyandotte)	Alternate scenario forecast population change per year–Kansas side study region counties
Missouri Office of Administration’s–Missouri State’s county level projections (2020–2030)	2020 and 2030 values	Missouri side study region counties (Cass, Clay, Jackson, Johnson, Lafayette, Pettis, Platte, Ray, and Salinas)	Base scenario forecast population change per year–Ray County and PTRPC region counties, and alternate scenario forecast population change per year–Other Missouri side study region counties

Using MARC’s TDM forecast (2015–2050), LDCMPO’s TDM forecast (2020–2050), and Missouri State’s county level projections (2020–2030) for Ray County and PTRPC, base scenario

assumptions were made on the percent population change per year for the FAZs and estimated future 2050 population and population change between 2022 and 2050 for the base scenario, as shown in **Table 2**. Population in the planning regions of MARC, LDCMPO, and PTRPC are expected to grow annually at rates of 0.83 percent, 1.18 percent, and 0.40 percent, on average, respectively. The overall study region population is expected to grow annually at a rate of 0.82 percent on average from about 2,374,300 residents in 2022 to about 2,921,300 residents in 2050, an increase of about 547,000 residents by 2050 under the base scenario. The changes in residents per acre (i.e., population density) are shown in **Figure 4**.



Source: U.S. Census Bureau, 2018–2022 ACS 5-Year Population by Census Tract Estimates; MARC TDM Forecast (2015–2050); LDCMPO TDM Forecast (2020–2050); Missouri State's County Level Projections (2020–2030); geographic information system (GIS) (Spatial Join) Analysis with FAZs identified for Geotab Data Analysis.

Figure 4. Base Scenario Population Density Change Forecasts by Freight Analysis Zone, 2022–2050

Table 2. Base Scenario Population Forecasts by Freight Analysis Zone, 2022 and 2050

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Population (2022)	Assumed % Population Change per Year	Estimated Future Population (2050)	Estimated Population Change (2022–2050)
102	Rest of Leavenworth County		MARC	82,050	0.75%	99,281	17,231
103	Miami County		MARC	34,312	0.96%	43,535	9,223
104	Rest of Cass County		MARC	83,008	1.02%	106,715	23,707
106	Ray County		MARC	23,122	0.18%	24,287	1,165
108	Middle West Johnson County (KS)	Prairie Center	MARC	No Data	N/A	No Data	No Data
109	South Central Johnson County (KS)	Olathe	MARC	8,681	4.66%	20,008	11,327
110	Southwest Central Johnson County (KS)	Gardner	MARC	4,591	7.55%	14,296	9,705
111	North Central Johnson County (KS)	Lenexa	MARC	1,336	3.77%	2,746	1,410
113	Southwest Central Wyandotte County	Edwardsville	MARC	4,744	0.07%	4,837	93
114	Southeast Platte County – Northwest Wyandotte County	Fairfax and Riverside	MARC	3,886	1.01%	4,985	1,099
115	Southwest Clay County – Northwest Jackson County	North Kansas City	MARC	7,050	0.17%	7,385	335
116	North Central Jackson County	Independence	MARC	4,014	0.36%	4,419	405

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Population (2022)	Assumed % Population Change per Year	Estimated Future Population (2050)	Estimated Population Change (2022–2050)
117	South Central Clay County – North Central Jackson County	Claycomo	MARC	15,897	0.17%	16,654	757
118	Northwest Cass County – Southwest Jackson County	Belton and Grandview	MARC	40,215	0.78%	48,998	8,783
119	Central Platte County	Kansas City International Airport	MARC	No Data	N/A	No Data	No Data
120	Southeast Clay County	Liberty	MARC	8,078	0.28%	8,711	633
123	Southwest Wyandotte County – Northwest Johnson County (KS) – Southeast Leavenworth County	Bonner Springs	MARC	2,803	0.82%	3,447	644
124	Central Cass County	Harrisonville	MARC	No Data	N/A	No Data	No Data
127	East Central Clay County	Excelsior Springs	MARC	4,930	0.63%	5,800	870
128	Northeast Central Jackson County	Buckner	MARC	5,429	1.14%	7,162	1,733
131	Middle Central Jackson County	Lee's Summit Airport	MARC	3,263	0.45%	3,674	411
132	South Central Jackson County	Lee's Summit	MARC	2,590	0.37%	2,858	268
133	Middle East Central Wyandotte County	Santa Fe / Kansas City	MARC	39	-0.09%	38	-1

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Population (2022)	Assumed % Population Change per Year	Estimated Future Population (2050)	Estimated Population Change (2022–2050)
135	Rest of Wyandotte County		MARC	160,979	0.48%	182,615	21,636
136	Rest of Platte County		MARC	103,147	1.50%	146,469	43,322
137	Rest of Clay County		MARC	224,717	1.31%	307,143	82,426
138	Middle East Wyandotte County	Armourdale / Kansas City	MARC	2,227	0.18%	2,339	112
139	Middle West Jackson County	Midtown Kansas City	MARC	36,208	0.73%	43,609	7,401
140	Rest of Jackson County		MARC	641,417	0.40%	713,256	71,839
141	Northeast Central Johnson County (KS)	Overland Park	MARC	18,609	0.09%	19,078	469
142	Middle East Johnson County (KS)	Leawood	MARC	20,547	0.45%	23,136	2,589
143	Rest of Johnson County (KS)		MARC	554,175	1.10%	724,861	170,686
101	Rest of Douglas County		LDCMPO	101,530	1.25%	137,066	35,536
112	Northwest Douglas County	Lecompton	LDCMPO	2,539	0.70%	3,037	498
129	Central Douglas County	Lawrence	LDCMPO	15,025	0.81%	18,433	3,408
107	Rest of Saline County		PTRPC	20,514	-0.28%	18,906	-1,608
121	Northwest and Central Pettis County	Sedalia	PTRPC	30,236	0.70%	36,162	5,926
122	Middle East Central Johnson County (MO)	Warrensburg	PTRPC	12,251	0.69%	14,618	2,367

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Population (2022)	Assumed % Population Change per Year	Estimated Future Population (2050)	Estimated Population Change (2022–2050)
125	Central Saline County	Marshall	PTRPC	2,705	-0.28%	2,493	-212
126	Southwest Central Lafayette County	Odessa	PTRPC	5,970	0.02%	6,003	33
130	Northeast Lafayette County	Waverly	PTRPC	1,480	0.02%	1,488	8
134	Rest of Pettis County		PTRPC	12,823	0.70%	15,336	2,513
144	Rest of Lafayette County		PTRPC	25,408	0.02%	25,550	142
145	Rest of Johnson County (MO)		PTRPC	41,774	0.69%	49,845	8,071
Sub-Total			MARC	2,102,064	0.83%	2,592,342	490,278
			LDCMPO	119,094	1.18%	158,536	39,442
			PTRPC	153,161	0.40%	170,401	17,240
Total			Study Region	2,374,319	0.82%	2,921,279	546,960

Source: U.S. Census Bureau, 2018–2022 ACS 5-Year Population by Census Tract Estimates; MARC TDM Forecast (2015–2050); LDCMPO TDM Forecast (2020–2050); Missouri State's County Level Projections (2020–2030); GIS (Spatial Join) Analysis with FAZ identified for Geotab Data Analysis.

Note: Cities/land uses identified are not fully enclosed by the FAZs.

Using the remaining population data sources, the study team estimated alternate population forecasts for the planning agency regions and the full study region (**Table 3**). The minimum and maximum alternate scenario forecasts indicate the annual population growth rate can vary between 0.50 percent and 0.83 percent on average, and the population change between 2022 and 2050 can vary between 332,400 and 552,500 people. At a minimum, the future multimodal freight transportation system must serve 2.7 million residents in the study region in 2050.

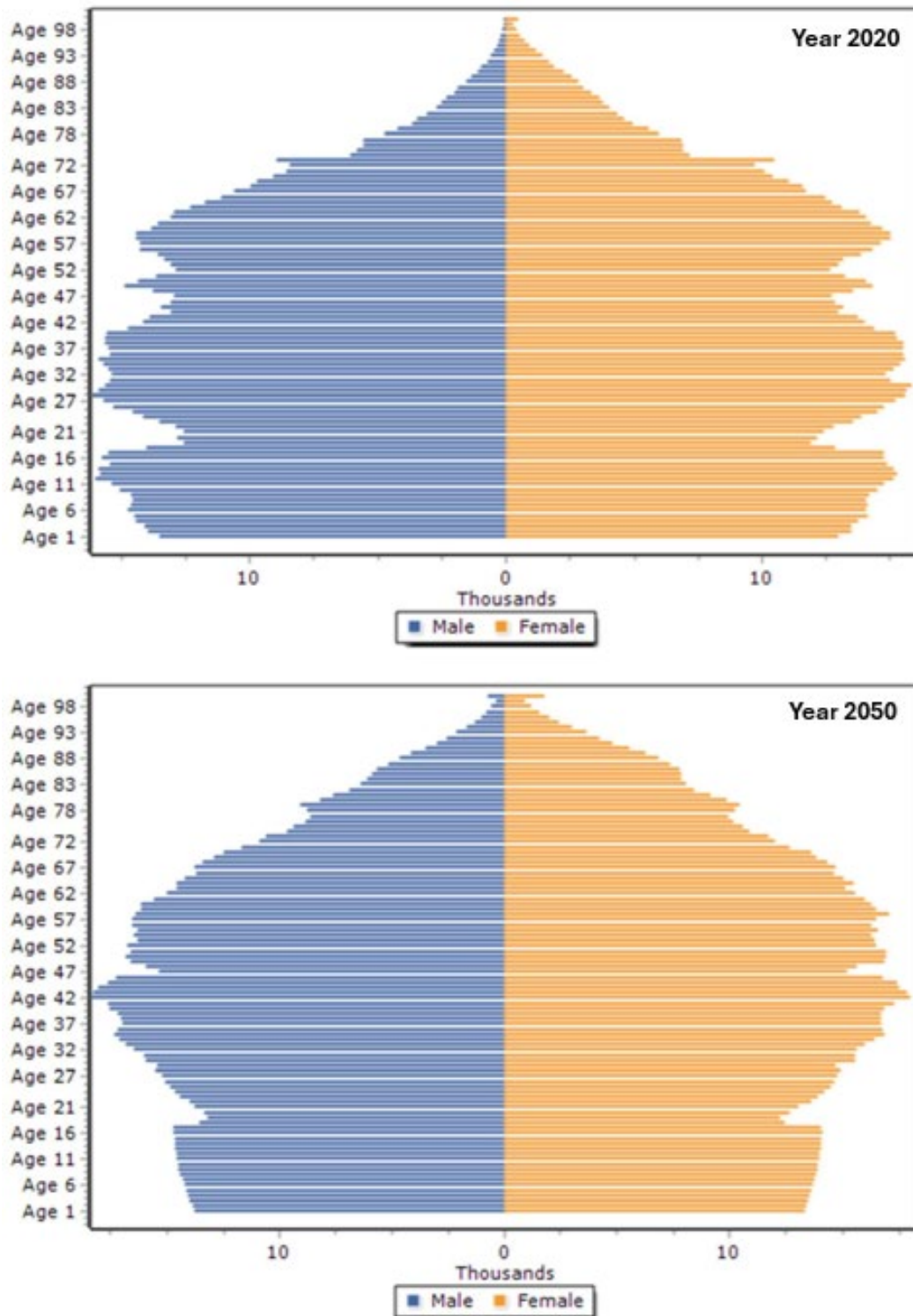
Table 3. Base and Alternate Scenario Population Forecasts by Planning Agency Region, 2022 and 2050

Planning Agency	Scenario	Current Population (2022)	Assumed % Population Change per Year	Estimated Future Population (2050)	Estimated Population Change (2022–2050)
MARC	Base – MARC TDM Forecast (2015-2050) for all except Ray County; Missouri State's County Level Projections (2020–2030) for Ray County	2,102,064	0.83%	2,592,342	490,278
	Alternate 1 – MARC's County Level June 2020 Projections (2020–2050)		0.77%	2,555,269	453,205
	Alternate 2 – MARC's Region Level September 2024 DRAFT Projections (2020–2050)		0.51%	2,402,239	300,175
	Alternate 3 – Kansas State's County Level Projections (2021–2051) and Missouri State's County Level Projections (2020–2030)		0.72%	2,526,390	424,326
LDCMPO	Base – LDCMPO TDM Forecast (2050)	119,094	1.18%	158,536	39,442
	Alternate 1 – LDCMPO MTP County Level Low Projection (2020–2050)		0.45%	134,100	15,006
	Alternate 2 – LDCMPO MTP County Level Medium Projection (2020–2050)		0.72%	143,103	24,009
	Alternate 3 – LDCMPO MTP County Level High Projection (2020–2050)		1.35%	164,112	45,018

Planning Agency	Scenario	Current Population (2022)	Assumed % Population Change per Year	Estimated Future Population (2050)	Estimated Population Change (2022–2050)
	Alternate 4 – Kansas State's County Level Projections (2021–2051)		0.87%	148,105	29,011
Pioneer Trails RPC	Base – Missouri State's County Level Projections (2020–2030)	153,161	0.40%	170,401	17,240
Study Region	Base	2,374,319	0.82%	2,921,279	546,960
	Minimum Alternate		0.50%	2,706,740	332,421
	Maximum Alternate		0.83%	2,926,855	552,536

Source: U.S. Census Bureau, 2018–2022 ACS 5-Year Population by Census Tract Estimates; Other sources listed in the table above.

The study team attempted to characterize population changes anticipated in the future in the study region in a limited way using age distribution changes seen in MARC’s September 2024 DRAFT Projections (2020–2050) (**Figure 5**). Population 15 and over (working age population) that is 55+ years in age has increased in share from 35 percent to 40 percent, indicating that the labor force in the study region is aging. The chart also shows the population share under 15 years of age is shrinking, which means the aging workforce issue may continue beyond 2050 unless migration adds to the working age population.



