

Western Governor's University

# PA – Executive Summary and Implications (NKM2)

D214 – Data Analytics Graduate Capstone

Nay Naing  
2-13-2024

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	
4					2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	
5	Total coffi	1 Brazil	Million \$		2,266.30	1,378.70	1,216.70	1,171.60	1,122.40	1,258.60	1,277.80	1,585.60	1,552.70	1,291.10	1,515.40	2,111.40	1,209.90	867	868.2	746	642	562.5	594	339.5	259.8	233.3	336.4	553.3	
6		2 Colombia	Million \$		2,132.00	1,485.30	1,221.80	1,267.90	1,254.00	1,367.90	1,194.90	1,311.20	1,243.70	1,026.20	999.5	1,441.90	918.1	789	853.7	706.8	629.9	632.7	410	377.3	331.4	318.8	451.6	519.3	
7		3 Switzerland	Million \$		854.1	790.8	454.5	360.9	238.2	186	115.4	118.4	95.5	49.1	66.4	84.7	63.2	54.5	38.6	35.5	37.9	38.4	36.2	28.7	22.2	17.9	10	4	
8		4 Vietnam	Million \$		765.8	602.8	511.6	497.7	618.1	803.4	864.4	684.4	809.8	674.7	731.3	635.9	439.7	326.7	350.9	341.5	243.1	190.7	144.5	98.3	73.2	89.8	132.8	118.1	
9		5 Mexico	Million \$		729.8	486.9	405.8	385.3	403.1	387.1	338.6	413.3	463.4	539.6	647.3	653.2	389.7	379.1	365.4	332.3	295.9	251.8	215.3	196.6	226.8	221.2	501.3	480.6	
10		6 Canada	Million \$		716.4	533.7	483.9	511	519.4	647.9	582.7	541	498.8	503.1	524.6	520	384	279.1	224	200.8	201.4	196.8	181	167	171.7	169.4	176.4	172.3	
11		7 Guatemala	Million \$		555.9	439.5	329.2	331.9	340.1	347.1	268.7	333.8	368.4	420.9	579.2	593.5	304	349.5	376.8	313.4	280.5	287.1	216.4	216.1	172.8	188.5	306.9	304.5	
12		8 Rest of wc	Million \$		4,960.30	4,104.00	3,722.70	3,901.00	3,959.40	4,074.10	3,668.80	3,548.50	3,302.50	3,128.50	3,664.00	3,675.20	2,554.00	2,119.00	2,508.20	2,114.90	1,869.70	1,615.70	1,551.40	1,452.00	1,199.90	1,172.50	1,528.90	1,453.80	
13		9 World	Million \$		12,980.60	9,818.70	8,346.20	8,427.30	8,454.70	9,066.70	8,311.30	8,536.20	8,298.80	7,633.20	8,725.70	9,715.80	6,265.00	5,160.30	5,580.80	4,791.20	4,200.40	3,775.70	3,148.80	2,875.50	2,457.80	2,403.40	3,444.30	3,605.90	
14		10 World (Qr.1,000 mt			2,414.00	2,344.50	2,254.60	2,371.90	2,236.80	2,276.20	2,235.80	2,161.00	2,112.40	2,087.00	2,018.80	2,015.00	1,894.60	1,823.00	1,881.90	1,850.90	1,827.40	1,746.30	1,758.70	1,716.30	1,636.50	1,600.90	1,726.10	1,651.50	
15																													
16	Coffee be	11 Brazil	Million \$		2,051.70	1,222.50	1,045.80	1,034.50	962.1	1,073.10	1,080.80	1,335.00	1,333.40	1,071.10	1,334.10	1,918.40	1,083.40	739.1	724.3	613.8	530.1	466.4	318.9	268.6	201.9	161.4	254.7	466.7	
