

MBUS 613 Quantitative and Statistical Analysis

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Group Project

Lincoln County SWOT Survey and Retail Sales Analysis

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Introduction

Students from Eastern Washington University (WU) conducted Strengths Weaknesses Opportunities and Threats (SWOT) survey in Lincoln County, WA during the winter of 2011. Subsequently, more survey results from more population groups have become available. Consequently, students from the MBA program at Gonzaga University were asked to provide a statistical analysis of the new, completed results of that SWOT Survey. Gonzaga students were also asked to examine historical Lincoln County sales data found in the Washington State Retail Survey, 2011 Ed., (here after referred to as the Retail Survey) and forecast gross retail revenue for the County for 2012 and 2013. To accomplish these goals, this paper will be broken down into the following sections: an Executive Summary, a brief description of Lincoln County, the statistical analysis of the SWOT Survey results, the examination of the Retail Survey and a revenue forecasts, finally a conclusion and recommendations.

Executive Summary

Examination of the SWOT Survey results reveals that county residents identify dry land wheat production as the County's lead strength and the potential for value added agricultural products as the leading opportunity. There is no such unity of perception for Weakness and Threats. Insufficient support for local businesses and the lack of educational opportunities in or after high school are a statistical tie for the leading weakness. Outmigration of younger people, declining population, costly government regulations and mandates required of municipalities, and governmental policies regarding agriculture are a statistical tie for the leading threats.

Examination of the Washington State Retail Survey and the USDA 2007 Census of Agriculture indicate that Lincoln County's economy was valued at approximately \$153.4 million

in 2007, the major components are agricultural production (\$126.2M or 82%) and retail sales (\$27.2M or 18%). More recent information indicates that Lincoln County retail sales have grown to nearly \$31.4M in 2010 and are expected to report at nearly \$32M in 2011. This reflects a five year growth rate of 3.2%. The beats both Washington State with a growth rate of only 0.6%, and the US Bureau of Labor and Statistics average Consumer Price Index increase of approximately 2.6% for the same period (2005-2010).

Simple linear regression of available data (2000-2010) forecasts a continued growth of approximately 1.95% (\$613,760) per year. The forecast for Lincoln County retail sales for 2012 is \$31.5 million and 2013 is \$32.1 million. If it is assumed that the agricultural portion of Lincoln County's economy has been growing at the same rate, (3.2% through 2010 and 2% thereafter), the County should see a total economy of approximately \$175.8 million in 2012 and \$179.3 million in 2013.

Lincoln County

Lincoln County is the rural county immediately to the west of the Spokane County. Of the 39 counties in Washington State, Lincoln county is the 7th largest by land area (2311 square miles) and 35th in population size (2010 census population of 10,570, US Census Bureau, American FactFinder, attachment 1). As of the 2010 census (US Census Bureau, Quick Facts, attachment 2), the population was predominantly white (95.64%), married (60%), female (51%), and living in an owner-occupied home (78.5%). 56% of the population ranges between ages of 18 years old and 64 years old, 21% are 65 and over. Interestingly however, only 5.8% of the population is between 18 and 24 years old. Of residents over the age of 25, 91% are high school

graduates (State average is 89%, attachment 2) and 20% hold a 4-year college degree or higher (State average is 31%, attachment 2).

Out of the multiple communities in Lincoln County, only eight are recognized by the US census. These communities are Almira (population: 285), Creston (population: 255), Davenport (population: 1725, largest, and County Seat), Harrington (population: 425), Odessa (population: 960), Reardan (population: 630), Sprague (population: 495), and Wilbur (population: 890). These communities account for approximately half of the County population. The rest of the population lives in unincorporated areas.

According to the Retail Survey, the per capita income is approximately \$31,500 (State per capita is \$43,500) but according to the US Census Bureau, the per capita income is approximately \$24,700 (State per capita is \$29,700, attachment 2). There is no explanation for this difference. The average household size is 2.26 people (Retail Survey and attachment 2) and the median household income is approximately \$45,600 (State median is \$57,200, attachment 2). Washington State estimates that Lincoln County's median household income is approximately \$43,600 (attachment 3).

In 2007, the latest year for which there is complete information, the County's retail and agricultural economy was approximately \$153.4M. The County is primarily dependent on an agricultural economy (\$126.2M or 82%, USDA 2007 Census of Agriculture, attachment 4) versus retail (\$27.2M or 18%, Retail Survey). Approximately 73% all county land use is in agricultural production (1.1M acres or 1703 square miles, attachment 4). Most of the agricultural economy is wheat and barley production (\$106.1M and 1160 square miles, 68% of all farm land use, attachment 4) or livestock and pasturing (\$8.5M and 443 square miles, 26% of all farm land use, attachment 4). Indeed, according to Cornell University's Mann Library,

Lincoln County is considered to be the second-largest wheat producer in the United States on a per acre basis and is ranked third in the State (of grain producing counties) and 181th in the nation (of 2933 grain producing counties or 7th percentile) for grain production by value by the Census of Agriculture (attachment 4).