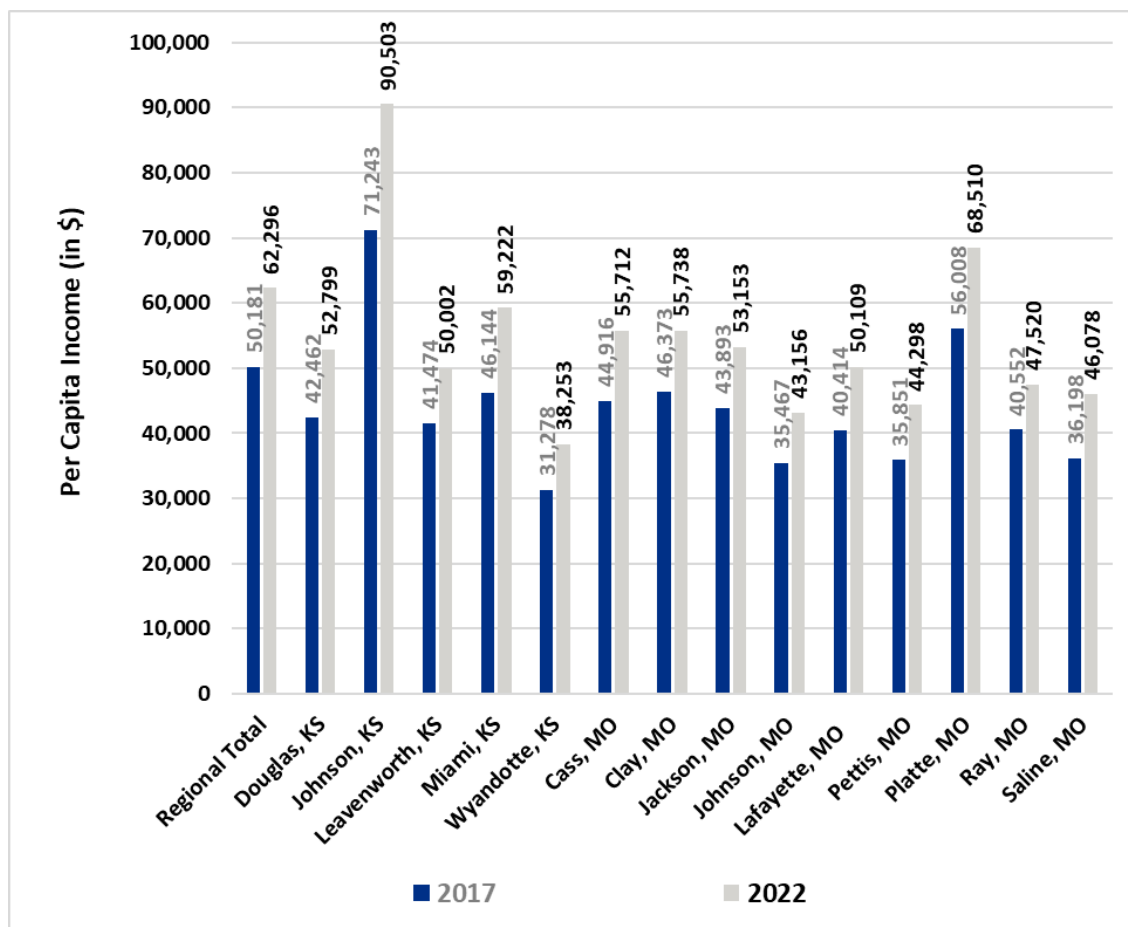
Source: Frank Lenk, Director of Research Services, MARC Presentation on "DRAFT Regional 2050 Population and Employment Forecasts", September 12, 2024 to MARC Model Users Group, available: <https://www.marc.org/sites/default/files/2024-09/DRAFT-Long-Run-Population-Employment-Forecast.pdf> (accessed on October 28, 2024).

Figure 5. Forecast Population Age Distribution Changes in Mid-American Regional Commission Region, 2020–2050

3.2. Per Capita Income

The study team investigated changes in per capita income (annual value) between 2017 and 2022 by county (**Figure 6**) to assess the changes in the purchasing power of goods and services of regional consumers and to identify regional disparities. It is noted the per capita income data are not in constant dollars, so they are affected by inflation between 2017 and 2022.

Acknowledging this, the regional average per capita income grew from \$50,181 to \$62,296, or 4.83 percent annually on average. For counties in the study region, the growth rate ranged between 3.44 percent (Ray County in Missouri) to 5.67 percent (Miami County in Kansas). A wide disparity in per capita income is seen across the study region. In 2022, the per capita income ranged between \$38,253 (Wyandotte County in Kansas) to \$90,503 (Johnson County in Kansas). The standard deviation in 2022 per capita income for all counties combined is around \$12,900, while the same excluding the extreme values for Wyandotte County in Kansas and Johnson County in Kansas is around \$7,100. In other words, the purchasing power of goods and services does not vary as much in the remaining counties.



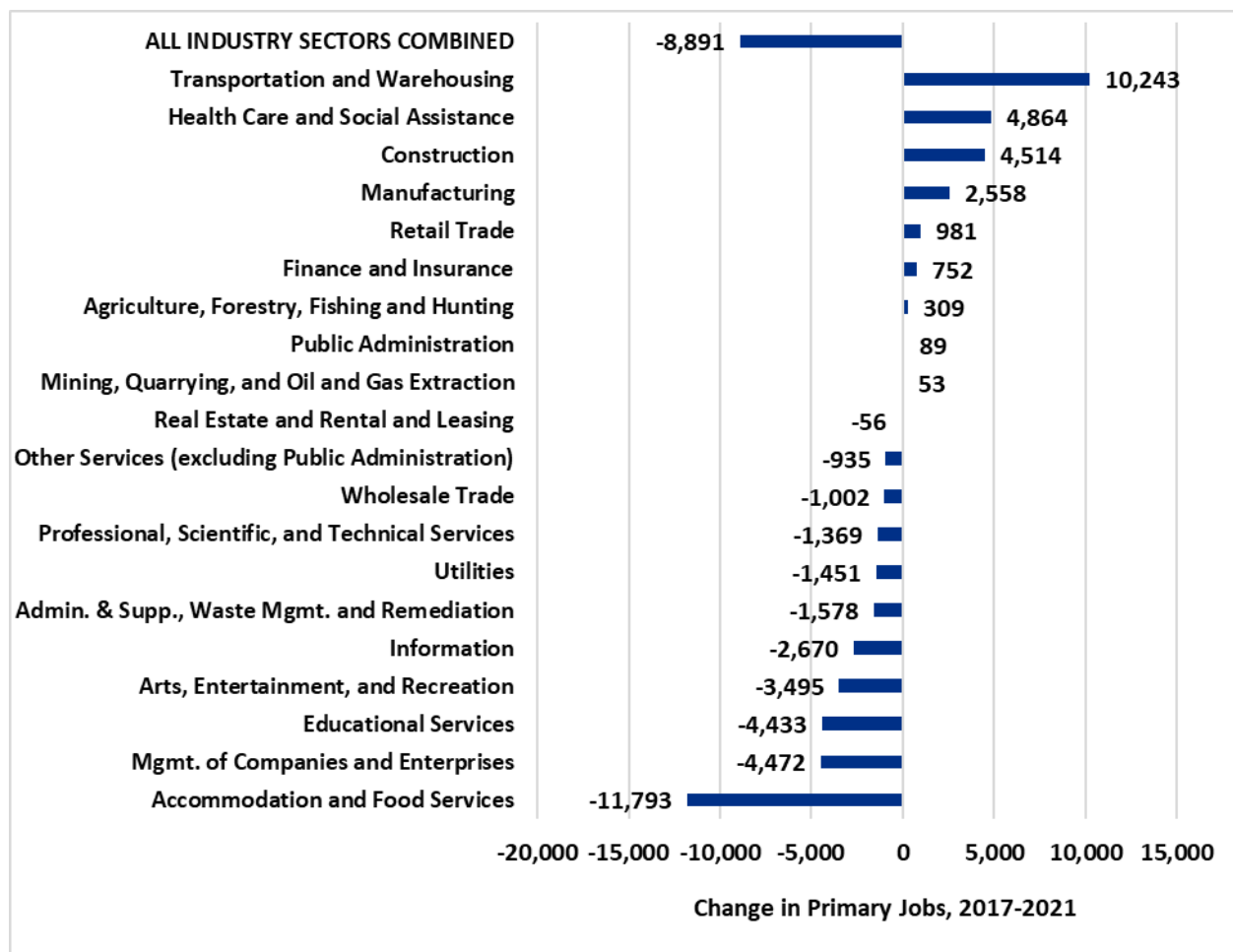
Source: U.S. Bureau of Economic Analysis, "CAINC1 County and metropolitan statistical area personal income summary: personal income, population, per capita personal income" (accessed Monday, October 7, 2024)

Figure 6. Historical Per Capita Income Changes, 2017 and 2022

3.3. Employment

As per U.S. Census Longitudinal Employer-Household Dynamics (LEHD) data,⁷ there were about 1,066,900 primary jobs in 2017, which reduced annually by 0.21 percent on average to reach about 1,058,000 primary jobs in 2021. This period coincides with shutdowns to prevent the spread of COVID-19 that began in May 2020 and the economic recovery that began after the risks of hospitalization and deaths due to the pandemic started declining.

The study team gathered historical changes in the number of primary jobs by industry sector between 2017 and 2021 as shown in **Figure 7**. In this period, there was a combined increase of more than 17,000 jobs in the goods producing/handling industry sectors of transportation and warehousing, construction, and manufacturing.

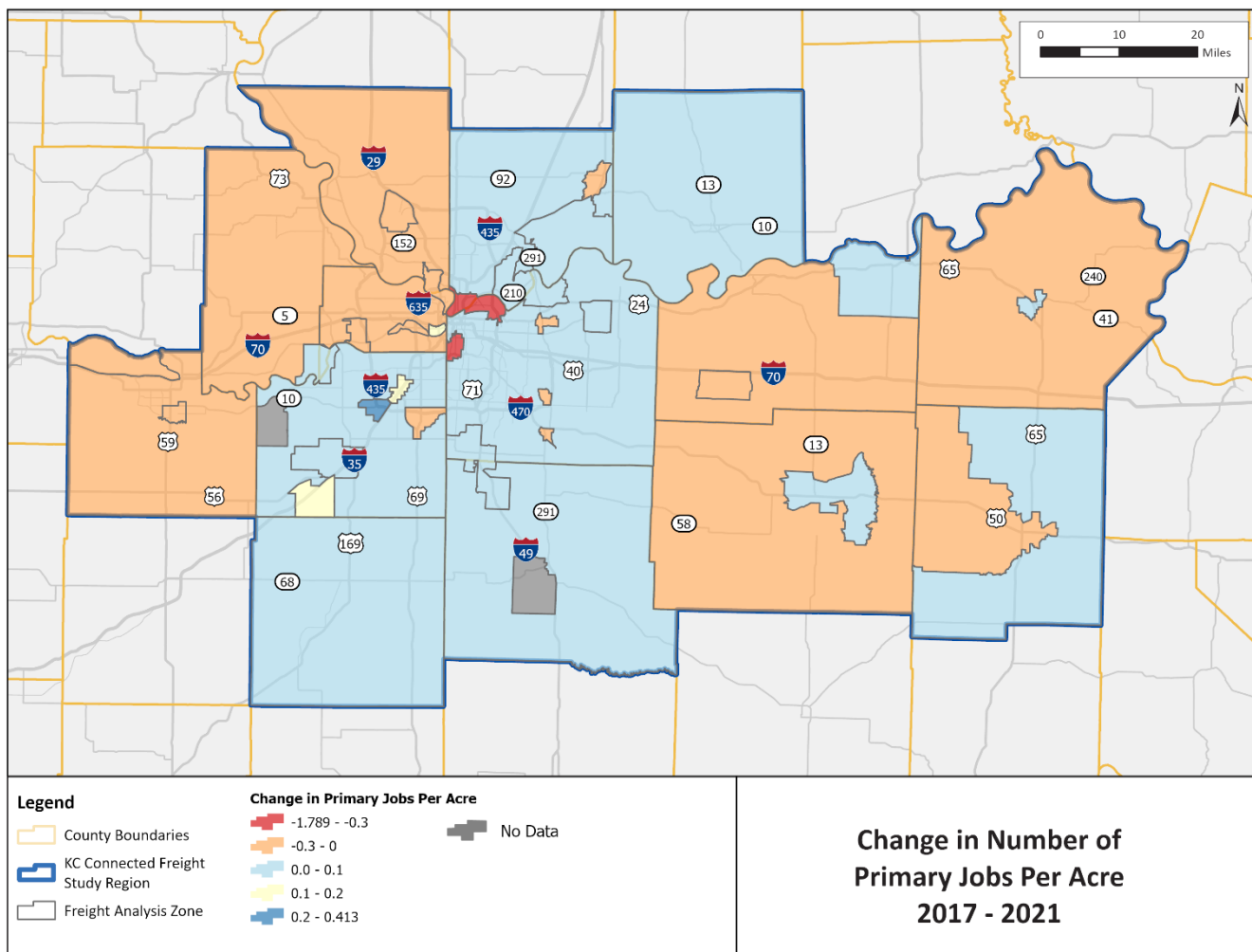


Source: U.S. Census Bureau, LEHD data, available: <https://onthemap.ces.census.gov/> (accessed on October 28, 2024).

Figure 7. Historical Employment Changes by Industry Sector in Study Region, 2017–2021

⁷ <https://onthemap.ces.census.gov/> (accessed on October 28, 2024)

Using U.S. Census on the map census tract level data and aggregation to FAZs, we also visualized the historical changes in the number of primary jobs per acre (i.e., employment density) as shown in **Figure 8**. Some FAZs of Johnson County in Kansas and Clay, Cass, and Jackson counties in Missouri (including those near the cities of Lenexa, Gardner, Belton, Grandview, Olathe and some rural areas) experienced job gains of over 1,000 jobs each between 2017 and 2021. At the same time, some other FAZs of Johnson, Wyandotte and Douglas County in Kansas and Clay, Platte, and Jackson counties in Missouri (including those near the cities of Leawood, North and Midtown Kansas City and some rural areas) experienced job losses of over 1,000 jobs each between 2017 and 2021.



Source: U.S. Census Bureau, LEHD data, available: <https://onthemap.ces.census.gov/> (accessed on October 28, 2024).

Figure 8. Historical Employment Density Change by Freight Analysis Zone, 2017–2021

Like the population forecasts, the study team gathered multiple sources of employment forecasts as shown in **Table 4**.

Table 4. Employment Forecast Data Sources

Data Source	Temporal Resolution	Spatial Resolution	Data Use
U.S. Census LEHD data	Current value (2021)	Processed at source and aggregated to FAZs in full study region	Current value for primary jobs–full study region; and planning factor #9 (truck trip production rate) estimation
MARC’s TDM forecast (2015–2050)	2020 and 2050 values	Processed at source and aggregated to FAZs in MARC region except Ray County	Base scenario forecast employment change per year–MARC region except Ray County
MARC’s county level June 2020 projections (2020–2050) and ongoing updates (region level September 2024 DRAFT projections)	2020 and 2050 values	MARC’s nine-county region	Alternate scenario forecast employment change per year–MARC’s nine-county region only
L-DC MPO’s TDM Forecast (2050)	2050 values	Processed at source and aggregated to FAZs in Douglas County and calculated growth rate by comparing to 2022 data	Base scenario forecast employment–Douglas County only
U.S. Bureau of Labor Statistics (BLS), Employment Projections	2023 and 2033 values	National projections (by industry sector) applied to planning agency regions and their industry sector mixes	Base scenario forecast employment change per year–Ray County and PTRPC, alternate scenario forecast employment change per year–MARC’s nine-county region and Douglas County

Sources:

U.S. Census Bureau, LEHD data, available: <https://onthemap.ces.census.gov/> (accessed on October 28, 2024).