17		12 Colombia	Million \$		1,849.90	1,309.90	1,065.70	1,140.40	1,142.50	1,253.20	1,093.60	1,196.90	1,129.70	900.2	847.5	1,262.20	772.7	686.4	804.9	677.5	594.9	598	386.5	360.6	315.5	301.3	436	497.3	
18		13 Guatemala	Million \$		536.6	410.8	302.4	316.4	326.2	329.7	258.2	323.7	359.8	410.5	565.4	576.8	294	339.3	369.5	309.2	277.6	284.1	212.6	212.2	167.5	171.4	301.8	301.5	
19		14 Mexico	Million \$		431.9	233.3	166.7	156.1	192.3	182.6	143.6	200.4	253	308.7	444.4	450.8	210.3	233.3	221.6	194.4	185.5	137	123.2	115.4	143.8	148.8	426.1	411.4	
20		15 Honduras	Million \$		397.5	381.5	237.3	245.8	210.7	294.9	246.5	212.9	198.4	158.6	281.7	230.7	77	74	131.6	100	58.1	60.3	42.6	24.3	27.1	35.7	97.4	49.3	
21		16 Nicaragua	Million \$		369.1	261.7	241.3	261.7	246.7	288.6	256	223.8	228.1	163.2	222.6	221.8	163.1	111.5	139.8	82.5	88.4	50.8	51.8	39.1	30.1	35.2	58.9	24.8	
22		17 Rest of wc	Million \$		1,978.00	1,373.80	1,365.40	1,461.70	1,660.50	1,810.80	1,745.50	1,617.20	1,726.20	1,657.60	2,112.00	2,245.70	1,454.50	1,201.20	1,412.70	1,259.40	1,094.80	905.4	732.1	591.9	483.5	500.2	774.6	787	
23		18 World	Million \$		7,614.70	5,193.50	4,425.10	4,618.60	4,741.00	5,232.90	4,824.20	5,118.60	5,228.60	4,669.90	5,807.70	6,906.40	4,055.00	3,375.20	3,804.40	3,236.80	2,829.40	2,502.00	1,867.70	1,612.10	1,369.40	1,357.00	2,349.50	2,534.00	
24		19 World (Qr.1,000 mt			1,512.80	1,469.40	1,427.70	1,592.50	1,503.20	1,532.30	1,515.60	1,461.30	1,427.10	1,453.80	1,371.10	1,280.50	1,255.60	1,171.30	1,180.50	1,255.60	1,131.00	1,012.60	1,276.60	1,213.60	1,239.00	1,219.70	1,162.80	1,159.00	1,297.30
25																													
26	Coffee, ro	20 Switzerland	Million \$		851.9	789.9	454	360.2	235.9	182.7	110.4	112.3	53.9	39.8	36.5	61.7	41.4	27.4	23.9	20.7	4	3.2	2.4	1.6	1.2	0.8	0.7	1.3	
27		21 Canada	Million \$		613.9	441.1	375.2	394.4	407.1	529.7	469.6	420	380.2	386.1	406.2	401.2	263.1	169.1	122.3	103.9	99.7	100.5	81.1	70.9	70.6	79.9	85	83.4	
28		22 Italy	Million \$		136.6	125.4	91.1	120.3	109.4	107.4	99.7	97.5	81.3	70.9	68	59.5	47	39.8	44.1	42	36.7	31.7	25.9	22.3	18.2	14.6	16.8	15.4	
29		23 Colombia	Million \$		81.1	54.9	54.2	48.1	43.4	50.2	32.8	35.1	35.2	30	54.9	54.2	36	29.9	11.5	3.7	3.9	6.9	5.3	4.6	4.6	4.8	3.2	5.4	
30		24 Mexico	Million \$		32.3	44.4	37.7	38.5	37.9	40	37.1	43.4	30.4	30.8	27.9	50.5	32.9	13.6	3.8	3.9	4.9	16.7	10.1	3.9	3.1	4.3	6.2	6.7	
