TEXAS STATE

INGRAM SCHOOL OF ENGINEERING

Problem Statement

To mitigate inventory losses from supply chain interruptions due to COVID-19, CTFB must make a financial investment towards declining product categories and optimize delivery routes to better support Central Texans in need.

Project Purpose

Determine where the food bank should allocate financial investment in order to supplement Inventory losses and optimize routes to better support growing agencies.

Project Objectives

• Determine which and how many of the 32 product categories to procure • Develop a model to optimize partner agency delivery routes

I2.02 – Inventory Planning and **Delivery Route Improvements**

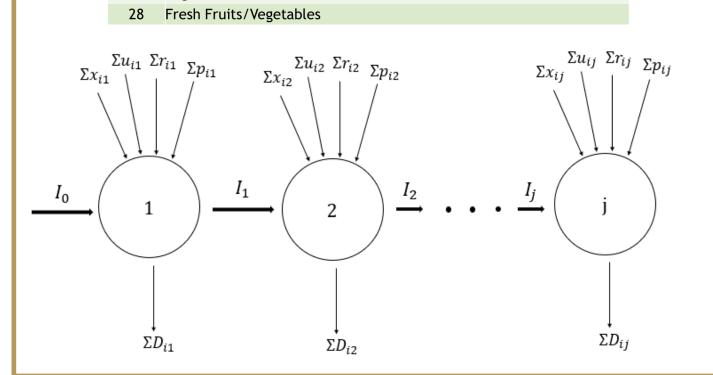
Adaora Anagbogu, Cross Mitchell, Leo Montoya

Central Texas Food Bank

Inventory Plan

ritical Categories Code Material Description 04 Bread/Bakery: Bread, Biscuits, Rolls, Batter, Tortillas, Pie Crusts 06 Complete Meal/Entree, Soup 07 Dairy: Yogurt, Cheese, Milk, Butter, Sour Cream, Ice Cream

- 10 Fruit: Canned and Frozen 14 Juice: 100% Fruit or Vegetable
- 15 Meat/Fish/Poultry 16 Mixed and Assorted Food
- Protein Non-Meat: Peanut Butter, Beans, Eggs, Pork & Beans, Nuts 27 Vegetables: Canned and Frozen



Decision variables

 $x_{ij} = pounds of product category i in time period j$ Other parameters:

 $u_{ij} = pounds of product category i received from USDA in time period j$ r_{ii} = pounds of product category i received from retail and other donors in time period j $c_{ii} = unit \ cost \ of \ product \ category \ i \ in \ time \ period \ j$ U_{ii} = USDA unit cost of product category i in time period j $P_{ii} = cost of already purchased product category i in time period j$ D_{ij} = demand of product category i in time period j I_{ii} = inventory of product category i in time period j E_{ii} = ending inventory of product category i in time period j Where i = product categories 4, 6, 7, 10, 14, 15, 16, 23, 27, 28