MARC, TDM Outputs–Population and Employment by Traffic Analysis Zone (TAZ), data provided for Connected Freight KC 2050 through email communications.

Frank Lenk, Director of Research Services, MARC Presentation on "DRAFT Regional 2050 Population and Employment Forecasts", September 12, 2024 to MARC Model Users Group, available: <https://www.marc.org/sites/default/files/2024-09/DRAFT-Long-Run-Population-Employment-Forecast.pdf> (accessed on October 28, 2024).

LDCMPO, TDM Outputs–Population and Employment by TAZ, data provided for Connected Freight KC 2050 through email communications. <https://assets.lawrenceks.org/mpo/T2050/T2050.pdf> (accessed on October 28, 2024).

U.S. BLS, Employment Projections, Table 2.11 Employment and Output by Industry, available: <https://www.bls.gov/emp/tables.htm> (accessed on October 28, 2024).

Using MARC’s TDM forecast (2015–2050), LDCMPO’s TDM Forecast (2020–2050) and U.S. BLS industry level employment projections (2023–2033) for Ray County and PTRPC, scenario assumptions on the percent employment change per year for the freight analysis zones and estimated future 2050 employment and employment change between 2021 and 2050 for the

base scenario were made, as shown in **Table 5**. Employment in the planning regions of MARC, LDCMPO and PTRPC are expected to grow annually at rates of 1.04 percent, 1.41 percent, and 0.34 percent, on average, respectively. The overall study region employment is expected to grow annually at a rate of 1.07 percent on average from about 1,058,000 jobs in 2021 to 1,385,000 jobs in 2050, an increase of about 327,000 jobs by 2050 under the base scenario. The changes in employees per acre (employment density) are shown in **Figure 9**.

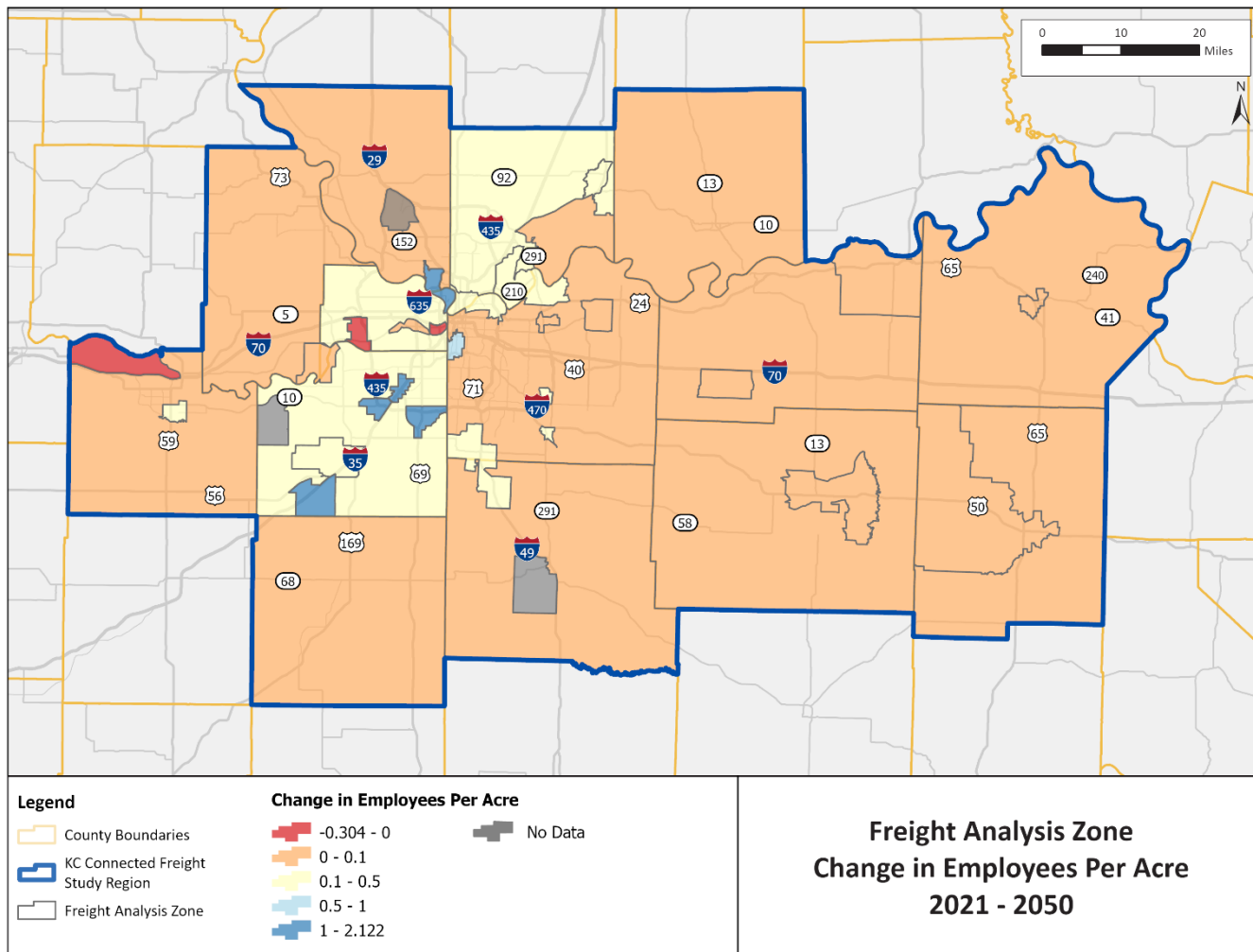


Figure 9. Base Scenario Employment Density Change Forecasts by Freight Analysis Zone, 2021–2050

Table 5. Base Scenario Employment Forecasts by Freight Analysis Zone

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Emp. (2021)	Assumed % Emp. Change per Year	Estimated Future Emp. (2050)	Estimated Emp. Change (2021–2050)
102	Rest of Leavenworth County		MARC	17,509	1.17%	23,450	5,941
103	Miami County		MARC	8,264	1.00%	10,661	2,397
104	Rest of Cass County		MARC	18,823	1.42%	26,574	7,751
106	Ray County		MARC	3,852	0.32%	4,209	357
108	Middle West Johnson County (KS)	Prairie Center	MARC	No Data	N/A	No Data	No Data
109	South Central Johnson County (KS)	Olathe	MARC	12,933	1.50%	18,559	5,626
110	Southwest Central Johnson County (KS)	Gardner	MARC	2,890	27.88%	26,256	23,366
111	North Central Johnson County (KS)	Lenexa	MARC	28,656	1.15%	38,213	9,557
113	Southwest Central Wyandotte County	Edwardsville	MARC	4,333	-1.47%	2,486	-1,847
114	Southeast Platte County – Northwest Wyandotte County	Fairfax and Riverside	MARC	11,872	2.67%	21,064	9,192
115	Southwest Clay County – Northwest Jackson County	North Kansas City	MARC	38,498	0.35%	42,405	3,907
116	North Central Jackson County	Independence	MARC	1,274	0.17%	1,337	63
117	South Central Clay County – North Central Jackson County	Claycomo	MARC	18,572	0.65%	22,072	3,500
118	Northwest Cass County – Southwest Jackson County	Belton and Grandview	MARC	25,063	1.16%	33,494	8,431

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Emp. (2021)	Assumed % Emp. Change per Year	Estimated Future Emp. (2050)	Estimated Emp. Change (2021–2050)
119	Central Platte County	Kansas City International Airport	MARC	2,855	1.30%	3,931	1,076
120	Southeast Clay County	Liberty	MARC	8,124	0.71%	9,797	1,673
123	Southwest Wyandotte County – Northwest Johnson County (KS) – Southeast Leavenworth County	Bonner Springs	MARC	209	4.54%	484	275
124	Central Cass County	Harrisonville	MARC	No Data	N/A	No Data	No Data
127	East Central Clay County	Excelsior Springs	MARC	2,330	1.00%	3,006	676
128	Northeast Central Jackson County	Buckner	MARC	857	0.92%	1,086	229
131	Middle Central Jackson County	Lee's Summit Airport	MARC	3,808	0.66%	4,537	729
132	South Central Jackson County	Lee's Summit	MARC	991	0.59%	1,161	170
133	Middle East Central Wyandotte County	Santa Fe / Kansas City	MARC	4,767	0.09%	4,891	124
135	Rest of Wyandotte County		MARC	60,867	1.41%	85,756	24,889
136	Rest of Platte County		MARC	33,935	1.98%	53,420	19,485
137	Rest of Clay County		MARC	50,653	1.62%	74,450	23,797
138	Middle East Wyandotte County	Armourdale / Kansas City	MARC	4,765	-0.07%	4,668	-97
139	Middle West Jackson County	Midtown Kansas City	MARC	51,760	0.15%	54,012	2,252
140	Rest of Jackson County		MARC	261,021	0.43%	293,570	32,549

FAZ ID	FAZ Name	Notable Cities/Land Use in FAZ	Planning Agency	Current Emp. (2021)	Assumed % Emp. Change per Year	Estimated Future Emp. (2050)	Estimated Emp. Change (2021–2050)
141	North East Central Johnson County (KS)	Overland Park	MARC	22,449	0.86%	28,048	5,599
142	Middle East Johnson County (KS)	Leawood	MARC	52,009	0.99%	66,941	14,932
143	Rest of Johnson County (KS)		MARC	212,408	1.59%	310,349	97,941
101	Rest of Douglas County		LDCMPO	35,600	1.57%	51,809	16,209
112	Northwest Douglas County	Lecompton	LDCMPO	2,360	-0.18%	2,237	-123
129	Central Douglas County	Lawrence	LDCMPO	5,723	1.04%	7,449	1,726
107	Rest of Saline County		PTRPC	5,142	0.34%	5,649	507
121	Northwest and Central Pettis County	Sedalia	PTRPC	16,016	0.34%	17,595	1,579
122	Middle East Central Johnson County (MO)	Warrensburg	PTRPC	7,411	0.34%	8,142	731
125	Central Saline County	Marshall	PTRPC	3,085	0.34%	3,389	304
126	South West Central Lafayette County	Odessa	PTRPC	1,301	0.34%	1,429	128
130	Northeast Lafayette County	Waverly	PTRPC	222	0.34%	244	22
134	Rest of Pettis County		PTRPC	2,327	0.34%	2,556	229
144	Rest of Lafayette County		PTRPC	6,444	0.34%	7,079	635
145	Rest of Johnson County (MO)		PTRPC	6,000	0.34%	6,592	592
Sub-Total			MARC	966,347	1.09%	1,270,887	304,540
			L-DC PC	43,683	1.41%	61,495	17,812
			PTRPC	47,948	0.34%	52,675	4,727
Total			Study Region	1,057,978	1.07%	1,385,057	327,079

Using the remaining employment data sources, the study team estimated alternate employment forecasts for the planning agency regions and the full study region, summarized in **Table 6**. For the study region, the minimum and maximum alternate scenario forecasts indicate the annual employment growth rate can vary between 0.49 percent and 0.95 percent on average, and the employment change between 2022 and 2050 can vary between 323,800 and 633,700. At a minimum, the future multimodal freight transportation system must serve 1.2 million jobs in the study region in 2050.

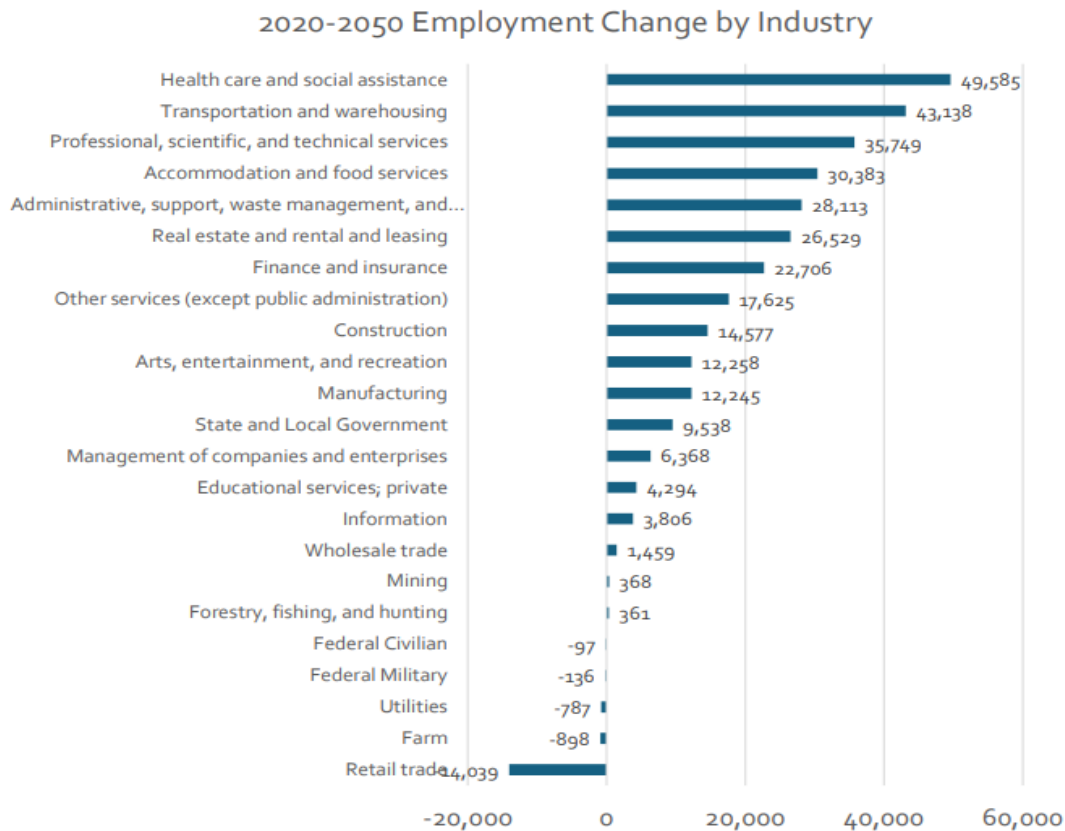
Table 6. Base and Alternate Scenario Employment Forecasts by Planning Agency Region

Planning Agency	Scenario	Current Emp. (2021)	Assumed % Emp. Change per Year	Estimated Future Emp. (2050)	Estimated Emp. Change (2021–2050)
MARC	Base - MARC TDM Forecast (2015–2050)	966,347	1.09%	1,270,887	304,540
	Alternate 1 – MARC's County Level June 2020 Projections (2020–2050)		0.70%	1,155,751	189,404
	Alternate 2 – MARC's Region Level September 2024 DRAFT Projections (2020–2050)		0.73%	1,163,868	197,521
	Alternate 3 – U.S. BLS, employment projections by industry sector (2023–2033) applied to MARC region's industry sector mix		0.45%	1,088,107	121,760
L-DC PC	Base – LDCMPO TDM Forecast (2020–2050)	43,683	1.41%	61,495	17,812
	Alternate – U.S. BLS, employment projections by industry sector (2023–2033) applied to LDCMPO region's industry sector mix		0.37%	48,209	4,526
Pioneer Trails RPC	Base – U.S. BLS, employment projections by industry sector (2023–2033) applied to Pioneer Trails RPC region's industry sector mix	47,948	0.34%	52,675	4,727
Study Region	Base	1,057,978	1.07%	1,385,057	327,079
	Minimum Alternate		0.43%	1,188,990	323,768
	Maximum Alternate		1.07%	1,385,057	633,719

Source: U.S. Census Bureau, LEHD Workers by Census Tract data; MARC TDM Forecast (2015–2050); Other sources listed in the table above.