31		25 Rest of wc	Million \$		138.9	102.6	101.5	117.3	94.2	90.4	83.5	74.6	78.3	96	130.7	116.9	84.3	91.6	110.6	102	102.1	94.7	71.7	61.2	57.2	54	67.2	68.4	
32		26 World	Million \$		1,854.70	1,558.30	1,113.70	1,078.80	927.9	1,000.70	833.1	782.9	659.3	653.6	734.2	744	504.7	317.4	316.2	276.2	251.3	253.7	196.5	164.5	154.9	158.5	179.1	180.1	
33		27 World (Qr.1,000 mt			112.3	109.8	97.2	102.7	88.6	93.2	85.2	76	68.3	69.5	74.6	75	63.7	50.9	42.1	42.8	44.8	46.9	41.4	41.2	39.9	38.2	41.1	40.9	
34																													
35	Coffee ex	28 France	Million \$		3.2	2.5	2.6	2	2.1	1.6	1.9	1.5	1.7	1.2	1.2	1.5	1.2	0.7	0.9	0.8	1.1	1.1	1.1	1.1	0.8	0.9	0.9	1.4	
36		29 India	Million \$		3.1	0.7	0.5	0.6	0.6	0.3	0.2	0.7	0.3	0.3	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0	0	0	0	0	0	0	
37		30 Poland	Million \$		2	1.9	2.4	1.4	1.1	1	0.8	0.8	1	0.6	0.7	0.4	0.3	0.5	0.2	0.2	0.1	0.3	0.5	0.5	0.5	0.6	0.2	0	
38		31 Portugal	Million \$		1.2	0.9	1.7	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39		32 Rest of wc	Million \$		2.7	1.4	1.2	1.4	2.5	2.1	2.1	1.9	2	2.4	2.2	2.3	2	1.9	2.4	1.2	1.7	1.5	1.4	1.6	1.5	1.2	1.4	1.5	
40		33 World	Million \$		12.2	7.4	8.4	5.9	6.3	5	5	4.9	5	4.5	4.2	4.3	3.7	3.2	3.6	2.3	2.9	2.9	3.1	3.2	2.8	2.7	2.5	2.9	
41		34 World (Qr.1,000 mt			7.5	3.3	3.4	2.6	2.1	1.7	1.8	2.1	1.8	1.6	1.4	1.5	1.4	1	1.2	1.2	1.6	1.6	1.7	2	1.7	1.9	1.7	2	
42																													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	
1	Import Ty Index	Country N	Million \$		2022	2021	2020		2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
2	Total coff	1 Brazil	Million \$		2266.3	1378.7	1216.7		1171.6	1122.4	1258.6	1277.8	1585.6	1552.7	1291.1	1515.4	2111.4	1209.9	867	863.2	746	642	562.5	394	339.5	259.8	233.3	336.4	553.3
3	Total coff	2 Colombia	Million \$		2132	1485.3	1221.8		1267.9	1254	1367.9	1194.9	1311.2	1243.7	1026.2	999.5	1441.9	918.1	789	853.7	706.8	629.9	632.7	410	377.3	331.4	318.8	451.6	519.3
4	Total coff	3 Switzerland	Million \$		790.8	454.5	369.7		394.2	386	416.4	318.4	79.3	49.1	66.4	84.7	62.2	54.5	38.6	35.5	37.9	38.4	36.2	28.7	22.2	17.9	10	4	
5	Total coff	4 Vietnam	Million \$		765.8	602.8	511.6		497.7	618.1	803.4	864.4	809.8	674.7	771.3	635.9	439.7	326.7	350.9	341.5	343.1	190.7	144.5	98.3	73.2	89.8	132.8	118.1	
6	Total coff	5 Mexico	Million \$		729.8	486.9	405.8		385.3	403.1	387.1	338.6	413.3	463.4	539.6	647.3	653.2	389.7	379.1	365.4	312.3	295.9	251.8	215.3	196.6	226.8	221.2	501.3	480.6