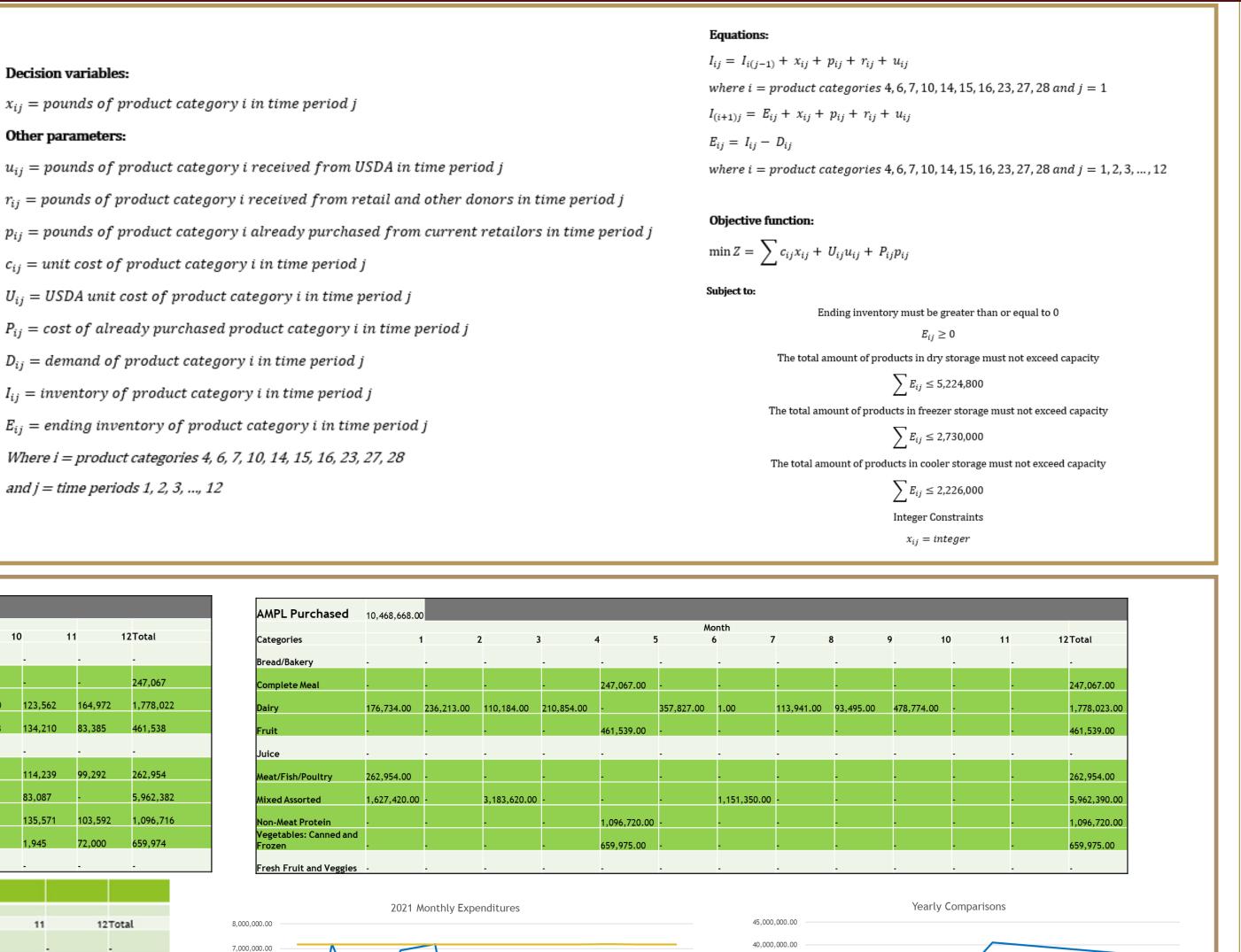
and j = time periods 1, 2, 3, ..., 12

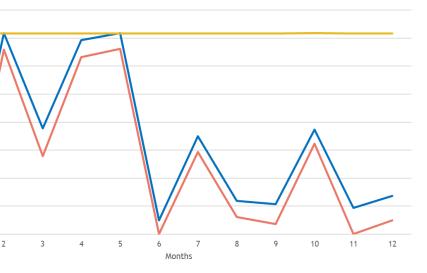
	10,468,6	53					Month								AMPL Pu
Categories		1	2	3		4	5	6	7	8 9	10) 1	1	12Total	Categories
Bread/Bakery															Bread/Bak
Complete Meal		-	-	-		-	-	-	43,735	203,332	-		-	247,067	Complete
Dairy	120,636	-	-	25	7,427	546,518	-	167,231	207,436	-	190,240	123,562	164,972	1,778,022	Dairy
ruit		-		-			-	_	134,001		109,943	134,210	83,385	461,538	Fruit
uice				-			-								Juice
Neat/Fish/Poultry		-	-	-			-	49,423	-	-	-	114,239	99,292	262,954	Meat/Fish/
Aixed Assorted	1,627,41	5 -	1,486	6,466 -		797,946	1,967,468	-			-	83,087	-	5,962,382	Mixed Asso
Non-Meat Protein		-	-			857,553	-		-	-	-	135,571	103,592	1,096,716	Non-Meat l
/egetables: Canned and Froze	n -		_	58	6,030		_	_				1,945	72,000	659,974	Vegetable Frozen
resh Fruit and Veggies	_		_	_			_					-	-	_	Fresh Frui
urchased 8,850,01	2					Month									
	2 2		3	4	5	Month 6	7		8	9	10	11	12T0	tal	8,000,000.00
ategories 1			3	4	5		7	_	8	9	10	11	12T0	tal	8,000,000.00
ategories 1 read/Bakery			3	4	5	6	7 9,117	-	8 - 114,325	9 - 54,422	10	11		tal 7,864	