The study team attempted to characterize employment changes anticipated in the future in the study region in a limited way using industry sector employment changes seen in MARC's

September 2024 DRAFT Projections (2020–2050) (**Figure 10**). The chart shows the goods producing/handling industry sectors of transportation and warehousing, construction and manufacturing will continue to be key contributors to regional employment growth.



Source: Frank Lenk, Director of Research Services, MARC Presentation on "DRAFT Regional 2050 Population and Employment Forecasts", September 12, 2024 to MARC Model Users Group, available: <https://www.marc.org/sites/default/files/2024-09/DRAFT-Long-Run-Population-Employment-Forecast.pdf> (accessed on October 28, 2024)

Figure 10. Forecast Industry Sector Employment Changes in Mid-America Regional Commission Region, 2020–2050

The Existing Conditions document identified the current strengths of the region's economy, in terms of goods production and handling firms and industries, by developing the following two lists:

- Major manufacturing/distribution firms (more than 500 employees) (**Table 7**)
- Study region's specialized industries (location quotient in terms of employment greater than 1.0) (**Table 8**)

Future multimodal freight systems must continue to provide high-quality transportation service and resilient supply chains supporting these key industries, which are essential to the study region's economic vitality (jobs).

Table 7. Major Manufacturing and/or Distribution Employers

Area of Specialization	Firm Name	Firm Emp.
Motor vehicle mfg.	Ford Motor Company	7,310
	General Motors Corp.	2,385
Electronic & mech. weapons components mfg.	Kansas City National Security Campus, managed by Honeywell FM&T	7,800
Fulfillment center, post office	Amazon	6,500
Global positioning system mfg. (Hdq.)	Garmin International, Inc.	4,744
Greeting card mfg. (Hdq.)	Hallmark Cards, Inc.	4,480
Retailer distribution center	Walmart	2,960
	Target	1,052
Delivery services	United Parcel Service	3,888
Delivery services call center	FedEx	2,891
Pork processing (Hdq.)	Triumph Foods, LLC	2,800
Ammunition mfg.	Olin Winchester, Lake City Ammunition Plant	1,550
Tire mfg.	Goodyear	1,500
Industrial equipment mfg.	Altec Industries, Inc.	1,500

Area of Specialization	Firm Name	Firm Emp.
Animal pharmaceuticals mfg.	Boehringer Ingelheim	800
Chocolate mfg.	Mars Wrigley	800
Meat processing (Hdq.)	National Beef Packing Company	795
Pet food mfg. (Hdq.)	Hill's Pet Nutrition, Inc.	762
Automotive welded body assembly parts mfg.	LMV Automotive	700
Microbiology media products mfg.	Thermo Fisher Scientific	687
Clothing retailer distribution center	American Eagle Outfitters	673
Catalog fulfillment & store distribution center	JCPenney Logistics Center	662
Plumbing specialty products mfg. (Hdq.)	Sioux Chief Manufacturing Co.	650
Electronic garage door components mfg.	Amarr Entrematic Garage Doors	650
Beverage mfg. & distribution (Hdq.)	Heartland Coca-Cola	637
Meat products mfg. (Hdq.)	Smithfield Farmland Foods, Inc.	635
Pre-engineered buildings (Hdq.)	BlueScope Properties Group	630
Food products mfg.	Kellogg Company	622

Area of Specialization	Firm Name	Firm Emp.
Snack food mfg. & distribution	Frito-Lay Inc.	1,406
Clothing distribution and fulfillment center	Urban Outfitters	1,400
Food mfg. & distribution	Reser's Fine Foods	1,354
Automotive storage battery mfg. & distribution	Clarios	1,342
Meat products mfg. & distribution	Tyson Foods, Inc.	1,299
Pharmaceutical services	CVS Health	1,274
Grocery distributor (Hdq.)	Associated Wholesale Grocers	1,194
Pharmaceutical call center & fulfillment center	OptumRx	1,100
Plastic products mfg.	Berry Global	1,000
Truck and equipment mfg. (Hdq.)	Custom Truck One Source	986
Pet supply distributor	Chewy, Inc.	891
Building products sales & service	DH Pace Company, Inc.	834

Area of Specialization	Firm Name	Firm Emp.
Batteries mfg.	Energysys, Inc.	619
Vehicle safety lighting and wiring harness mfg. (Hdq.)	Peterson Manufacturing Co.	617
Auto parts mfg.	Challenge Manufacturing Company	600
Apparel distribution (Hdq.)	GEAR for Sports, a Division of HanesBrands, Inc.	560
Electric motors distribution center	Grainger	560
Automotive parts distribution (Hdq.)	TVH Parts Company	550
Fiberglass insulation mfg.	CertainTeed Insulation	550
Crop protection products mfg.	Bayer CropScience	548
Food service marketing & distribution	Sysco Food Services, Inc.	534
Fulfillment center	Jet.com	510
Pet food mfg.	J.M. Smucker Co.	510
Commercial goods mgmt. and disposition (Hdq.)	Recovery Management Corporation	506

Source: Kansas City Area Development Council, Regional Employers, Available at: <https://thinkkc.com/business/regional-employers/Employers> (last accessed on August 9, 2024)

Note: Emp. = Employment in persons, Hdq. = Headquarters

Table 8. Study Region's Specialized and Goods Movement Dependent Industries

Private Sector Industry with Location Quotient > 1.0	Jobs	Share of Regional Total Jobs	Location Quotient
NAICS 323 Printing and related support activities	5,444	0.47%	1.95
NAICS 334 Computer and electronic product manufacturing	11,993	1.04%	1.44
NAICS 493 Warehousing and storage	20,153	1.74%	1.43
NAICS 488 Support activities for transportation	8,579	0.74%	1.40
NAICS 492 Couriers and messengers	10,850	0.94%	1.34
NAICS 336 Transportation equipment manufacturing	17,502	1.51%	1.31
NAICS 484 Truck transportation	15,208	1.31%	1.30
NAICS 459 Sporting goods, hobby, musical instrument, book, and miscellaneous retailers	13,741	1.19%	1.20
NAICS 423 Merchant wholesalers, durable goods	29,741	2.57%	1.16
NAICS 444 Building material and garden equipment and supplies dealers	11,672	1.01%	1.10
NAICS 325 Chemical manufacturing	7,347	0.63%	1.08
NAICS 424 Merchant wholesalers, nondurable goods	18,019	1.56%	1.08
NAICS 456 Health and personal care retailers	8,990	0.78%	1.08
NAICS 238 Specialty trade contractors	40,826	3.52%	1.07
NAICS 425 Wholesale trade agents and brokers	4,113	0.36%	1.06
NAICS 455 General merchandise retailers	25,368	2.19%	1.04
NAICS 322 Paper manufacturing	2,793	0.24%	1.03
NAICS 441 Motor vehicle and parts dealers	15,706	1.36%	1.02
NAICS 449 Furniture, home furnishings, electronics, and appliance retailers	6,505	0.56%	1.02
TOTAL	274,550	23.7%	

Source: U.S. BLS – Quarterly Census of Employment and Wages – 2023 Annual Average Employment, All establishment sizes for 14-County Kansas City Study Region Counties and U.S.

Note: Location Quotient for an industry was computed as an industry's share of the regional employment total divided by the industry's share of national total employment.

3.4. Economic Productivity (Output in Constant Dollars Per Employee)

In addition to national employment projections, the U.S. BLS provides national economic output projections for 2023 and 2033. From these projections, national parameters were derived on current (2023) economic productivity by industry in terms of economic output (in constant 2017 dollars) per employee and future changes per year as shown in **Table 9**. Among the goods producing and handling industries, wholesale trade, retail trade, mining and extraction industries have high economic productivity gains (over 2.0 percent annual growth); while transportation and warehousing, manufacturing, construction, and agriculture have moderate economic productivity gains (below 2.0 percent annual growth).

Table 9. National Economic Productivity Projections by Industry

NAICS Industry Sector	Current Economic Productivity, 2023 (in 2017 \$ of output/employee)	Future Economic Productivity, 2023 (in 2017 \$ of output/employee)	Percentage Change in Economic Productivity per Year (2023–2033)
Agriculture, forestry, fishing, and hunting	303,461	346,029	1.40%
Mining, quarrying, and oil and gas extraction	908,450	1,197,145	3.18%
Utilities	878,367	963,610	0.97%
Construction	200,339	220,076	0.99%
Manufacturing	432,675	485,168	1.21%
Wholesale trade	341,792	424,140	2.41%
Retail trade	136,862	183,372	3.40%
Transportation and warehousing	205,794	235,203	1.43%
Information	833,834	1,104,382	3.24%
Finance and insurance	454,635	519,286	1.42%
Real estate and rental and leasing	1,025,096	1,206,050	1.77%
Professional, scientific, and technical services	277,039	309,589	1.17%
Mgmt. of companies and enterprises	304,875	360,483	1.82%
Admin. and support and waste mgmt. and remediation services	141,380	168,463	1.92%
Educational services; state, local, and private	N/A	N/A	N/A

NAICS Industry Sector	Current Economic Productivity, 2023 (in 2017 \$ of output/employee)	Future Economic Productivity, 2023 (in 2017 \$ of output/employee)	Percentage Change in Economic Productivity per Year (2023–2033)
Healthcare and social assistance	N/A	N/A	N/A
Arts, entertainment, and recreation	168,301	195,813	1.63%
Accommodation and food services	89,778	102,190	1.38%
Other services (except public administration)	113,329	126,905	1.20%
Public administration	N/A	N/A	N/A

Source: U.S. BLS, Employment Projections, Table 2.11 Employment and Output by Industry, available: <https://www.bls.gov/emp/tables.htm> (accessed on October 28, 2024)

Note: Location Quotient for an industry was computed as an industry's share of the regional employment total divided by the industry's share of national total employment.

The national parameters were combined with the current (2021) and future (2050) minimum alternate scenario forecasts for regional employment by industry (Alternate Scenario 3 for MARC, Alternate Scenario for LDCMPO, and Base Scenario for PTRPC) as weights to further derive the annual regional economic productivity growth rates for MARC, LDCMPO, PTRPC and the study region of 1.76 percent, 1.72 percent, 0.64 percent and 1.10 percent, respectively (**Table 10**). The base scenario forecasts for regional employment are not industry specific but higher in total employment compared to the minimum alternate scenario forecasts, so the economic productivity growth rates may slightly differ for the base scenario. Nevertheless, the high output per employee growth rates estimated for the minimum alternate scenario over and above employment growth can be attributed to the following possible reasons:

- Increase in input costs for production – including labor (wages/benefits), materials and equipment
- Increase in value added to goods and services
- Use of advanced technologies (information, automation, computation, software, sensing, and networking technologies) that increase productivity

Table 10. Minimum Alternate Scenario Economic Productivity Forecasts by Planning Agency Region

Planning Agency	Scenario	Current Economic Productivity, 2021 (2017 \$ of output per employee)	Assumed % Economic Productivity Change per Year	Est. Future Economic Productivity, 2050 (2017 \$ of output per employee)	Estimated Economic Productivity Change (2021–2050)
MARC	Alternate 3 – U.S. BLS, economic productivity projections by industry sector (2023–2033) applied to MARC region’s industry sector mix	\$280,228	1.76%	\$423,046	\$142,818
LDCMPO	Alternate – U.S. BLS, economic productivity projections by industry sector (2023–2033) applied to LDCMPO region’s industry sector mix	\$264,301	1.72%	\$395,916	\$131,615
PTRPC	Base – U.S. BLS, economic productivity projections by industry sector (2023–2033) applied to Pioneer Trails RPC region’s industry sector mix	\$290,576	0.64%	\$344,292	\$53,716
Study Region	Minimum Alternate (for Employment Forecast)	\$280,103	\$1.10%	\$369,668	\$89,565

Source: U.S. Census Bureau, LEHD Workers by Census Tract data; MARC TDM Forecast (2015–2050); Other sources listed in the table above.

3.5. Real Gross Domestic Product

The study team inspected changes in GDP (annual values in constant 2017 dollars, also referred to as “real GDP”) between 2017 and 2022 (past five years) by county (**Figure 11**) to assess the changes in the value addition activities of regional industries and to identify regional patterns.

The regional total real GDP grew from \$142 billion to \$154 billion, by 1.79 percent annually on average. Johnson County in Kansas and Jackson County in Missouri contributed 67.0 percent of the regional GDP in 2022. Douglas and Wyandotte counties in Kansas and Clay and Platte counties in Missouri contributed an additional 24.6 percent of the regional GDP in 2022. Only 8.4 percent of the regional GDP is contributed by the remaining eight counties.

Johnson and Miami counties in Kansas and Clay County in Missouri experienced a high growth in GDP (over 2.0 percent annually), Cass, Jackson, and Pettis counties in Missouri experienced a moderate growth in GDP (between 1.0 and 2.0 percent annually), and the remaining counties

experienced a low growth in GDP except for Ray County where the GDP declined by 1.61 percent annually.

The regional GDP data with the U.S. Bureau of Economic Analysis (BEA) is not broken down into industries to analyze the value addition activities of specific goods producing and handling industries. However, the trend data showed the current attractiveness of the counties for locating new businesses and/or expanding goods and services for existing businesses.