7	Total coff	6 Canada	Million \$		716.4	533.7	483.9		511	519.4	647.9	582.7	541	498.8	503.1	524.6	520	384	279.1	224	200.8	201.4	196.8	181	167	171.7	169.4	176.4	172.3
8	Total coff	7 Guatemala	Million \$		555.9	436.5	329.2		331.9	340.1	341.7	268.7	333.8	368.4	420.9	577.2	593.5	307.4	345.9	376.8	313.4	280.5	287.1	216.4	216.1	172.8	180.5	306.9	304.5
9	Total coff	8 Rest of wv	Million \$		4960.3	4104	3722.7		3901	3959.4	4074.1	3668.8	3548.5	3302.5	3128.5	3664	3675.2	2554	2119	2508.2	2114.9	1869.7	1615.7	1551.4	1452	1199.9	1172.5	1528.9	1453.8
10	Total coff	9 World	Million \$		12980.6	9818.7	8346.2		8427.3	8454.7	9066.7	8311.3	8536.2	8298.8	7633.2	8725.7	9715.8	6265	5160.3	5580.8	4791.2	4200.4	3775.7	3148.8	2875.5	2457.8	2403.4	3444.3	3605.9
11	Total coff	10 World (Q, 1,000 mt			2414	2444.5	2254.6		2371.9	2236.8	2276.2	2235.8	2161	2112.4	2087	2038.8	2015	1894.6	1823	1881.9	1850.9	1827.4	1746.3	1758.7	1716.3	1636.5	1600.9	1726.1	1651.5
12	Coffee be	11 Brazil	Million \$		2051.7	1222.5	1045.6		1034.5	962.1	1072.1	1080.8	1335	1333.4	1071.1	1334.1	1918.4	1083.4	799.1	724.3	613.8	530.1	466.4	318.9	268.6	201.9	161.4	254.7	466.7
13	Coffee be	12 Colombia	Million \$		1849.9	1309.9	1065.7		1140.4	1142.5	1253.2	1093.6	1196.9	1129.7	900.2	847.5	1262.2	772.7	686.4	804.9	677.5	594.9	598	386.5	360.6	315.5	301.3	436	497.3
14	Coffee be	13 Guatemala	Million \$		536.6	410.8	302.4		316.4	326.2	329.7	258.2	323.7	359.8	410.5	565.4	576.8	294	339.3	369.5	309.2	277.6	284.1	212.6	212.2	167.5	174.4	301.8	301.5
15	Coffee be	14 Mexico	Million \$		431.9	233.3	166.7		156.1	192.3	182.6	143.6	200.4	253	308.7	444.4	450.8	210.3	223.3	221.6	194.4	185.5	137	123.2	115.4	143.8	148.8	426.1	411.4
16	Coffee be	15 Honduras	Million \$		397.5	381.5	237.3		245.8	210.7	294.9	246.5	212.9	198.4	158.6	281.7	230.7	77	74.4	131.6	100	58.1	60.3	42.6	24.3	27.1	35.7	97.4	49.3
17	Coffee be	16 Nicaragua	Million \$		369.1	261.7	241.8		263.7	246.7	288.6	256	232.5	228.1	163.2	222.6	221.8	163.1	111.5	139.8	82.5	88.4	50.8	51.8	39.1	30.1	35.2	58.9	24.8
18	Coffee be	17 Rest of wv	Million \$		1978	1373.8	1365.4		1461.7	1660.5	1810.8	1745.5	1817.2	1726.2	1697.6	2112	2245.7	1454.5	1201.2	1412.7	1259.4	1094.8	905.4	733.1	591.9	483.5	500.2	774.6	783
19	Coffee be	18 World	Million \$		7614.7	5193.5	4425.1		4618.6	4741	5232.9	4824.2	5118.6	5228.6	4669.9	5607.7	6906.4	4055	3375.2	3804.4	3226.8	2829.4	2502	1867.7	1612.1	1369.4	1357	2349.5	2534