SWOT Survey Analysis

Test Data

As discussed, previously, students from Eastern Washington University conducted a SWOT survey of the residents of Lincoln County. The students compiled and sorted the large amount of data obtained through the surveys that pertained to the questions that Lincoln County commissioners desired to be answered. This data was then consolidated into an excel spreadsheet created and developed by the group of students from EWU. The EWU group had data that covered all eight of the relevant cities in the county, and also ranged over different sources of the surveys, such as ‘listening posts’ located outside grocery stores and post offices and inserts sent with utilities bills. This data helped to analyze the commonalities and differences in the thinking of the different cities to determine agreement upon the county’s strengths, weakness, opportunities, and threats.

Additional data was acquired in the form of more SWOT surveys from the county that the EWU group was not able to enter into this spreadsheet. This data was helpful in determining even more accurate commonalities within the cities. Unfortunately, a good chunk of the new data was disregarded in the grand scheme of the project, given that it was from a large amount of the youth population, which skewed the results. Rather than include them in the county as a whole, the youth were put into their own population.

The survey had the following options (select two for each):

Strengths:

- Dry land wheat production
- Recreational and tourism attractions
- Rural open space, natural areas, habitat
- Proximity to Spokane markets & airport
- Willingness to work together for the common good
- Transportation infrastructure

Weaknesses:

- Lack of skilled workforce
- Long term regional water supply limits growth
- Aging and limited municipal infrastructure (water & sewer systems)
- Insufficient municipal revenue to support infrastructure and public safety
- Lack of educational opportunities in or after high school
- Insufficient support for local business

Opportunities

- Potential for value added ag products (changed or enhanced to increase value)
- High speed broadband may bring economic opportunity
- Continue to seek external governmental financial support for industrial development
- Potential for ag or other business clusters (interconnected businesses grouped for efficiency)
- Production of bio fuels
- Expanding production and distribution of wheat

Threats

- Continuing reductions in external governmental grants and loans
- Costly government regulations and mandates required of municipalities
- Outmigration of younger population
- Regional water issues
- Governmental policies regarding agriculture
- Declining population

Research Methodology

The data was entered into the spreadsheet based upon the cities and their respective collection spots for the SWOT surveys. A separate population was created for the youth results,

given that these results skewed the results of a couple of the cities, and the county as a whole. Then for each city, numbers were entered based off of the SWOT results on the options for strengths, weaknesses, opportunities, and threats. These were totaled and divided within the spreadsheet in various ways. It was useful to take advantage of the megastat functions for analysis. The main statistical analysis tools we used were the correlation matrix, regression analysis, and Analysis of Variance (ANOVA).

Research Questions

1. What do the different population groups and residents of Lincoln County believe are their main Strengths, Weaknesses, Opportunities, and Threats?
2. Is there a statistical difference between each of these beliefs?

Results and Analysis

The data collected by EWU that was received by Lincoln County was aggregated, so it is nearly impossible to determine how many surveys were actually completed, and since the survey was anonymous, the assumption that no duplicate entries exist must be made. An example of a duplicate entry would consist of a City Council member for Davenport answering a survey both as a council member and as a member of the city. Each of the four SWOT categories consisted of six different choices, and each person was asked to choose what they thought the major two options in each category were. The results for the different population groups are summarized in the tables below. These tables, specifically the numbers of votes, and not the percentages, serve as the basis for the ANOVA used to predict County-wide survey results. High school students and the Lincoln County EDC (LC EDC) excluded from the data.

ANOVA was performed on the number of raw votes in each of the categories to determine the significance of each option and the relationship between them. A level of significance of

0.05 was assumed for every test. Each of the following tables shows a category of the survey. Specifically, each table shows the options, the average number of sample votes for each option, each option's standard deviation, the corresponding percentage of votes for each option, and the significance. In other words, based on the survey sample results, each table shows how the entire County would respond with 95% confidence.

Table 1 shows the average Strengths category, and as expected, given that Lincoln County is mostly dependent on wheat production, indicates that the most residents would select Dry land wheat production as the leading strength. It can also be seen that among the entire population, the Recreation and tourism, Open Space, and Willingness to work together form a statistical tie for second.

Table 1A. County Strength Projection

Strength	Avg Votes	Stand Dev	% Votes	Significance
Dryland Wheat	45.3	10.4	38.8%	99% 1st
Recreation and tourism	19.3	12.6	15.7%	Statistical tie for 2nd
Open Space	18.2	5.0	15.6%	Statistical tie for 2nd
Proximity to Spokane	11.1	7.3	9.3%	
Willingness to work together	20.2	8.5	16.6%	Statistical tie for 2nd
Transportation infrastructure	4.7	3.7	3.9%	

Dry land wheat farming is the clear leading strength selected by all population groups. There is a statistical tie for the second leading strength. It can be seen in the table below that different population groups have selected different second strengths leading to the tie; Davenport and Wilbur clearly choose Recreation and Tourism, Almira and Odessa clearly choose

Willingness to work together , and Creston, Reardan, and high school students clearly select open spaces.