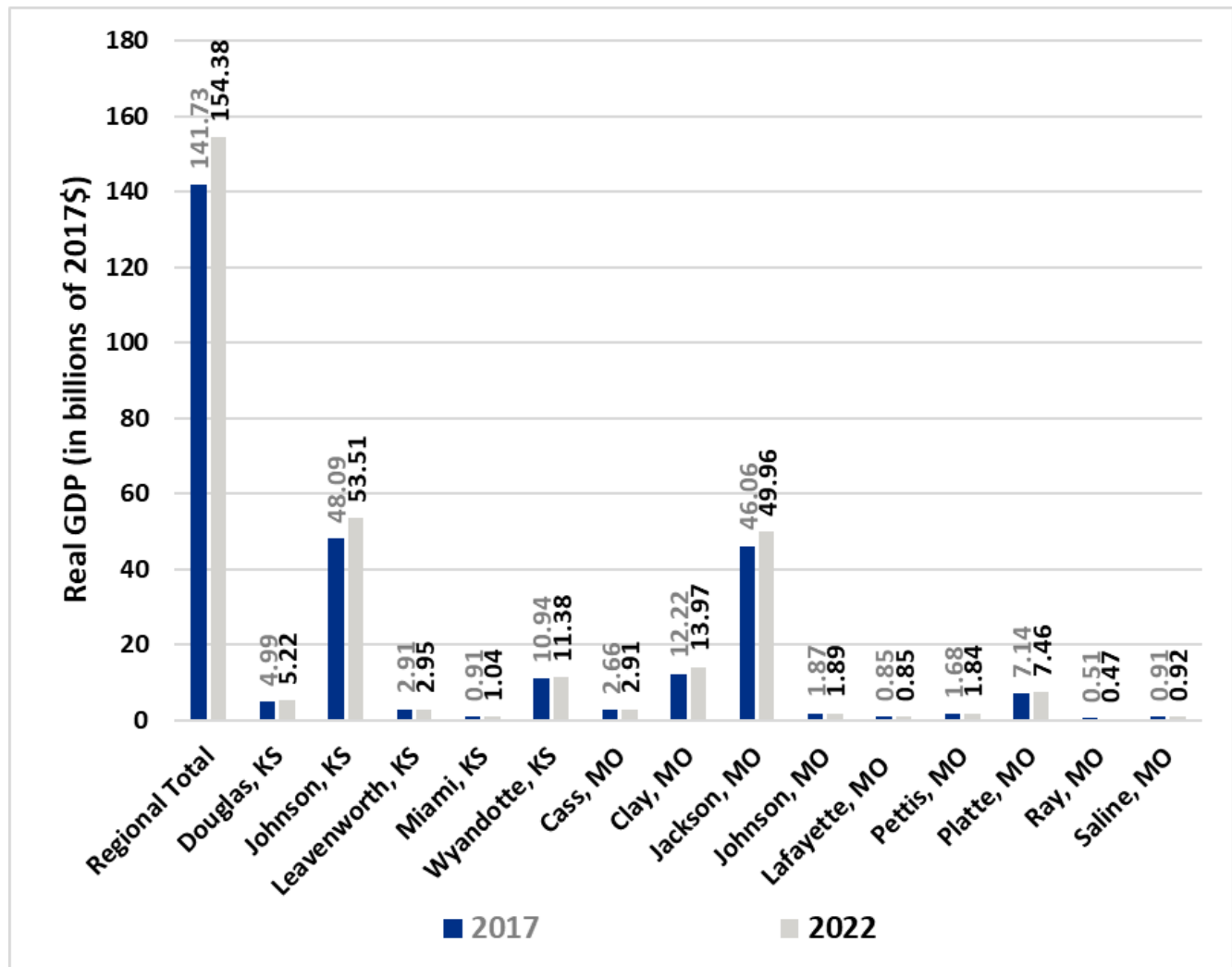


Figure 11. Historical Gross Domestic Product Changes, 2017 and 2022

4. Freight Factor Values

4.1. Value by Value Per Ton (in Constant Dollars) of Freight Moved by Commodity

The U.S. Bureau of Transportation Statistics (BTS) and Federal Highway Administration's (FHWA's) FAF⁸ contains national forecasts for freight flow from/to Kansas City "KC FAF regions."⁹ This data was used in the Existing Conditions document to characterize existing and future base (medium) forecast freight flows that are originating or terminating in the study region. In this memorandum, the study team explored the alternate forecasts (low and high) for scenario planning purposes. The study team also gathered the value addition potential of future freight flows by measuring changes in value per ton, and assumed a higher value per ton growth is related to a higher value addition potential and an economic opportunity in the making. The study team broke down regional freight into two components: (a) outbound flows, (b) inbound and intra flows. Outbound freight flows are closely related to regional employment and output factors, while inbound and intra flows are closely related to regional population and per capita income factors. The top commodities, modal usage and top trade partners vastly differ for the two freight flow components.

Considering total outbound freight flows, the annual growth rate is expected to range between 3.12 percent (low) and 3.70 percent (high). The average value per ton for outbound freight flows is expected to increase from \$1,363 (in 2017\$) per ton to at least \$1,721 per ton by 2050, an increase of at least 0.88 percent annually. Similarly, for total inbound and intra freight flows, the annual growth rate is expected to range between 3.22 percent (low) and 3.78 percent (high). The average value per ton for inbound and intra freight flows is expected to increase from \$980 (in 2017\$) per ton to at least \$1,294 per ton by 2050, an increase of at least 1.07 percent annually. Comparing these freight flow components, the value growth rates are comparable but the value per ton growth rates of the outbound freight flows are higher compared to the inbound and intra freight flows.

The study team began the analysis with the alternate scenarios for the top commodities by value; and their value per ton changes into the future as shown in **Table 11** and **Table 12**. Among the top ten outbound commodities by value, motorized vehicles are expected to decline in value under all scenarios. Natural gas and other fossil products are expected to decline under the low forecast scenario and would have a small annual growth rate under the medium and high forecast scenarios. Other commodities have a robust range of value growth forecasts. Among

⁸ U.S. BTS, FAF Version 5.6.1 Website, available: <https://www.bts.gov/faf> (last accessed on Oct 28, 2024)

⁹ FAF zone 201 includes not only the five study region counties on Kansas side, but also four other counties of Atchison, Doniphan, Franklin, and Linn in Kansas. FAF zone 291 includes all except Pettis and Saline counties of the nine study region counties on Missouri side. It also includes six other counties of Andrew, Bates, Buchanan, Caldwell, Clinton, and DeKalb counties in Missouri.

the outbound commodities, machinery is expected to have the highest value addition potential with value per ton growth of 0.47 to 0.48 percent per year, followed by electronics, chemical products, and pharmaceuticals, which would increase in value per ton in the range of 0.10 to 0.24 percent per year. On the other hand, textiles and leather may face a decline of up to 0.38 percent per year in value per ton. Limited changes will be seen in other outbound top commodities.

Among the top ten inbound and intra commodities by value, all top commodities are expected to grow under all forecast scenarios. FAF estimates meat and seafood to have the lowest value growth rate of 0.90 percent per year, while pharmaceuticals will have the highest value growth rate of 7.52 percent per year. Among the inbound and intra commodities, pharmaceuticals are expected to have the highest value addition potential with value per ton growth of 0.45 to 0.52 percent per year, followed by machinery and motorized vehicles, which would increase in value per ton in the range of 0.13 to 0.17 percent per year. Limited changes will be seen in the other top inbound and intra commodities.

Table 11. Outbound Freight Value Growth Scenarios – Top Commodities, 2020–2050

Commodity	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Motorized vehicles	12,253	11,216	11,424	11,653	-0.28%(L), -0.23%(M), -0.16%(H)
Mixed freight	11,004	22,329	24,087	24,537	3.43%(L), 3.96%(M), 4.10%(H)
Electronics	6,243	16,962	17,167	17,511	5.72%(L), 5.83%(M), 6.02%(H)
Pharmaceuticals	5,017	14,590	16,233	16,558	6.36%(L), 7.45%(M), 7.67%(H)
Chemical prods.	4,971	12,504	14,304	14,570	5.05%(L), 6.26%(M), 6.44%(H)
Misc. mfg. prods.	4,486	14,295	14,836	15,133	7.29%(L), 7.69%(M), 7.91%(H)
Textiles/leather	4,444	10,168	11,154	11,379	4.29%(L), 5.03%(M), 5.20%(H)
Natural gas and other fossil products	4,439	4,318	4,815	4,913	-0.09%(L), 0.28%(M), 0.36%(H)
Machinery	4,174	8,526	8,864	9,041	3.48%(L), 3.75%(M), 3.89%(H)
Other foodstuffs	3,919	6,249	6,596	6,827	1.98%(L), 2.28%(M), 2.47%(H)
Other Commodities	31,639	58,019	61,657	63,254	2.78%(L), 3.16%(M), 3.33%(H)
TOTAL (All Commodities)	92,589	179,176	191,138	195,377	3.12%(L), 3.55%(M), 3.70%(H)

Commodity	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value per Ton (in 2017\$/ton)					
Motorized vehicles	13,376	14,097	14,115	14,115	0.18%(L), 0.18%(M), 0.18%(H)
Mixed freight	2,679	2,673	2,676	2,675	-0.01%(L), 0.00%(M), 0.00%(H)
Electronics	16,140	17,301	17,127	17,127	0.20%(L), 0.20%(M), 0.24%(H)
Pharmaceuticals	39,378	40,871	40,587	40,587	0.10%(L), 0.10%(M), 0.13%(H)
Chemical prods.	2,093	2,194	2,190	2,188	0.15%(L), 0.15%(M), 0.16%(H)
Misc. mfg. prods.	10,733	10,646	10,628	10,628	-0.03%(L), -0.03%(M), -0.03%(H)
Textiles/leather	21,935	19,496	19,454	19,426	-0.38%(L), -0.38%(M), -0.37%(H)
Natural gas and other fossil products	216	229	229	229	0.20%(L), 0.20%(M), 0.20%(H)
Machinery	11,683	13,331	13,361	13,361	0.47%(L), 0.48%(M), 0.48%(H)
Other foodstuffs	674	682	677	677	0.01%(L), 0.02%(M), 0.04%(H)
Other Commodities	968	1,050	1,032	1,033	0.22%(L), 0.22%(M), 0.28%(H)
AVERAGE (All Commodities)	1,363	1,757	1,723	1,721	0.88%(L), 0.88%(M), 0.97%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

Table 12. Inbound and Intra Freight Value Growth Scenarios – Top Commodities, 2020–2050

Commodity	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Mixed freight	14,166	24,906	26,791	27,287	2.53%(L), 2.97%(M), 3.09%(H)
Motorized vehicles	13,439	27,186	27,463	28,012	3.41%(L), 3.48%(M), 3.61%(H)
Electronics	9,284	21,068	21,282	21,708	4.23%(L), 4.31%(M), 4.46%(H)
Machinery	8,849	18,396	18,670	19,043	3.60%(L), 3.70%(M), 3.84%(H)
Pharmaceuticals	6,933	19,737	22,134	22,577	6.16%(L), 7.31%(M), 7.52%(H)
Misc. mfg. prods.	6,754	18,779	19,228	19,613	5.93%(L), 6.16%(M), 6.35%(H)
Meat/seafood	6,008	7,635	8,159	8,349	0.90%(L), 1.19%(M), 1.30%(H)
Other foodstuffs	5,457	7,544	8,033	8,238	1.27%(L), 1.57%(M), 1.70%(H)

Commodity	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020-2050
Plastics/rubber	5,428	12,590	13,600	13,868	4.40%(L), 5.02%(M), 5.18%(H)
Natural gas and other fossil products	5,286	8,414	9,874	10,072	1.97%(L), 2.89%(M), 3.02%(H)
Other Commodities	43,883	80,396	86,621	88,907	2.77%(L), 3.25%(M), 3.42%(H)
TOTAL (All Commodities)	125,487	246,651	261,855	267,673	3.22%(L), 3.62%(M), 3.78%(H)
Freight Value per Ton (in 2017\$/ton)					
Mixed freight	3,332	3,267	3,266	3,265	-0.07%(L), -0.07%(M), -0.07%(H)
Motorized vehicles	6,852	7,112	7,112	7,112	0.13%(L), 0.13%(M), 0.13%(H)
Electronics	12,922	13,113	13,114	13,114	0.05%(L), 0.05%(M), 0.05%(H)
Machinery	11,133	11,691	11,685	11,685	0.17%(L), 0.17%(M), 0.17%(H)
Pharmaceuticals	23,663	26,855	27,330	27,330	0.45%(L), 0.52%(M), 0.52%(H)
Misc. mfg. prods.	6,351	6,373	6,376	6,376	0.01%(L), 0.01%(M), 0.01%(H)
Meat/seafood	3,466	3,406	3,405	3,402	-0.06%(L), -0.06%(M), -0.06%(H)
Other foodstuffs	925	919	918	919	-0.02%(L), -0.02%(M), -0.02%(H)
Plastics/rubber	2,983	3,018	3,003	3,005	0.02%(L), 0.02%(M), 0.04%(H)
Natural gas and other fossil products	213	211	211	211	-0.02%(L), -0.02%(M), -0.02%(H)
Other Commodities	519	782	730	719	1.29%(L), 1.36%(M), 1.69%(H)
AVERAGE (All Commodities)	980	1,405	1,308	1,294	1.07%(L), 1.11%(M), 1.44%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

4.2. Value and Value Per Ton (in Constant Dollars) of Freight Moved by Mode

The study team inspected the alternate scenarios for the value and value per ton by freight mode of transportation under the outbound and inbound and intra freight flow components as shown in **Table 13** and **Table 14**. Among the outbound freight flows, the pipeline mode is expected to decline in freight value under the low forecast scenario and would have a small annual growth rate under the medium and high forecast scenarios. All other modes are expected to grow under all scenarios with the highest growth in freight value for multiple modes and mail and air mode in the range of 3.94 to 5.32 percent per year. In terms of value addition potential, freight carried by

multiple modes and mail are expected to have the highest value per ton growth of 1.65 to 1.73 percent per year, followed by air and rail modes, which would increase in value per ton in the range of 0.50 to 0.69 percent per year. Limited changes will be seen in value per ton of truck and pipeline modes.

Among the inbound and intra freight flows, all modes are expected to have robust growth in value under all scenarios. In terms of value addition potential, freight carried by rail mode is expected to have the highest value per ton growth of 3.78 to 4.74 percent per year, followed by multiple modes and mail and truck modes, which would increase in value per ton in the range of 0.88 to 1.77 percent per year. Limited changes will be seen in value per ton of pipeline and air modes.