20	Coffee be	19 World (Q, 1,000 mt			1512.8	1469.4	1427.7		1592.5	1501.2	1532.3	1515.6	1461.3	1437.1	1423.8	1371.1	1376.7	1280.5	1255.6	1311	1312.6	1276.6	1213.6	1239	1219.7	1162.8	1159	1297.3	1233.6
21	Coffee, ro	20 Switzerland	Million \$		851.9	789.9	454		360.2	235.9	182.7	110.4	112.3	53.9	39.8	36.5	61.7	41.4	27.4	23.9	20.7	4	3.2	2.4	1.6	1.2	0.9	0.7	0.8
22	Coffee, ro	21 Canada	Million \$		613.9	441.1	375.2		394.4	407.1	529.7	469.6	420	380.2	386.1	406.2	401.2	263.1	169.1	122.3	103.9	99.7	100.5	81.1	70.9	70.6	79.9	85	83.4
23	Coffee, ro	22 Italy	Million \$		136.6	125.4	91.1		120.3	109.4	107.4	99.7	97.5	81.3	70.9	68	59.5	47	39.8	44.1	42	36.7	31.7	25.9	22.3	18.2	14.6	16.8	15.4
24	Coffee, ro	23 Colombia	Million \$		81.1	54.9	54.2		48.1	43.4	50.2	32.8	35.1	35.2	30	54.9	54.2	36	29.9	11.5	3.7	3.9	6.9	5.3	4.6	4.6	4.8	3.2	5.4
25	Coffee, ro	24 Mexico	Million \$		32.3	44.4	37.7		38.5	37.9	40.3	37.1	43.4	30.4	30.8	27.9	50.5	32.9	13.6	3.8	3.9	4.9	16.7	10.1	3.9	3.1	4.3	6.2	6.7
26	Coffee, ro	25 Rest of wv	Million \$		336.9	102.6	101.5		117.3	94.2	90.4	83.5	74.6	78.3	96	130.7	116.9	84.3	91.6	110.6	102	102.1	94.7	71.7	61.2	57.2	54	67.2	68.4
27	Coffee, ro	26 World	Million \$		1854.7	1558.3	1113.7		1078.8	927.9	1000.7	833.1	782.9	659.3	653.6	724.2	744	504.7	371.4	316.2	276.2	251.3	251.7	196.5	164.5	154.9	158.5	179.1	180.1
28	Coffee, ro	27 World (Q, 1,000 mt			112.3	109.8	97.2		102.7	88.6	93.2	85.2	76	68.3	69.5	74.6	75	63.7	50.9	42.1	42.8	44.8	46.9	41.4	41.2	39.9	38.2	41.1	40.9
29	Coffee ex	28 France	Million \$		3.2	2.5	2.6		2	2.1	1.6	1.9	1.5	1.7	1.2	1.2	1.5	1.2	0.7	0.9	0.8	1.1	1.1	1.1	1.1	0.8	0.9	0.9	1.4
30	Coffee ex	29 India	Million \$		3.1	0.7	0.5		0.6	0.6	0.3	0.2	0.7	0.3	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0
31	Coffee ex	30 Poland	Million \$		2	1.9	2.4		1.4	1.1	1	0.8	0.8	1	0.6	0.7	0.4	0.3	0.5	0.2	0.2	0.1	0.3	0.5	0.5	0.5	0.6	0.2	0
32	Coffee ex	31 Portugal	Million \$		1.2	0.9	1.7		0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Coffee ex	32 Rest of wv	Million \$		2.7	1.4	1.2		1.4	2.5	2.1	2.1	1.9	2	2.4	2.2	2.3	2	1.9	2.4	1.2	1.7	1.5	1.4	1.6	1.5	1.2	1.4	1.5
34	Coffee ex	33 World	Million \$		12.2	7.4	8.4		5.9	6.3	5	5	4.9	5	4.5	4.2	4.3	3.7	3.2	3.6	2.3	2.9	2.9	3.1	3.2	2.8	2.7	2.5	2.9
35	Coffee ex	34 World (Q, 1,000 mt			7.5	3.3	3.4		2.6	2.1	1.7	1.8	2.1	1.8	1.6	1.4	1.5	1.4	1	1.2	1.2	1.6	1.6	1.7	2	1.7	1.9	1.7	2
36	Tea and m	35 China (Ma	Million \$		116	111.6	107.5		125.2	132.9	125.3	136.8	124.4	118.1	128.1	126	102.6	82.3	66.8	80.5	70.8	60.7	47.7	38.4	35.3	27.4	21.4	20.4	24.5