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ategories 1 read/Bakery omplete Meal airy	2	85,828	3	4		6 - -		-		54,422 260,483	10 242,873	316,3	177 163 2,5	7,864	7,000,000.00
ategories 1 read/Bakery - omplete Meal - airy - ruit -	2	85,828	3			6 - -	9,117	-		54,422			177 163 2,5	7,864	7,000,000.00
ategories 1 sread/Bakery complete Meal pairy ruit	2	85,828	3			6 - -	9,117	-		54,422 260,483 228,235		316,3 54,69	- 177 863 2,5 96 283 -	7,864 966,193 2,931	7,000,000.00
ategories 1 read/Bakery omplete Meal airy ruit vice eat/Fish/Poultry	2	85,828		334,320	- 428, -	6	9,117 1,098,114	-		54,422 260,483 228,235 191,932		316,3	177 363 2,5 96 283 	7,864 966,193 2,931 7,496	7,000,000.00
ategories 1 read/Bakery omplete Meal airy ruit vice eat/Fish/Poultry ixed Asssorted - 1,	2	85,828	3 - - - - - - - - - - - - - - - - - - -	334,320 1,382,71	- 428, -	6	9,117 1,098,114	-		54,422 260,483 228,235		- 316,3 54,69 - 105,5	- 177 863 2,5 96 283 - 564 297 3,8	7,864 966,193 2,931 7,496 892,322	7,000,000.00
ategories 1 read/Bakery omplete Meal airy ruit uice eat/Fish/Poultry	2	85,828		334,320	- 428, -	6	9,117 1,098,114	- - - - 579,910		54,422 260,483 228,235 191,932		316,3 54,69	- 177 863 2,5 96 283 - 564 297 3,8	7,864 966,193 2,931 7,496	7,000,000.00 6,000,000.00 5,000,000.00 4,000,000.00 3,000,000.00 2,000,000.00