Table 13. Outbound Freight Value Growth Scenarios for KC FAF Zones – Modes, 2020–2050

Mode	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Truck	65,576	122,575	131,124	134,033	2.90%(L), 3.33%(M), 3.48%(H)
Multiple modes & mail	17,874	42,855	45,397	46,403	4.66%(L), 5.13%(M), 5.32%(H)
Pipeline	4,208	3,820	4,270	4,357	-0.31%(L), 0.05%(M), 0.12%(H)
Rail	2,677	4,944	5,149	5,271	2.82%(L), 3.08%(M), 3.23%(H)
Air (include truck-air)	2,160	4,710	4,918	5,028	3.94%(L), 4.26%(M), 4.43%(H)
Water	5.8	5.4	6.3	6.5	Not Calculated
Other and unknown	89	267	274	279	Not Calculated
TOTAL (All Modes)	92,589	179,176	191,138	195,377	3.12%(L), 3.55%(M), 3.70%(H)
Freight Value per Ton (in 2017\$/ton)					
Truck	1,968	2,017	1,969	1,965	-0.01%(L), 0.00%(M), 0.08%(H)
Multiple modes & mail	3,967	6,027	6,006	5,933	1.65%(L), 1.71%(M), 1.73%(H)
Pipeline	205	205	205	205	0.00%(L), 0.00%(M), 0.00%(H)
Rail	280	322	325	326	0.50%(L), 0.54%(M), 0.55%(H)
Air (include truck-air)	94,171	113,563	111,735	111,543	0.61%(L), 0.62%(M), 0.69%(H)
Water	315	255	257	256	Not Calculated
Other and unknown	174,563	8,276	8,040	8,040	Not Calculated
AVERAGE (All Modes)	1,363	1,757	1,723	1,721	0.88%(L), 0.88%(M), 0.97%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

Table 14. Inbound & Intra Freight Value Growth Scenarios for KC FAF Zones – Modes, 2020–2050

Mode	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Truck	98,859	188,103	199,275	203,691	3.01%(L), 3.39%(M), 3.53%(H)
Multiple modes & mail	18,662	41,866	44,181	45,173	4.14%(L), 4.56%(M), 4.74%(H)
Pipeline	4,334	7,157	8,399	8,566	2.17%(L), 3.13%(M), 3.26%(H)
Rail	2,170	3,659	3,962	4,095	2.29%(L), 2.75%(M), 2.96%(H)
Air (include truck-air)	1,325	2,968	3,083	3,144	4.13%(L), 4.42%(M), 4.57%(H)
Water	0.0	1.1	1.2	1.3	Not Calculated
Other and unknown	136	2,897	2,954	3,002	Not Calculated
TOTAL (All Modes)	125,487	246,651	261,855	267,673	3.22%(L), 3.62%(M), 3.78%(H)
Freight Value per Ton (in 2017\$/ton)					
Truck	1,158	1,580	1,476	1,463	0.88%(L), 0.92%(M), 1.22%(H)
Multiple modes & mail	2,600	3,979	3,835	3,801	1.54%(L), 1.58%(M), 1.77%(H)
Pipeline	197	196	196	196	-0.02%(L), -0.02%(M), -0.02%(H)
Rail	162	393	371	347	3.78%(L), 4.29%(M), 4.74%(H)
Air (include truck-air)	80,903	85,166	84,681	84,615	0.15%(L), 0.16%(M), 0.18%(H)
Water	48	101	101	101	Not Calculated
Other and unknown	1,592	17,056	15,744	15,588	Not Calculated
AVERAGE (All Modes)	980	1,405	1,308	1,294	1.07%(L), 1.11%(M), 1.44%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

4.3. Value and Value Per Ton (in Constant Dollars) of Freight Moved by Trade Partner

Using FAF data, the study team analyzed alternate scenarios for top trade partners by value and associated value per ton changes under the domestic/international trade type and outbound/inbound and intra freight flow type.

4.3.1. Domestic trade

Domestic outbound trade and domestic inbound and intra trade, as a whole, are expected to grow robustly in the ranges of 2.97 to 3.55 percent per year and 3.02 to 3.57 percent per year, respectively (**Table 15** and **Table 16**).

Among the top 15 domestic outbound trade partners by value, all are expected to grow in value and between 1.54 percent per year (Chicago IL-IN-WI (IL Part) low scenario) and 4.74 percent per year (Wichita KS high scenario). In terms of value addition potential, freight headed to St. Louis MO-IL (MO Part) would have the highest value per ton growth of 3.53 to 3.85 percent per year, followed by Iowa and Denver CO that would have value per ton growth in the range of 1.17 to 1.87 percent per year. Other trade partners would have lower value additional potential. Rest of PA, as an exception, is expected to decline in value per ton in the range of 0.28 to 0.35 percent per year.

Among the top 15 domestic inbound and intra trade partners by value, again, all are expected to grow in value and between 1.41 percent per year (Rest of KS low scenario) and 5.22 percent per year (Indianapolis IN high scenario). In terms of value addition potential, freight coming from Rest of IL, Rest of MO, and Kansas City MO-KS (MO Part) would have the highest value per ton growth in the range of 1.21-2.24 percent per year. Other trade partners would have lower value additional potential. Rest of NE, Rest of KS, and Los Angeles CA, as exceptions, are expected to decline in value per ton in the range of 0.16 to 0.52 percent per year under the low scenario.

Table 15. Outbound Freight Value Growth Scenarios for KC FAF Zones – Top Domestic Trade Partners, 2020–2050

Domestic Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Rest of KS	7,339	14,754	15,845	16,175	3.37%(L), 3.86%(M), 4.01%(H)
Rest of MO	6,751	11,822	12,894	13,159	2.50%(L), 3.03%(M), 3.16%(H)
Iowa	4,365	7,472	8,027	8,189	2.37%(L), 2.80%(M), 2.92%(H)
Chicago IL-IN-WI (IL Part)	4,045	5,911	6,318	6,445	1.54%(L), 1.87%(M), 1.98%(H)
St. Louis MO-IL (MO Part)	2,948	5,341	5,867	5,981	2.71%(L), 3.30%(M), 3.43%(H)
Wichita KS	2,526	5,713	6,005	6,117	4.21%(L), 4.59%(M), 4.74%(H)
Rest of NE	2,229	4,271	4,752	4,850	3.06%(L), 3.77%(M), 3.92%(H)
Rest of IL	2,140	3,365	3,559	3,647	1.91%(L), 2.21%(M), 2.35%(H)

Domestic Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Dallas-Fort Worth TX-OK (TX Part)	2,034	3,732	3,999	4,083	2.78%(L), 3.22%(M), 3.36%(H)
Omaha NE-IA (NE Part)	2,023	4,280	4,572	4,654	3.72%(L), 4.20%(M), 4.33%(H)
Rest of PA	1,804	3,147	3,339	3,414	2.48%(L), 2.84%(M), 2.98%(H)
Denver CO	1,617	3,536	3,716	3,790	3.96%(L), 4.33%(M), 4.48%(H)
Los Angeles CA	1,584	2,772	2,909	2,986	2.50%(L), 2.79%(M), 2.95%(H)
Arkansas	1,552	2,745	2,861	2,955	2.56%(L), 2.81%(M), 3.01%(H)
St. Louis MO-IL (IL Part)	1,527	3,129	3,516	3,595	3.50%(L), 4.34%(M), 4.51%(H)
Other Trading Partners	41,006	79,777	84,633	86,619	3.15%(L), 3.55%(M), 3.71%(H)
TOTAL (All Domestic Trade Partners)	85,491	161,769	172,811	176,659	2.97%(L), 3.40%(M), 3.55%(H)
Freight Value per Ton (in 2017\$/ton)					
Rest of KS	962	994	977	977	0.05%(L), 0.05%(M), 0.11%(H)
Rest of MO	980	1,222	1,176	1,173	0.66%(L), 0.67%(M), 0.82%(H)
Iowa	875	1,366	1,329	1,330	1.73%(L), 1.73%(M), 1.87%(H)
Chicago IL-IN-WI (IL Part)	395	518	500	500	0.88%(L), 0.88%(M), 1.04%(H)
St. Louis MO-IL (MO Part)	940	2,026	1,937	1,935	3.53%(L), 3.54%(M), 3.85%(H)
Wichita KS	3,269	3,903	3,781	3,777	0.52%(L), 0.52%(M), 0.65%(H)
Rest of NE	1,825	1,960	1,904	1,904	0.14%(L), 0.14%(M), 0.25%(H)
Rest of IL	753	1,007	975	978	0.98%(L), 0.98%(M), 1.12%(H)
Dallas-Fort Worth TX-OK (TX Part)	2,439	2,756	2,723	2,722	0.39%(L), 0.39%(M), 0.43%(H)
Omaha NE-IA (NE Part)	2,055	2,779	2,646	2,641	0.95%(L), 0.96%(M), 1.17%(H)
Rest of PA	1,858	1,701	1,673	1,664	-0.35%(L), -0.33%(M), -0.28%(H)

Domestic Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Denver CO	5,927	8,007	8,047	8,038	1.17%(L), 1.19%(M), 1.19%(H)
Los Angeles CA	2,736	2,749	2,682	2,662	-0.09%(L), -0.07%(M), 0.02%(H)
Arkansas	672	796	808	803	0.62%(L), 0.68%(M), 0.68%(H)
St. Louis MO-IL (IL Part)	830	957	959	957	0.51%(L), 0.52%(M), 0.52%(H)
Other Trading Partners	2,384	2,862	2,857	2,846	0.65%(L), 0.66%(M), 0.67%(H)
AVERAGE (All Domestic Trade Partners)	1,363	1,762	1,725	1,722	0.88%(L), 0.88%(M), 0.98%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

Table 16. Inbound & Intra Freight Value Growth Scenarios for KC FAF Zones – Top Domestic Trade Partners, 2020–2050

Domestic Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Kansas City MO-KS (MO Part)	20,489	37,638	40,429	41,199	2.79%(L), 3.24%(M), 3.37%(H)
Kansas City MO-KS (KS Part)	17,205	32,123	34,134	34,889	2.89%(L), 3.28%(M), 3.43%(H)
Rest of KS	6,398	9,112	9,994	10,199	1.41%(L), 1.87%(M), 1.98%(H)
Iowa	4,276	7,403	7,802	7,963	2.44%(L), 2.75%(M), 2.87%(H)
Rest of MO	4,200	7,468	7,954	8,121	2.59%(L), 2.98%(M), 3.11%(H)
Los Angeles CA	3,740	8,760	9,201	9,406	4.47%(L), 4.87%(M), 5.05%(H)
Dallas-Fort Worth TX-OK (TX Part)	3,375	6,554	6,934	7,075	3.14%(L), 3.51%(M), 3.65%(H)
Chicago IL-IN-WI (IL Part)	3,182	6,292	6,636	6,775	3.26%(L), 3.62%(M), 3.76%(H)
Rest of OK	2,218	3,247	3,681	3,762	1.55%(L), 2.20%(M), 2.32%(H)
Rest of NE	2,168	4,070	4,497	4,588	2.93%(L), 3.58%(M), 3.72%(H)

Domestic Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Detroit MI	2,163	3,140	3,238	3,306	1.51%(L), 1.66%(M), 1.76%(H)
St. Louis MO-IL (MO Part)	2,124	4,636	5,056	5,158	3.94%(L), 4.60%(M), 4.76%(H)
Rest of IL	1,653	2,738	2,951	3,008	2.19%(L), 2.62%(M), 2.73%(H)
Atlanta GA	1,614	3,454	3,564	3,639	3.80%(L), 4.03%(M), 4.18%(H)
Indianapolis IN	1,526	3,724	3,836	3,918	4.80%(L), 5.04%(M), 5.22%(H)
Other Trading Partners	42,086	85,343	90,147	92,404	3.43%(L), 3.81%(M), 3.99%(H)
TOTAL (All Domestic Trade Partners)	118,417	225,703	240,054	245,408	3.02%(L), 3.42%(M), 3.57%(H)
Freight Value per Ton (in 2017\$/ton)					
Kansas City MO-KS (MO Part)	784	1,116	1,074	1,067	1.21%(L), 1.24%(M), 1.41%(H)
Kansas City MO-KS (KS Part)	642	867	796	787	0.75%(L), 0.80%(M), 1.17%(H)
Rest of KS	461	458	422	420	-0.30%(L), -0.28%(M), -0.02%(H)
Iowa	910	1,191	1,157	1,157	0.90%(L), 0.90%(M), 1.03%(H)
Rest of MO	825	1,237	1,187	1,184	1.45%(L), 1.46%(M), 1.66%(H)
Los Angeles CA	10,625	10,682	10,225	10,127	-0.16%(L), -0.13%(M), 0.02%(H)
Dallas-Fort Worth TX-OK (TX Part)	4,446	5,194	5,050	5,023	0.43%(L), 0.45%(M), 0.56%(H)
Chicago IL-IN-WI (IL Part)	3,935	4,487	4,288	4,284	0.30%(L), 0.30%(M), 0.47%(H)
Rest of OK	253	268	261	262	0.11%(L), 0.11%(M), 0.19%(H)
Rest of NE	448	396	378	378	-0.52%(L), -0.52%(M), -0.39%(H)
Detroit MI	6,252	6,722	6,703	6,701	0.24%(L), 0.24%(M), 0.25%(H)
St. Louis MO-IL (MO Part)	2,441	2,823	2,798	2,800	0.49%(L), 0.49%(M), 0.52%(H)
Rest of IL	1,265	2,116	1,993	1,988	1.91%(L), 1.92%(M), 2.24%(H)
Atlanta GA	6,071	6,706	6,603	6,595	0.29%(L), 0.29%(M), 0.35%(H)

Domestic Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Indianapolis IN	5,390	6,745	6,712	6,692	0.81%(L), 0.82%(M), 0.84%(H)
Other Trading Partners	1,375	2,417	2,240	2,175	1.94%(L), 2.10%(M), 2.53%(H)
AVERAGE (All Domestic Trade Partners)	941	1,339	1,246	1,234	1.04%(L), 1.08%(M), 1.41%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

4.3.2. International Trade

Export and import trades, as a whole, are expected to grow robustly in the range of 4.90 to 5.53 percent per year and 3.17 to 3.53 percent per year, respectively (**Table 17** and **Table 18**).

Among the top five export partners by value, all are expected to grow in value between 3.56 percent per year (Canada low scenario) and 7.19 percent per year (Eastern Asia high scenario). In terms of value addition potential, exports to Europe would have the highest value per ton growth of 4.17 to 4.62 percent per year, followed by Eastern Asia (range of 2.98 to 3.01 percent per year) and Mexico (range of 1.20 to 1.21 percent per year). While exports to Canada would have almost no change in value per ton, exports to South-Eastern Asia and Oceania are expected to decline in value per ton between 0.80 and 0.83 percent per year.

Among the top five import partners by value, all are expected to grow in value between 3.47 percent per year (Canada low scenario) and 6.50 percent per year (Eastern Asia high scenario). In terms of value addition potential, imports from Eastern Asia and Europe would have the highest value per ton growth in the range of 1.27 to 1.53 percent per year, followed by Mexico (range of 0.71 to 0.75 percent per year). While imports from South-Eastern Asia and Oceania would have almost no change in value per ton, imports from Canada are expected to decline in value per ton between 2.13 and 2.25 percent per year.