37	Tea and m	36 Canada	Million \$		88.5	81	96.2		96.7	85.9	96.7	87.6	86.1	87.6	101.3	105.6	106	103.8	91.4	73.9	68.3	65.2	61.7	62.9	53.3	53.4	52.5	46	37
38	Tea and m	37 Japan	Million \$		84.6	95	81.6		62.4	63	52.7	45.5	37.8	31.7	34	30	32.3	24.7	21.9	19	19.1	18.5	10.4	5.7	5.4	4.5	3.5	4	3.7
39	Tea and m	38 India	Million \$		83	85	70.4		67.6	60.7	69.1	66.3	65.1	66.7	69	59	65.2	58.7	50.3	48.9	39.5	42.6	36.8	28.5	29	23.5	23.1	21.4	20.3
40	Tea and m	39 Rest of wv	Million \$		382.3	346.8	303.6		309.5	294.9	300.7	312.8	304.7	312.6	294	268.7	283.3	250	209.8	217.2	203.1	192.5	174.1	157.7	143.2	137.2	135.7	126.7	127.1
41	Tea and m	40 World	Million \$		754.4	719.4	659.3		661.4	637.4	644.5	649	638.1	616.7	626.4	589.3	569.4	516.5	440.2	439.5	400.8	379.5	330.7	299.2	266.2	246	236.2	218.5	212.6
42	Tea and m	41 World (Q, 1,000 mt			199.9	186.9	181		188.6	181	191.7	200.7	202.3	199.6	206.6	201.2	202.2	203.2	189.8	199.1	187.5	187.6	175.9	184.3	168	163	164.7	161	152
43	Spices	42 Vietnam	Million \$		390.7	298.3	202.8		193.5	201.2	261.6	342.3	299.1	284.3	177.6	100.8	130.1	64.3	55.9	51.7	29.4	37	32.6	29	20.7	18.9	12.1	18.6	16.6
44	Spices	43 Madagasc	Million \$		286	255.5	288.9		419.1	521.6	401.7	227.8	120.9	74.5	50.2	45.3	25.3	28.3	28.6	29.2	34.2	31.1	36.9	134.2	179	115.5	78.1	30.6	19
45	Spices	44 India	Million \$		285.9	217.1	240		224.5	220.2	238.6	248.3	260.1	185.2	181.2	209.4	174.7	119.8	96.5	132.6	122.4	67.5	52	54.7	46.9	52.6	60	92.2	145.1
46	Spices	45 Indonesia	Million \$		174.7	181	175.8		176.7	171.3	243.6	217.4	245	161.5	216.3	242.9	182.5</												

```

# SARIMA (Optimized Parameters)
# Split the data into training and testing sets
n_test = 5
train, test = ts_diff2[:-n_test], ts_diff2[-n_test:]

# Fit the SARIMA model with the identified optimal parameters
model = SARIMAX(train, order=(3, 2, 2), seasonal_order=(0, 1, 1, 4))
model_fit = model.fit()

# Forecast
forecast = model_fit.get_forecast(steps=n_test)
predicted_mean = forecast.predicted_mean

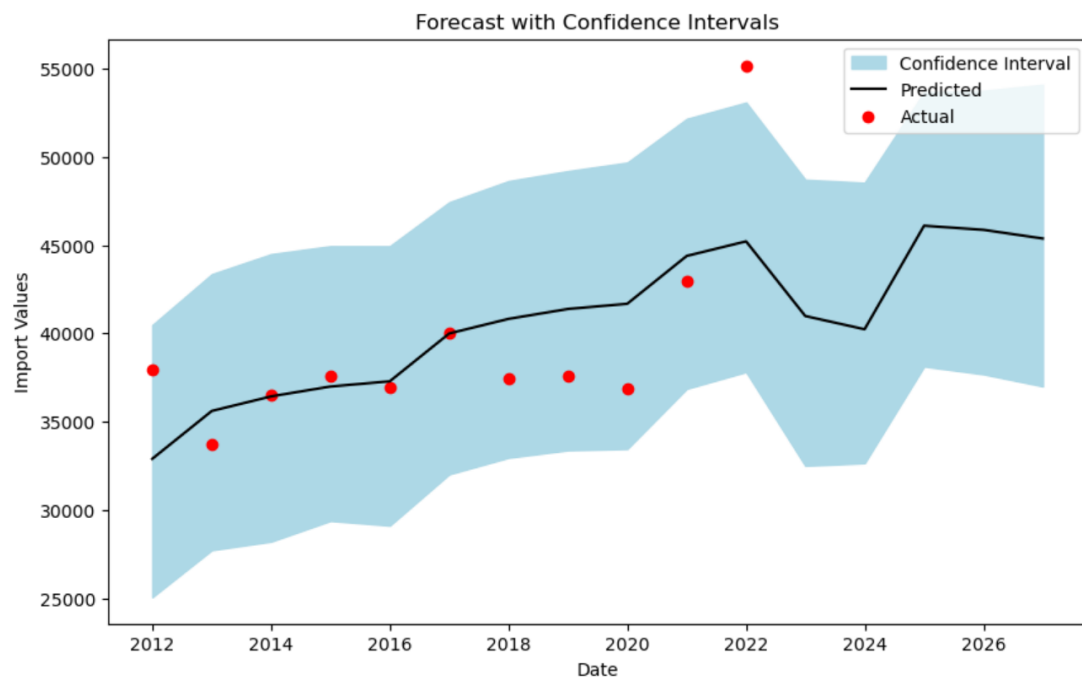
# Calculate MAPE between the predicted and true values
mape = mean_absolute_percentage_error(test, predicted_mean)

print(f'Predicted Mean: {predicted_mean}')
print(f'MAPE: {mape}')

Predicted Mean: 17      87758.6
18      99009.6
19     115989.2
20     127161.8
21     146841.4
Name: predicted_mean, dtype: float64
MAPE: 143.0379365208073