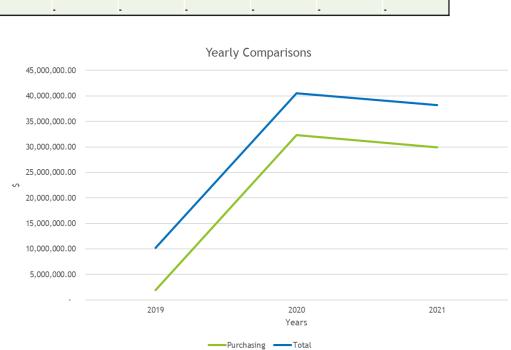
Partner Agency Delivery Routes

	🗾 🛛 Day of the Week 💌 🛛 Weel	🔹 Ship-To Address	Ship-To City	County 💌	population growth rate (percentag	e) 🔄 growth classification	Yeight	🔺 Cube 🔺 S	itops 👱 🔹 🕈 of Trucks	Type of Truck	Route 🕈 🗾	Priority of the C	ounty 🖬							
1/22/2022	Saturday 0 Saturday 0	3811 E. 12th St. 2600 S 1st St	Austin Temple	Travis Bell	31.60	1Large increase 1Large increase	3,638	258	$\frac{1}{1}$ 1	Bobtail/ Non CDL 48 ft tractor trailer	1	High			16,50	0 42	,000	47,500	8,500	1,500
1/22/2022	Saturday 0	2000 5 150 50	remple	Dell	23.22 * N/A	*N/A	42,000	1,235	5 1	53 ft tractor trailer	3	#N/A			30 ft route traile	er 48 ft tractor tra	ailer 53 ft tractor	trailer Bobtail/ No	on CDL D	Duck
1/23/2022	Sunday 0 Monday 1	7210 Bruck Country Bd		Travia	*N/A 21.60	TLarge increase	<u>6,000</u> 4 488	415 288	5 1	Bobtail/ Non CDL Bobtail/ Non CDL Bobtail/ Non CDL	3	#N/A High			73%	60%	74%	75%	5	52%
1/24/2022	Monday 1	7210 Brush Country Rd 7000 Woodhue	Austin Austin	Travis Travis Travis	31.60	1Large increase	7,450	272	1 1	Bobtail/ Non CDL	6	High			13/0	0076	74/0	13/0		JZ/0
1/24/2022 1/24/2022	Monday 1	1200 E Rundberg Lane	Austin Cedar Park		31.60	1Large increase	13,945 8,745	1,187	1 1	48 ft tractor trailer	7	High							43%	
1/24/2022	Monday 1 Monday 1	1200 E Rundberg Lane 1150 S. Bell Blvd (Twin Lakes) 905 Bedford Street	Austin	¥illiamson Travis	31.60	1Large increase 1Large increase	210	17	1 1	30 ft route trailer Duck	9	nign High					30%			
1/24/2022	Monday 1	2001 Bosowood	Austin	Travis Travis	31.60	1 Large increase	450	35	1 1	Duck	10	High						88%	71%	
1/24/2022 1/24/2022	Monday 1 Monday 1	1143 Salina Ave. P.O. Box 5 FOOD CARE CENTER	Austin Temple Killeen	Travis Bell	23.22	1Large increase 1Large increase	10.060	454	$\frac{1}{1}$ 1	Duck 30 ft route trailer	12	High High						0070		
1/24/2022	Monday 1	FOOD CARE CENTER		Bell	23.22	1 Large increase	12,220	731	1 1	30 ft route trailer	13	High							53%	
1/24/2022	Monday 1 Monday 1	3221 Hilliard Ave 6101 Westcliff Rd 220 Herndon Street	Killeen	Bell	23.22	1Large increase 1Large increase			1	30 ft route trailer 30 ft route trailer	13	High High							88%	
1/24/2022	Monday 1	220 Herndon Street	Killeen San Marcos	Hays	59.69	1 Large increase	21,173	828	1 1	30 ft route trailer 48 ft tractor trailer	14	Medium					2004		00/0	
1/24/2022 1/24/2022	Monday 1	901 Bois-D'arc Street 300 Crystal Falls Parkway	Lockhart Leander	Hays Caldwell	18.48 55.49	2 Moderate increase	5,569	240	1 1	48 ft tractor trailer Bobtail/ Non CDL	14	Medium					33%			
1/24/2022	Monday 1	1401 Hugu 183	Leander	Williamson Williamson	55.49	1Large increase 1Large increase		240	1	Bobtail/ Non LUI	15	High			539	%				
1/24/2022	Monday 1	2303 Euclid Ave. 702 W. Ave. G	Leander Austin	Travis Bell	31.60	1 Large increase	4,861	214	1 1	Bobtail/ Non CDL	16	High								14%
1/24/2022	Monday 1 Monday 1	2000 W. Airport Road	Temple	Bell	23.22	1 Large increase 1 Large increase	10,000	404	1	30 ft route trailer 30 ft route trailer	17	High								
1/24/2022	Monday 1 Monday 1	2000 W. Airport Road 4403 Russell Dr.	Temple Temple Austin Waco	Travis McLennan	31.60	1 Large increase	8,318	279	1 1	Bobtail/ Non CDL Bobtail/ Non CDL	18	High								30%
1/24/2022	Monday 1 Monday 1	ACTS STOREHOUSE	Waco	McLennan	11.86 #N/A	2 Moderate increase	5,733	305	1 1 5 2	Bobtail/ Non CUL 48 ft tractor trailer	19 20	High #N/A								20%
1/26/2022	Wednesday 1 Wednesday 1	2210 Holland Rd P.O. Box 433	Belton	Bell	23.22	1Large increase	9,704	330	1 1	30 ft route trailer	21	High			C10	24				
1/26/2022 1/26/2022	Wednesday 1 Wednesday 1	P.O. Box 433 220 Heredon Street	Belton Smithville San Marcos	Bastrop Hays San Saba	27.88	1 Large increase 1 Large increase	3,022	218	$\frac{1}{1}$ 1	lsuzu Duck	22	High Medium			619					
1/26/2022	Wednesday 1	220 Herndon Street San Saba Civic Center 6002 Jain Ln.	San Saba	San Saba	-1.53	4 Stagnent	6,633	255	1 1	Bobtail/ Non CDL Bobtail/ Non CDL	24	Low			749	%				
1/26/2022	Wednesday 1	6002 Jain Ln.	Austin	Travis	31.60	1Large increase 1Large increase	5,508 16,654	214	1 1	Bobtail/ Non CDL 30 ft route trailer	25	High					50%			