Table 17. Outbound Freight Value Growth Scenarios for KC FAF Zones – Top International Trade Partners, 2020–2050

Export Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Canada	1,726	3,567	3,785	3,871	3.56%(L), 3.98%(M), 4.14%(H)
Mexico	1,234	3,017	3,123	3,189	4.82%(L), 5.10%(M), 5.28%(H)
Eastern Asia	1,226	3,624	3,789	3,871	6.52%(L), 6.97%(M), 7.19%(H)
Europe	1,167	2,713	2,897	2,958	4.41%(L), 4.94%(M), 5.11%(H)
South-Eastern Asia and Oceania	526	1,352	1,407	1,438	5.24%(L), 5.59%(M), 5.78%(H)
Other Trading Partners	775	2,167	2,314	2,359	5.99%(L), 6.62%(M), 6.81%(H)
TOTAL (All Export Trade Partners)	6,654	16,439	17,315	17,686	4.90%(L), 5.34%(M), 5.53%(H)
Freight Value (in millions of 2017\$)					
Canada	2,280	2,357	2,286	2,273	-0.01%(L), 0.01%(M), 0.11%(H)
Mexico	426	580	580	580	1.20%(L), 1.20%(M), 1.21%(H)
Eastern Asia	1,537	2,926	2,917	2,912	2.98%(L), 2.99%(M), 3.01%(H)
Europe	4,525	10,793	10,283	10,182	4.17%(L), 4.24%(M), 4.62%(H)
South-Eastern Asia and Oceania	2,454	1,863	1,843	1,843	-0.83%(L), -0.83%(M), -0.80%(H)
Other Trading Partners	2,491	1,778	1,745	1,739	-1.01%(L), -1.00%(M), -0.95%(H)
AVERAGE (All Export Trade Partners)	1,271	1,620	1,616	1,614	0.90%(L), 0.90%(M), 0.91%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

Table 18. Inbound & Intra Freight Value Growth Scenarios for KC FAF Zones – Top International Trade Partners, 2020–2050

Import Trade Partner	2020	2050 Low Forecast	2050 Medium Forecast	2050 High Forecast	Percent Change per Year, 2020–2050
Freight Value (in millions of 2017\$)					
Eastern Asia	2,320	6,452	6,683	6,844	5.94%(L), 6.27%(M), 6.50%(H)
Europe	1,506	3,840	4,093	4,174	5.16%(L), 5.72%(M), 5.90%(H)
Canada	1,044	2,130	2,227	2,280	3.47%(L), 3.78%(M), 3.95%(H)
Mexico	918	2,600	2,643	2,697	6.11%(L), 6.27%(M), 6.46%(H)
South-Eastern Asia and Oceania	582	1,461	1,541	1,574	5.03%(L), 5.48%(M), 5.67%(H)
Other Trading Partners	531	1,417	1,504	1,536	5.56%(L), 6.10%(M), 6.31%(H)
TOTAL (All Import Trade Partners)	9,902	19,305	19,999	20,399	3.17%(L), 3.40%(M), 3.53%(H)
Freight Value (in millions of 2017\$)					
Eastern Asia	4,031	5,605	5,576	5,563	1.27%(L), 1.28%(M), 1.30%(H)
Europe	4,372	6,383	6,265	6,248	1.43%(L), 1.44%(M), 1.53%(H)
Canada	1,561	564	521	508	-2.25%(L), -2.22%(M), -2.13%(H)
Mexico	4,219	5,163	5,122	5,119	0.71%(L), 0.71%(M), 0.75%(H)
South-Eastern Asia and Oceania	4,245	4,406	4,396	4,386	0.11%(L), 0.12%(M), 0.13%(H)
Other Trading Partners	2,089	2,902	2,854	2,851	1.22%(L), 1.22%(M), 1.30%(H)
AVERAGE (All Import Trade Partners)	3,140	2,613	2,486	2,445	-0.74%(L), -0.69%(M), -0.56%(H)

Source: FAF 5.6, 2022

Key: (L) = Low, (M) = Medium, (H) = High

4.4. Truck Trip Production Rate

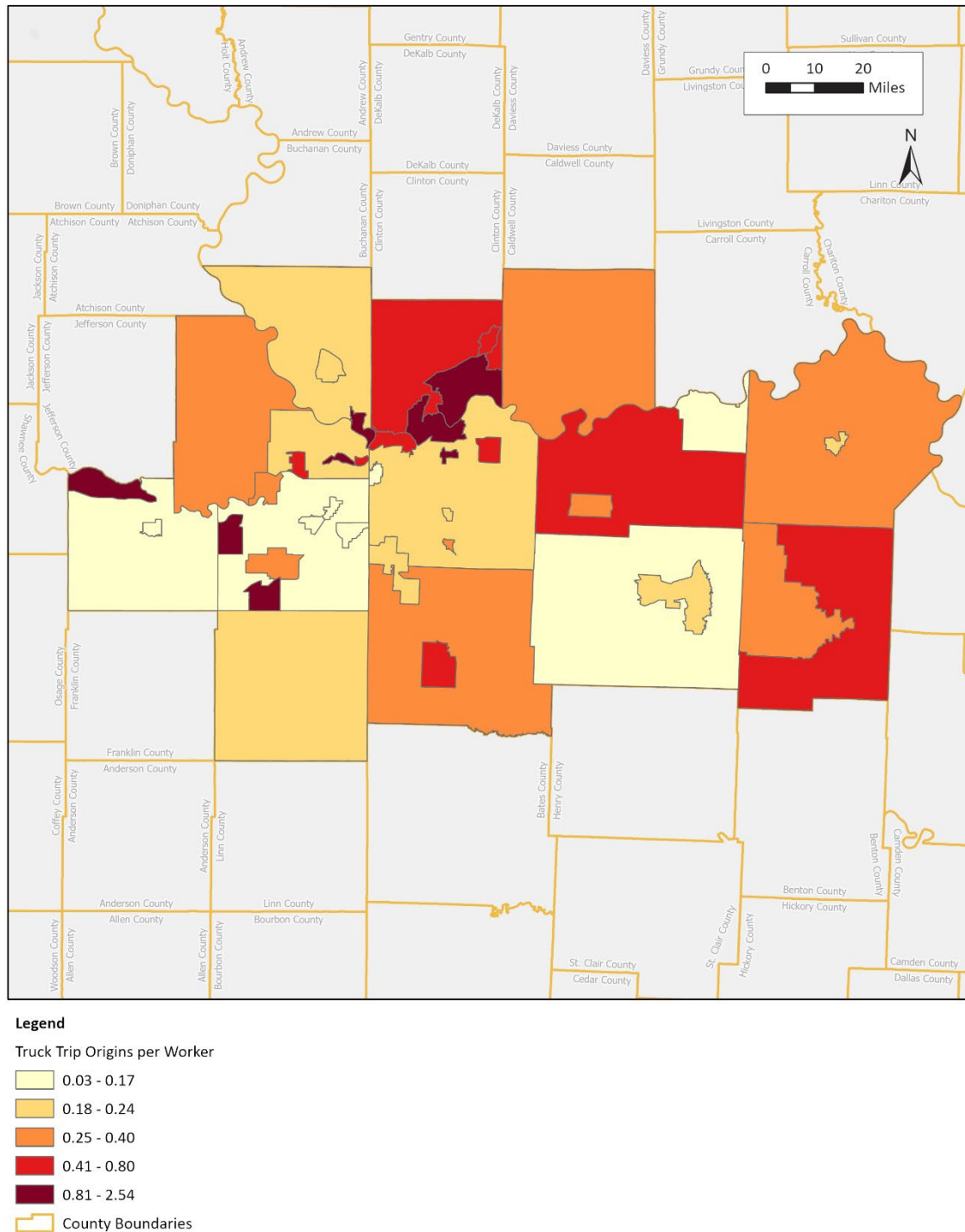
The project team developed a trip production rate metric using existing originating daily truck trips (2023 estimate) as the numerator and current employment (2021 workers) for each freight analysis zone as shown in **Figure 12**. The originating truck trips include outbound and intra flows for the freight analysis zones, and the metric represents truck trip production intensity. The truck

trip production rates vary substantially across the study region. They help identify areas of the most goods producing jobs.

The following eight freight analysis zones have a top tier truck trip production rate (higher than 0.8 daily truck trips per worker): 108 – Middle West Johnson County (KS), 110 – Southwest Central Johnson County (KS), 112 – Northwest Douglas County, 114 – Southeast Platte County – Northwest Wyandotte County, 116 – North Central Jackson County, 117 – South Central Clay County – North Central Jackson County, 120 – Southeast Clay County, and 133 – Middle East Central Wyandotte County. Of these, only the zones 114 and 133 also have a high number of workers per acre of 1.75 and 2.02, respectively.

Nine FAZs that are parts of Wyandotte County in Kansas and parts of Cass, Clay, Lafayette, Pettis, and Jackson counties in Missouri have middle tier truck trip production rate (between 0.41 and 0.8 daily truck trips per worker). Of these, only two zones, one in Wyandotte County in Kansas and other in Jackson County in Missouri has a higher than 1.0 worker per acre.

In the remaining 27 FAZs that formed the bottom tier, the truck trip production rates are widely spread from 0.03 to 0.40 daily truck trips per worker. Of these, only seven zones in Douglas and Johnson counties in Kansas and Jackson County in Missouri have a higher than 1.0 worker per acre.



Source: Geotab Data, September-November 2023; U.S. Census Bureau, LEHD data, available: <https://onthemap.ces.census.gov/> (accessed on October 28, 2024)

Note:

1. Geotab data is sample truck origin-destination data for a 3-month period in 2023, which was expanded to the truck population by the project team using annual average daily traffic to Geotab truck flows expansion factors, and average daily truck trips were derived from this data.
2. The most recent data from LEHD belonged to the year 2021, hence, this was used.

Figure 12. Truck Trip Production Rates by Freight Analysis Zone

4.5. Truck Trip Attraction Rate

Lastly, the project team developed a trip attraction rate metric using existing terminating daily truck trips (2023 estimate) as the numerator and current population (2022 estimate) for each freight analysis zone as shown in **Figure 13**. The terminating truck trips include inbound and intra flows for the freight analysis zones, and the metric represents truck trip attraction intensity.

Nine AZs have a top tier truck trip attraction rate (higher than 0.8 daily truck trips per resident): 110 – Southwest Central Johnson County (KS), 111 – North Central Johnson County (KS), 112 – Northwest Douglas County, 114 – Southeast Platte County – Northwest Wyandotte County, 115 – Southwest Clay County – Northwest Jackson County, 117 – South Central Clay County – North Central Jackson County, 120 – Southeast Clay County, 133 – Middle East Central Wyandotte County, and 138 – Middle East Wyandotte County. Of these, only zone 138 has a high population density of 1.35 residents per acre. In zone 133 where the trip attraction is the highest (171 daily truck trips per resident), employment instead of resident population appears to be a better explanation variable for truck trip attractions.

Six AZs that are parts of Johnson and Wyandotte counties in Kansas and parts of Clay, Jackson, and Saline Counties in Missouri have middle tier truck trip attraction rate (between 0.17 and 0.8 daily truck trips per worker). Of these, only two zones have a population density greater than 1.0 resident per acre.

In the remaining 29 FAZs that formed the bottom tier, the truck trip attraction rates vary narrowly between 0.02 and 0.16 daily truck trips per resident. Of these, ten zones in Douglas, Johnson, and Wyandotte counties in Kansas and Cass, Clay, and Jackson counties in Missouri have a population density greater than 1.0 resident per acre.

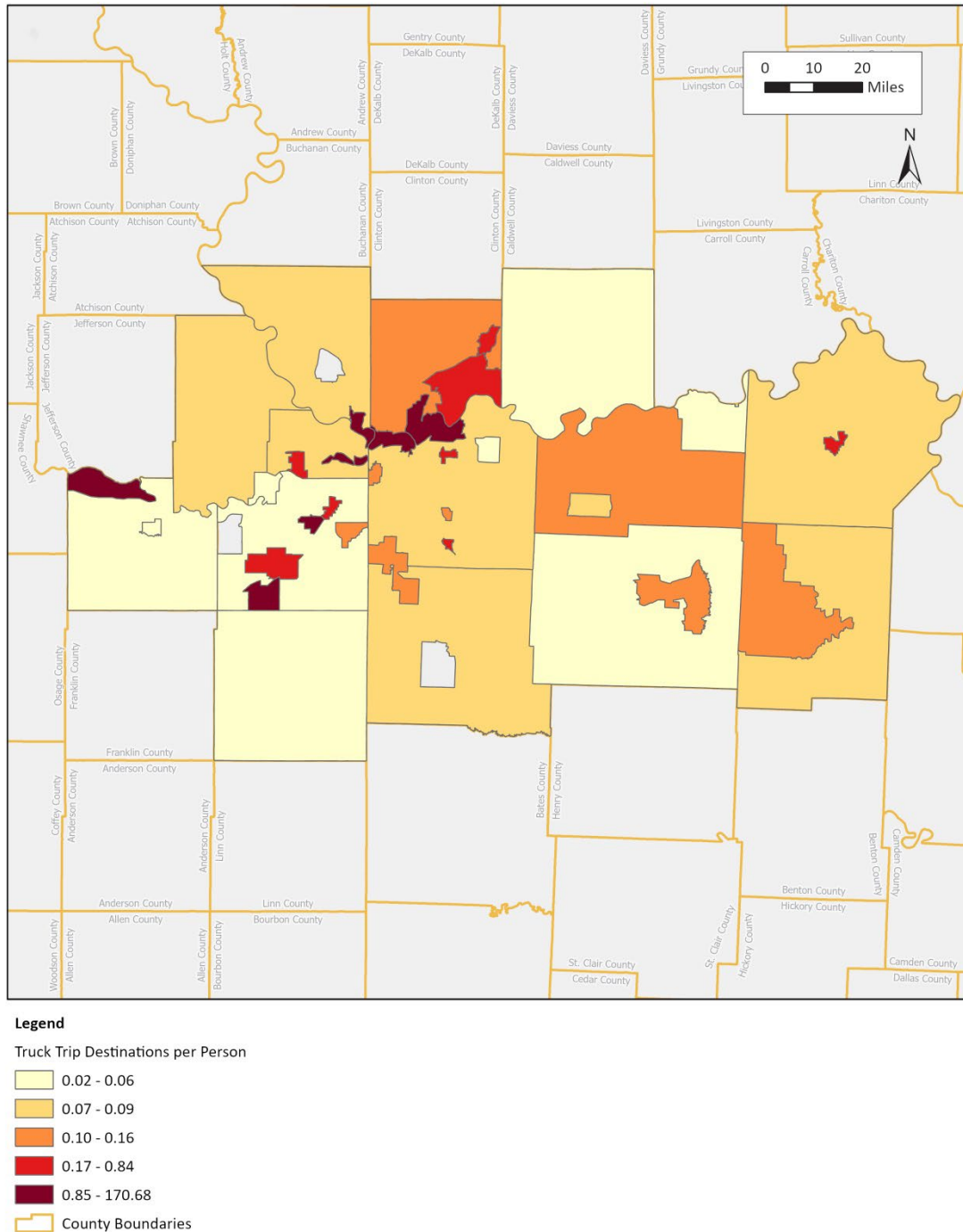


Figure 13. Truck Trip Attraction Rates by Freight Analysis Zone

Source: Geotab Data, September–November 2023; U.S. Census Bureau, 2018–2022 ACS 5-Year Population by Census Tract Estimates

Note:

1. Geotab data is sample truck origin–destination data for a 3-month period in 2023, which was expanded to the truck population by the project team using average annual daily traffic to Geotab truck flows expansion factors, and average daily truck trips were derived from this data.
2. The most recent data from LEHD belonged to the year 2021, hence, this was used.