```

The inadequacy of SARIMA models, as indicated by a high MAPE for both, led me to employ the Prophet model. A segmented analysis using data from 2012 to 2022 was performed to refine the predictions and minimize the effects of earlier global disruptions.



**Outline of Findings:** The SARIMA model initially produced unsatisfactory forecasts, prompting the exploration of the Prophet model, which demonstrated a lower MAPE of 8.83% for the period from 2012 to 2022, thereby surpassing the accuracy threshold posited by our alternate hypothesis. The Prophet model's forecasts also included confidence intervals, providing a probabilistic assessment of future import values.

**Limitations of Techniques and Tools:** The primary limitation of the SARIMA model was its presumption of data stationarity and the complexity of identifying optimal parameters. Prophet, while user-friendly and robust, operates under the assumption that past trends will continue unaltered, potentially overlooking abrupt market shifts.

**Summary of proposed actions:** In light of the findings, I would advise using the Prophet model for upcoming forecasting requirements, but with the proviso that it be updated frequently with fresh data. To proactively manage anticipated changes in import values, supply chain optimization, policy modifications, and the establishment of strategic reserves are also advised.

**Benefits of Study:** The Prophet model is expected to provide stakeholders with a more accurate forecasting tool, potentially improving supply chain and procurement process efficiency. Businesses can save money by better anticipating import values, and policymakers can better support domestic industries. Specifically, improved forecasting accuracy, now quantified at an error rate of less than 10%, could lead to better inventory management and reduced waste, with the potential to reduce inventory holding costs by a similar amount.

## **B. Panopto Video**

Panopto video URL provided in submission.

## **C. Acknowledge Sources**

**Dataset:** The dataset used for the project and analysis.

<https://www.ers.usda.gov/data-products/u-s-food-imports/>

**Prophet:** For instructions on using Prophet for time series analysis with Python.

[https://facebook.github.io/prophet/docs/quick\\_start.html#python-api](https://facebook.github.io/prophet/docs/quick_start.html#python-api)

<https://www.analyticsvidhya.com/blog/2022/04/an-end-to-end-guide-on-time-series-forecasting-using-fbprophet/>

<https://medium.com/illumination/understanding-fb-prophet-a-time-series-forecasting-algorithm-c998bc52ca10>

**SARIMA:** Using SARIMA and optimizing model with auto\_arima.

<https://towardsdatascience.com/time-series-forecasting-with-arima-sarima-and-sarimax-ee61099e78f6>

<https://machinelearningmastery.com/sarima-for-time-series-forecasting-in-python/>

## **World Events Impacting Trade**

<https://www.federalreservehistory.org/essays/great-recession-and-its-aftermath>

**D. Demonstrate professional communication.**