1/26/2022	Wednesday 1	2000 W. Airport Road 106 W. Ave D	Temple Temple	Bell	23.22	1Large increase *N/A	10,034	110	1	30 ft route trailer	26	High					5070			
1/26/2022	Wednesday 1					#N/A	42,612	1,412	6 2	48 ft tractor trailer	27	#N/A								
	Growth Classification	.t County Priority -	Growth perc												30 ft route trailer	48 ft tractor trailer	53 ft tractor trailer	Bobtail/ Non CDL	Duck	
ntg 💌	Growth Classification																		D'alon	
vis I		E County Honey		centage		Growth classific	ation	Sum of Wolaht	Column Lobala 🔻									,		1.100/
	Large increase	High	X > -10%	centage		Large decrease		Sum of Weight	Column Labels 🖛						55.51%	73.79%		,	21.1	L.18%
ell in the second se	Large increase	High High		sentage						2 Moderate increase 3	Slight increase	4 Stagnent	5 Moderate decrease(Grand Total				42.87%		L.18%
		High	X> -10% -2% > X > -10%	centage		Large decrease Moderate decrease		Row Labels	1 Large increase		•		5 Moderate decrease(73.79%	5 98.73 %	,		1.18%
ell in the second se	Large increase	High High High High High	X > -10% -2% > X > -10% -2% > X > 2%	centage:		Large decrease Moderate decrease Stagnent				2 Moderate increase 3 116861.72	Slight increase			Grand Total 675673.72			5 98.73 %	42.87%		1.18%
nson	Large increase Large increase	High High High	X> -10% -2% > X > -10% -2% > X > 2% 2% < X < 10%			Large decrease Moderate decrease Stagnent Slight increase		Row Labels 30 ft route trailer	1 Large increase 499315	116861.72	14363	25260		675673.72		73.79%	5 98.73%	42.87% 40.95%		1.18%
nson rrop	Large increase Large increase Large increase	High High High High High	X> -10% -2% > X > -10% -2% > X > 2% 2% < X < 10% 10% < X < 20%			Large decrease Moderate decrease Stagnent Slight increase Moderate increase		Row Labels	1 Large increase 499315 r 465074.6	116861.72 202331	•	25260		675673.72 783331.6		73.79%	5 98.73 %	42.87% 40.95% 65.87%		1.18%
rop	Large increase Large increase Large increase Large increase Large increase	High High High High High Medium	X> -10% -2% > X > -10% -2% > X > 2% 2% < X < 10%			Large decrease Moderate decrease Stagnent Slight increase		Row Labels30 ft route trailer48 ft tractor traile	1 Large increase 499315 r 465074.6	116861.72 202331	14363	25260		675673.72 783331.6		73.79%	5 98.73%	42.87% 40.95%		1.18%
nson rop	Large increase Large increase Large increase Large increase Large increase Large increase	High High High High Medium Low High	X> -10% -2% > X > -10% -2% > X > 2% 2% < X < 10% 10% < X < 20%			Large decrease Moderate decrease Stagnent Slight increase Moderate increase		Row Labels30 ft route trailer48 ft tractor traile53 ft tractor traile	1 Large increase 499315 r 465074.6 r 72111	116861.72 202331 50731	14363 115926	25260	19874	675673.72 783331.6 122842		73.79%	5 98.73%	42.87% 40.95% 65.87% 45.71%		1.18%
HI nson no n	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase	High High High High Medium Low High Medium	X>-10% -2%>X>-10% -2%>X>2% 2% <x<10% 10%<x<20% X>20%</x<20% </x<10% 			Large decrease Moderate decrease Stagnent Slight increase Moderate increase		Row Labels30 ft route trailer48 ft tractor traile	1 Large increase 499315 r 465074.6	116861.72 202331	14363	25260	19874	675673.72 783331.6		73.79%	5 98.73%	42.87% 40.95% 65.87%		1.18%
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II IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase	High High High High Low Low High Medium Medium Low	X > -10% -2% > X > -10% -2% > X > 2% 2% < X < 10% 10% < X < 20% X > 20% Sum of Weight Colu	lumn Labels 🝸	Low + Medium Grand Total	Large decrease Moderate decrease Stagnent Slight increase Moderate increase		Row Labels30 ft route trailer48 ft tractor traile53 ft tractor traile	1 Large increase 499315 r 465074.6 r 72111 540601.76 48256.56	116861.72 202331 50731 108794.6 1450	14363 115926	25260 32219	19874 47077 1893.5	675673.72 783331.6 122842 766915.36 52599.06	55.51%	73.79%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%		1.18%
II IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase	High High High High Low Low High Medium Medium Low Low	X > -10% -2% > X > -10% -2% > X > 2% 2% < X < 10% 10% < X < 20% X > 20% Sum of Weight Colu	lumn Labels 🝸	Low #Medium Grand Total	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase		Row Labels30 ft route trailer48 ft tractor traile53 ft tractor traileBobtail/ Non CDLDuck	1 Large increase 499315 r 465074.6 r 72111 540601.76 48256.56	116861.72 202331 50731 108794.6 1450	14363 115926 38223	25260 32219	19874 47077 1893.5	675673.72 783331.6 122842 766915.36 52599.06		73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%		1.18%
II IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase	High High High Medium Low High Medium Medium Low Low Low	X > -10% -2% > X > -10% -2% > X > 2% 2% < X < 10% 10% < X < 20% X > 20% Sum of Weight Colu	lumn Labels 🝸	• Low	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase		Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 2 499315 499315 r 465074.6 r 72111 540601.76 48256.56 106780.08	116861.72 202331 50731 108794.6 1450 9728.1	14363 115926 38223 999	25260 32219	19874 47077 1893.5 3161	675673.72 783331.6 122842 766915.36 52599.06 119669.18	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1	
ell elle	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase	High High High Medium Low High Medium Medium Low Low Low Low	X > -10% -2% > X > -10% -2% > X > 2% 2% < X < 10% 10% < X < 20% X > 20% Sum of Weight Colu	lumn Labels ार ⊕ High +		Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase	Low	Row Labels30 ft route trailer48 ft tractor traile53 ft tractor traileBobtail/ Non CDLDuck	1 Large increase 499315 r 465074.6 r 72111 540601.76 48256.56	116861.72 202331 50731 108794.6 1450	14363 115926 38223	25260 32219	19874 47077 1893.5 3161	675673.72 783331.6 122842 766915.36 52599.06	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1	1.18%
II III nson III rop III ys III non III met III spie IIII asas IIII e IIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase Slight increase	High High High Medium Low High Medium Medium Low Low Low Low Low Medium	 ×> -10× -2× > ×> -10× -2× > ×> -2× 2× < × < 10× 10× < × < 20× ×> 20× Sum of Weight Colu Row Labels ▼ 	lumn Labels ार ⊕ High +		Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase	Low	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 2 499315 499315 r 465074.6 r 72111 540601.76 48256.56 106780.08	116861.72 202331 50731 108794.6 1450 9728.1	14363 115926 38223 999	25260 32219	19874 47077 1893.5 3161	675673.72 783331.6 122842 766915.36 52599.06 119669.18	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1	5.80%
ell elle	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase	High High High Medium Low High Medium Medium Low Low Low Low Low Medium Medium	 ×> -10× -2×> ×> -10× -2×> ×> -2× 2×< ×< 10× 10× < × < 20× 10× < × < 20× Sum of Weight Colu Row Labels ▼ ⊞ Jan 	lumn Labels ₹	13,686 39,267 258,901	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase High Medium 79.55% 15.17%	Low 5.29%	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 499315 499315 465074.6 7 72111 540601.76 48256.56 106780.08 1732139	116861.72 202331 50731 108794.6 1450 9728.1 489896.42	14363 115926 38223 999 169511	25260 32219 57479	19874 47077 1893.5 3161 72005.5	675673.72 783331.6 122842 766915.36 52599.06 119669.18 2521030.92	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1 	5.80%
II III nson III rop III ys III non III met III spie IIII asas IIII e IIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase Slight increase	High High High Medium Low High Medium Medium Low Low Low Low Low Medium	 ×> -10× -2×> ×> -10× -2×> ×> -2× 2×< ×< 10× 10× < × < 20× 10× < × < 20× Sum of Weight Colu Row Labels ▼ ⊞ Jan 	lumn Labels ₹	13,686 39,267 258,901	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase High Medium 79.55% 15.17%	Low 5.29%	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 499315 499315 465074.6 7 72111 540601.76 48256.56 106780.08 1732139	116861.72 202331 50731 108794.6 1450 9728.1 489896.42	14363 115926 38223 999 169511	25260 32219 57479	19874 47077 1893.5 3161 72005.5	675673.72 783331.6 122842 766915.36 52599.06 119669.18 2521030.92	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1 	5.80%