5. Impacts of Socioeconomic and Freight Factors

Table 19 provides a qualitative discussion of the likely impacts of the socioeconomic and freight factors discussed in previous sections of this memorandum.

Table 19. Likely Impacts of Socioeconomic and Freight Factors

Factors	Trend/Projection	Likely Impacts
Population	↑ regional total population	↑ total freight attracted to the region
	↔ sub-region's (county, freight analysis zone, city) share of total change in regional population	↔ concentration of freight attractions in sub-regions and associated congestion and safety issues
	↔ age distribution of population	↔ characteristics of freight attracted (changes in commodity mix and pickup/delivery methods)
Per capita income	↑ regional average per capita income	↑ total freight attracted to the region
	↑ regional disparity of per capita income	↑ goods and transportation cost share of disposable income for low-income households ↑ equity considerations when planning for freight systems and services
Employment	↑ regional total employment	↑ total freight produced from the region
	↔ sub-region's (county, freight analysis zone, city) share of total change in regional employment	↔ concentration of freight productions in sub-regions and associated congestion and safety issues
	↑ employment in specialized goods producing/handling industries and major employers for manufacturing/distribution	↑ economics of scale and ↓ goods production costs ↑ clustering and sharing of resources and ↓ goods handling costs ↑ local sourcing, which leads to ↑ resiliency and sustainability of supply chains ↑ economic vitality

Factors	Trend/Projection	Likely Impacts
	↔ industry distribution of employment	↔ characteristics of freight produced (changes in commodity mix, shipment mode, size and frequency, ability to produce/handle new products/services)
Economic productivity (output in constant dollars per employee)	↑ labor productivity in goods production/handling industries	↑ total freight produced from the region ↑ support opportunities
	↑ use of advanced technologies (information, automation, computation, software, sensing, and networking technologies) in goods production/handling industries	↑ freight product/service innovations, including e-commerce ↑ speed and reliability of freight delivery ↑ visibility of freight to consumers ↑ high-skilled and higher-paying jobs ↓ low-skilled and lower-paying jobs in the sub-region
	↑ output and sales (freight value) for goods production and handling industries	↑ private investment and jobs for high freight value growth related economic opportunities
GDP contribution	↑ regional or sub-regional (e.g., county, freight analysis zone, city) total GDP contribution	↑ marketability of region or sub-region to prospective businesses for economic development
	↑ value-addition activities in goods production and handling industries	↑ unit price of freight, thus total value of freight produced ↑ high-skilled and higher-paying jobs ↑ private investment and jobs for high value per ton related economic opportunities
	↑ total value of freight moved	↑ jobs for regional workforce
Value and value per ton (in constant dollars) of freight moved by commodity	↑ freight value of top commodities	↑ opportunities for economies of scale, clustering, and specialization for high growth top commodities (see Economic productivity)

Factors	Trend/Projection	Likely Impacts
	↑ freight value per ton of top commodities	↑ value-addition opportunities for high growth top commodities (see GDP contribution)
Value and value per ton (in constant dollars) of freight moved by mode	↑ freight value carried on rail and water modes	↑ opportunities to serve heavier commodities and low time-sensitive commodities (see Economic productivity)
	↑ freight value carried on truck and air modes	↑ opportunities for high-value and time-sensitive commodities (see Economic productivity)
	↑ freight value carried on multimodal and mail (truck-rail and truck-truck) modes	↑ opportunities for containerization and multimodal transfer of commodities (see Economic productivity)
	↑ freight value per ton carried on modes	↑ value-addition opportunities for high growth modes (see GDP contribution)
Value and value per ton (in constant dollars) of freight moved by trade partner	↑ freight value for top trade partners	↑ opportunities for economies of scale, clustering, and specialization for high growth top trade partners (see Economic productivity)
	↑ freight value per ton for top trade partners	↑ value-addition opportunities for high growth top trade partners (see GDP contribution)
Truck trip production rate (in truck trips per employee)	Not a trend/projection but influenced by other trends/projections	–
Truck trip attraction rate (in truck trips per person)	Not a trend/projection but influenced by other trends/projections	–

Key: ↑ Increase in, ↓ Decrease in, ↔ Nominal Change

6. Summary

6.1. Socioeconomic Factors

1. Population

- a. Population in the planning regions of MARC, LDCMPO, and PTRPC are expected to grow annually at a rate of 0.83 percent, 1.18 percent, and 0.40 percent, respectively. The overall study region population is expected to grow annually at a rate of 0.82 percent from about 2,374,300 residents in 2022 to about 2,921,300 residents in 2050, an increase of about 547,000 residents by 2050 under the base scenario. At a minimum, the future multimodal freight transportation system must serve 2.7 million residents in the study region in 2050.
- b. Under the alternate scenarios, the study region population growth between 2022 and 2050 may vary between 332,400 and 552,500 people. At a minimum, the future multimodal freight transportation system must serve 2.7 million residents in the study region in 2050.
- c. The region may continue to face aging population issues beyond 2050, impacting the future workforce.
- d. Population factors will likely affect total freight demand attractions, their concentration, and characteristics, and thus create specific multimodal freight system capacity and service improvement needs.

2. Per capita income

- a. Not adjusting for inflation, the study region per capita income grew from \$50,181 to \$62,296 between 2017 and 2022, by 4.83 percent annually.
- b. There is a wide disparity in per capita income across the study region, ranging from \$38,253 (Wyandotte County in Kansas) to \$90,503 (Johnson County in Kansas); goods and transportation costs will likely grow in share of the disposable income for low-income households. Therefore, equity considerations should be made when making transportation plans and system improvements for cost and access of consumer goods.

3. Employment

- a. More than 17,000 jobs in the goods producing / handling industry sectors of transportation and warehousing, construction and manufacturing were added between 2017 and 2022.

- b. Employment in the planning regions of MARC, LDCMPO, and PTRPC are expected to grow annually at rates of 1.04 percent, 1.41 percent, and 0.34 percent, respectively. The overall study region employment is expected to grow annually at a rate of 1.07 percent from about 1,058,000 jobs in 2021 to 1,385,000 jobs in 2050, an increase of about 327,000 jobs by 2050 under the base scenario.
- c. Under the alternate scenarios, the employment change between 2022 and 2050 can vary between 323,800 and 633,700. At a minimum, the future multimodal freight transportation system must serve 1.2 million jobs in the study region in 2050.
- d. The goods producing/handling industry sectors of transportation and warehousing, construction and manufacturing will continue to be key contributors to future regional employment growth.
- e. Employment factors would likely affect total freight demand, concentration, and characteristics, and thus create multimodal freight system capacity and service improvement needs.
- f. Future multimodal freight systems must continue to provide high-quality transportation services and resilient supply chains supporting the region's major manufacturing/distribution firms (more than 500 employees) and specialized industries. This may lead to economic vitality by further increasing economies of scale, clustering, shared resources, local sourcing, and their side-benefits on sustainability and resiliency.

4. Economic Productivity

- a. Under the low scenario for employment growth (based on the U.S. BLS' national industry level employment and output growth assumptions applied to regional industry level employment), economic productivity (output per employee) is expected to grow for MARC, LDCMPO, PTRPC, and the study region at the rates of 1.76 percent, 1.72 percent, 0.64 percent, and 1.10 percent, respectively.
- b. By focusing improvements on labor productivity, use of advanced technology and freight growth markets, anticipated economic productivity gains can be achieved.
- c. Growth opportunities in goods production and handling industries can create increases in employment.

5. Real GDP

- a. The regional total real GDP grew from \$142 billion to \$154 billion between 2017 and 2022, a 1.79 percent annual growth rate on average.

- b. Johnson and Miami counties in Kansas and Clay County in Missouri experienced a high growth in GDP (over 2.0 percent annually), Cass, Jackson, and Pettis counties in Missouri experienced moderate growth in GDP (between 1.0 and 2.0 percent annually), and the remaining counties experienced low growth in GDP except for Ray County where the GDP declined by 1.61 percent annually.
- c. Regional and county level GDP are useful economic development measures for marketing to prospective businesses (new goods production and handling facilities or expansion of existing facilities).
- d. Value-addition opportunities in goods production and handling industries can create high-skilled and high-paying jobs and attract private investment.

6.2. Freight Factors

- 6. Value and value per ton (in constant dollars) of freight moved by commodity
 - a. Regional value growth
 - i. Outbound freight flows: 3.12 to 3.70 percent growth per year
 - ii. Inbound and Intra freight flows: 3.22 to 3.78 percent growth per year
 - b. Regional value per ton growth
 - i. Outbound freight flows: 0.88 to 0.97 percent growth per year
 - ii. Inbound and Intra freight flows: 1.07 to 1.44 percent growth per year
 - c. Value growth for top 10 commodities by value
 - i. Outbound freight flows: Except motorized vehicles, natural gas, and other fossil products, other top commodities have robust value growth, the lowest growth commodity being other foodstuffs and the highest growth commodity being miscellaneous manufacturing products.
 - ii. Inbound and Intra freight flows: All top 10 commodities have robust value growth, the lowest growth commodity being meat and seafood and the highest growth commodity being pharmaceuticals.
 - d. Value per ton growth for top 10 commodities by value
 - i. Outbound freight flows: Machinery, electronics, chemical products, and pharmaceuticals are key opportunity commodities for value-addition. Textiles and leather is an at-risk commodity where value per ton is dropping.

- ii. Inbound and Intra freight flows: Pharmaceuticals, machinery, and motorized vehicles are key opportunity commodities for value-addition.
 - e. Growth in commodities will lead to economic vitality by increasing economic productivity and GDP growth, which in turn would come from creating new or expanding existing economies of scale, clustering, specialization, and value-addition opportunities for goods producing and handling industries.
7. Value and value per ton (in constant dollars) of freight moved by mode
- a. Value growth for modes
 - i. Outbound freight flows: Except pipeline mode, other modes have robust value growth, the lowest growth mode being rail and the highest growth mode being multiple modes and mail.
 - ii. Inbound and Intra freight flows: All modes have robust value growth, the lowest growth mode being pipeline and the highest growth mode being multiple modes and mail.
 - b. Value per ton growth for modes
 - i. Outbound freight flows: Multiple modes and mail, air, and rail modes are key opportunity modes for value-addition.
 - ii. Inbound and Intra freight flows: Rail, multiple modes, and mail and truck are key opportunity modes for value-addition.
 - c. Rail or water mode freight value growth projections indicate opportunities for heavier commodities and low time-sensitive commodities, truck and air mode freight value growth projections indicate opportunities for high-value and time-sensitive commodities, and multiple modes and mail freight value growth projections indicate opportunities for containerization.
 - d. Growth in any modal use will lead to economic vitality by increasing economic productivity and GDP growth, which in turn would come from creating new or expanding existing economies of scale, clustering, specialization, and value-addition opportunities for modal operators and their customers.
8. Value and value per ton (in constant dollars) of freight moved by trade partner
- a. Value growth for top 15 domestic trade partners by value
 - i. Outbound freight flows: All top 15 trade partners have robust value growth, the lowest growth trade partner being Chicago IL-IN-WI (IL Part) and the highest growth trade partner being Wichita KS.

- ii. Inbound and Intra freight flows: All the top 15 trade partners have robust value growth, the lowest growth trade partner being Rest of KS and the highest growth trade partner being Indianapolis IN.
- b. Value per ton growth for top 15 domestic trade partners by value
 - i. Outbound freight flows: St. Louis MO-IL (MO Part), Iowa, and Denver CO are key opportunity trade partners for value-addition. Rest of PA is an at-risk trade partner where value per ton is dropping.
 - ii. Inbound and Intra freight flows: Rest of IL, Rest of MO, and Kansas City MO-KS (MO Part) are key opportunity trade partners for value-addition. Rest of NE, Rest of KS and Los Angeles CA are at-risk trade partners where value per ton is dropping.
- c. Value growth for top five international trade partners by value
 - i. Exports: All top five trade partners have robust value growth, the lowest growth trade partner being Canada and the highest growth trade partner being Eastern Asia.
 - ii. Imports: All top five trade partners have robust value growth, the lowest growth trade partner being Canada and the highest growth trade partner being Eastern Asia.
- d. Value growth for top five international trade partners by value
 - i. Exports: Europe, Eastern Asia, and Mexico are key opportunity trade partners for value-addition. South-Eastern Asia and Oceania is an at-risk trade partner where value per ton is dropping.
 - ii. Imports: Eastern Asia, Europe and Mexico are key opportunity trade partners for value-addition. Canada is an at-risk trade partners where value per ton is dropping.
- e. Growth in trade partners will lead to economic vitality by increasing economic productivity and GDP growth, which in turn would come from creating new or expanding existing economies of scale, clustering, specialization and value-addition opportunities for transportation and warehousing, wholesale trade and retail trade industries.

9. Truck trip production rate

- a. Trip production rates were developed using Geotab truck origins (outbound plus intra truck trips) data and LEHD employment data for the freight analysis zones.
- b. Identified zones in three tiers, the top tier consisted of eight zones with trip production rate higher than 0.80 daily truck trips per worker, the middle tier consisted of nine zones with trip production rate between 0.40 and 0.80 daily truck trips per worker, and the bottom tier consisted of 27 zones with trip production rate between 0.03 and 0.40 daily truck trips per worker.

10. Truck trip attraction rate

- a. Trip attraction rates were developed using Geotab truck destinations (inbound plus intra truck trips) data and ACS population data for the freight analysis zones.
- b. Identified zones in three tiers, the top tier consisted of nine zones with trip attraction rate higher than 0.80 daily truck trips per resident, the middle tier consisted of six zones with trip attraction rate between 0.17 and 0.80 daily truck trips per resident, and the bottom tier consisted of 29 zones with trip attraction rate between 0.02 and 0.17 daily truck trips per resident.
- c. In zone 133 (Middle East Central Wyandotte County) where the trip attraction is the highest (171 daily truck trips per resident), employment instead of resident population appears to be a better explanation variable for truck trip attractions.