II III nson III rop III ys IIII no IIIII no IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase Slight increase Slight increase	High High High Medium Low High Medium Medium Low Low Low Low Low Medium Medium	 ×> -10× -2× > ×> -10× -2× > ×> -2× 2× < × < 10× 10× < × < 20× ×> 20× Sum of Weight Colu Row Labels ▼ 	lumn Labels r	39,267 258,901 33,968 149,741 556,349	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase High Medium 79.55% 15.17% 66.98% 26.91%	Low 5.29% 6.11%	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 499315 499315 465074.6 7 72111 540601.76 48256.56 106780.08 1732139 Large increase 106780.08	116861.72 202331 50731 108794.6 1450 9728.1 489896.42 Moderate increase	14363 115926 38223 999 169511 Slight increase	25260 32219 57479 Stagnent	19874 47077 1893.5 3161 72005.5 Moderate decrease	675673.72 783331.6 122842 766915.36 52599.06 119669.18 2521030.92 Total	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1 	5.80%
II Image: Second s	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase Slight increase Slight increase Slight increase Slight increase	High High High High Medium Low High Medium Low Low Low Low Low Medium Medium Medium	 ×> -10× -2×> ×> -10× -2×> ×> -2× 2×< ×< 10× 10× < × < 20× 10× < × < 20× Sum of Weight Colu Row Labels ▼ ⊞ Jan 	lumn Labels r	39,267 258,901 33,968 149,741 556,349	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase High Medium 79.55% 15.17% 66.98% 26.91%	Low 5.29% 6.11%	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 499315 499315 465074.6 7 72111 540601.76 48256.56 106780.08 1732139	116861.72 202331 50731 108794.6 1450 9728.1 489896.42	14363 115926 38223 999 169511	25260 32219 57479	19874 47077 1893.5 3161 72005.5 Moderate decrease	675673.72 783331.6 122842 766915.36 52599.06 119669.18 2521030.92	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1 	5.80%
II Image: Second s	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase	High High High High Medium Low High Medium Low Low Low Low Low Medium Medium Medium Medium Medium Medium	 ×> -10× -2×> ×> -10× -2×> ×> 2× 2×< ×< 10× 10× < × < 20× Sum of Weight Colu Row Labels ▼ ⊞ Jan ⊞ Feb ⊞ Mar 	lumn Labels ↑	13,686 39,267 258,901 33,968 149,741 556,349 82,620 300,999 1,705,781	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase High Medium 79.55% 15.17% 66.98% 26.91% 77.51% 17.65%	Low 5.29% 6.11% 4.84%	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 499315 499315 465074.6 7 72111 540601.76 48256.56 106780.08 1732139 Large increase 1732139	116861.72 202331 50731 108794.6 1450 9728.1 489896.42 Moderate increase 489896.42	14363 115926 38223 999 169511 Slight increase 169511	25260 32219 57479 Stagnent 57479	19874 47077 1893.5 3161 72005.5 Moderate decrease 72005.5	675673.72 783331.6 122842 766915.36 52599.06 119669.18 2521030.92 Total	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1 	5.80%
III IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Large increase Large increase Large increase Large increase Large increase Moderate increase Moderate increase Moderate increase Moderate increase Slight increase Slight increase Slight increase Stagnent Stagnent	High High High High Medium Low High Medium Low Low Low Low Low Cow Medium Medium Medium	×> -10× -2×> ×> -10× -2×> ×> 2× 2×< ×< 10×	lumn Labels ↑	39,267 258,901 33,968 149,741 556,349	Large decrease Moderate decrease Stagnent Slight increase Moderate increase Large increase High Medium 79.55% 15.17% 66.98% 26.91%	Low 5.29% 6.11%	Row Labels 30 ft route trailer 48 ft tractor traile 53 ft tractor traile Bobtail/ Non CDL Duck Isuzu	1 Large increase 499315 499315 465074.6 7 72111 540601.76 48256.56 106780.08 1732139 Large increase 106780.08	116861.72 202331 50731 108794.6 1450 9728.1 489896.42 Moderate increase	14363 115926 38223 999 169511 Slight increase	25260 32219 57479 Stagnent	19874 47077 1893.5 3161 72005.5 Moderate decrease	675673.72 783331.6 122842 766915.36 52599.06 119669.18 2521030.92 Total	55.51%	73.79% 75.19%	5 98.73% 5 100.00%	42.87% 40.95% 65.87% 45.71%	21.1 	5.80%

	n Fleet	Truck Tana	Truck Veight Lin	nit	Puk	Limit	total cost \$ 492	2.83	
	K	Truck Type	TTUCK TEIJAL LIII		CUUR		cost savings \$ 127		0
		3 ft Tractor Trailer	47,500		٩.	235).61%	
	Ŷ		000 ₁ 17		կլ		total distance 666.	.3061 miles	
	4:	3 ft Tractor Trailer	42,000		1	185	distance reduction 341.0	.0939 miles	
	Ţ		Τώ _Ι νου				total routes	6	
	2	0 ft Route Trailer	16,500		Ş	80	Trucks used:		
	· · · · · · · · · · · · · · · · · · ·		-				Truck Type # used	d Avg. lb Utilizati	on Avg ft^3 Ut
9	F	Sobtail/ Non CDL	8,500		f	30	53 ft Tractor Trailer	0 N/A	N/A
•			•				48 ft Tractor Trailer	4 63.9	9%
1		SUZU	3,500		F	00	30 ft Route Trailer	1 86.5	3%
							Bobtail/ Non CDL	0 N/A	N/A
1		Duck	1,500		2	50	Isuzu	1 80.3	7%
•	Ι	1	-1	Ι	-	_	Duck	0 N/A	N/A
				a 11 fr			Total Truck Utilization	6 <mark>70.4</mark>	8%
ie	Stop number #	Address 6500 Metropolis Dr	Weight Ibs N/A	Cubic ft	Latitude 30.20356	Longitude -97.71026	total cost \$	620.77	• • • • • • • • • • • • • • • • • • •
ay	1	100 W. Rundberg Lane	8,043	N/A 378	30.36156	-97.69333	total distance		4 miles
	2	2800 Webberville Rd	5,424	181	30.2657	-97.71052	total routes	1001.1	2
d t	3	4410 Duval Road	8,670	233	30.41384	-97.73201	Trucks Used:	le	<u> </u>
	4	300 S.15th St.	10,690	295	31.54761	-97.13818			4 11 11.11
	5	801 Burleson St	1,363	108	29.99578	-97.87726	Truck Type # use	ed	Avg. Ib Utiliza
	6	2111 Parker Lane	1,450	115	30.23318	-97.7359	53 ft Tractor Trailer	U	NA
n F	7	7500 Blessing Ave	2,200	70	30.33283	-97.69344	48 ft Tractor Trailer	2	62.43%
	8	701 N. Key Ave.	13,027	592	31.07314	-98.18523	30 ft Route Trailer	3	76.76%
	9	5412 Gilbert Rd	25,588	939	30.25858	-97.59229	Bobtail/ Non CDL	4	85.74%
P	-		7,014	257	31.4557	-98.57999	Isuzu	1	62.86%
	10	1509 Hanna Valley Rd	7,014						
CSFP t aite eek	10 11	1509 Hanna Valley Rd 5600 E William Cannon Dr	14,277	523	30.17803	-97.74039	Duck	2	93.77%









Performance Metrics								
etric 1: Difference of eight (Food Received - od Distributed = X)	Score							
> X	1							
2 0.25 million lbs.	2							
2 0.50 million lbs.	3							
2 0.75 million lbs.	4							
2 1 million lbs.	5							
etric 2: Percent Distance raveled Reduced = D	Score							
< 0%	1							
< 10%	2							
< 20%	3							
< 30%	4							
> 30%	5							

Future Work

Apply transportation optimization model to other delivery route dates

Acknowledgements

Sponsor Stephanie Cosmas **Operations Project Manager** Instructor Dr. Michelle Londa, Ph.D. Associate Professor Faculty Sponsor Dr. Clara Novoa, Ph.D. Associate Professor