It is also interesting that in this case, the large number of high school respondents in comparison to the total number of respondents would have skewed the results.

Table 1B. Population Strength Data

		STRENGTHS												
		Dryland Wheat		Recreation		Open Space		Proximity		Willingness to Work		Trans Infrastructure		Total
Populations	Reardan	53	38%	8	6%	30	22%	26	19%	21	15%	1	1%	139
	Davenport	43	34%	33	26%	15	12%	11	9%	21	16%	5	4%	128
	Creston	34	43%	14	18%	16	20%	4	5%	8	10%	3	4%	79
	Wilbur	50	29%	47	27%	20	12%	14	8%	33	19%	9	5%	173
	Almira	66	51%	14	11%	20	15%	1	1%	28	22%	1	1%	130
	Harrington	42	44%	11	11%	13	14%	14	15%	15	16%	1	1%	96
	Odessa	36	32%	16	14%	16	14%	6	5%	29	26%	10	9%	113
	Sprague	35	35%	12	12%	19	19%	14	14%	16	16%	3	3%	99
	Wheat Producers	49	43%	19	17%	15	13%	10	9%	11	10%	9	8%	113
	LC EDC	14	50%	7	25%	3	11%	0	0%	4	14%	0	0%	28
	All County (No HS)	422	38%	181	16%	167	15%	100	9%	186	17%	42	4%	1098
High Schools	155	43%	12	3%	93	26%	44	12%	40	11%	13	4%	357	
All County (with HS)	577	40%	193	13%	260	18%	144	10%	226	16%	55	4%	1455	

Table 1C. Population Strength ANOVA

Randomized blocks ANOVA

<i>Mean</i>	<i>n</i>	<i>Std. Dev</i>	
45.333	9	10.368	Dryland Wheat
19.333	9	12.610	Recreation
18.222	9	5.044	Open Space
11.111	9	7.305	Proximity
20.222	9	8.526	Willingness to Work
4.667	9	3.742	Trans Infrastructure
23.167	6	18.280	Reardan
21.333	6	14.278	Davenport
13.167	6	11.462	Creston
28.833	6	17.244	Wilbur
21.667	6	24.172	Almira
16.000	6	13.711	Harrington
18.833	6	11.462	Odessa
16.500	6	10.559	Sprague
18.833	6	15.237	Wheat Producers
19.815	54	15.104	Total

ANOVA table

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Treatments	8,634.15	5	1,726.830	28.35	3.67E-12
Blocks	1,019.81	8	127.477	2.09	.0594
Error	2,436.19	40	60.905		
Total	12,090.15	53			

Post hoc analysis (2-tail p-values for pairwise paired observations t-tests)

		Trans Infrastructure	Proximity	Open Space	Recreation	Willingness to Work	Dryland Wheat
		4.667	11.111	18.222	19.333	20.222	45.333
Trans Infrastructure	4.667						
Proximity	11.111	.0594					
Open Space	18.222	.0005	.0062				
Recreation	19.333	.0037	.1341	.8215			
Willingness to Work	20.222	.0005	.0417	.4996	.8174		
Dryland Wheat	45.333	6.57E-06	3.93E-05	2.27E-05	.0010	.0001	

Table 2 shows the Weaknesses category. It shows that the population of Lincoln County believes that lack of education opportunities and lack of support for business are the main weaknesses that the county faces.

Table 2A

Weakness	Avg Votes	Stand Dev	% Votes	Significance
Lack of skilled workforce	10.3	4.6	9.5%	Statistical tie for 3rd
Water supply limits growth	15.4	10.3	13.6%	Statistical tie for 2nd and 3rd
Aging municipal infrastructure	16.2	6.5	15.1%	Statistical tie for 2nd and 3rd
Revenue for infrastructure	19.2	5.5	17.8%	Statistical tie for 2nd
Lack of education opportunities	20.0	6.8	18.5%	Statistical tie for 1st a 2nd
Support for business	28.0	10.0	25.5%	Statistical tie for 1st

Water supply limiting growth is the clear leading weakness for Odessa at 36 votes or 29%. Davenport and high school students significantly believe that lack of education and training opportunities are the leading weakness in the county.

Again, inclusion of the high school students would have skewed the results concerning the secondary weakness of Lack of education opportunities.

Table 2B Population Weakness Data

		WEAKNESSES													
		Lack of Workforce		Water Supply		Aging Municipal		Revenue for Infrastructure		Training Opportunities		Support for Businesses		Total	
Populations	Reardan	8	6%	27	21%	21	16%	29	22%	19	15%	27	21%	131	
	Davenport	13	12%	16	15%	13	12%	20	18%	28	25%	20	18%	110	
	Creston	6	8%	10	13%	15	19%	16	21%	15	19%	16	21%	78	
	Wilbur	13	9%	11	8%	15	11%	24	17%	26	19%	50	36%	139	
	Almira	7	6%	19	16%	31	25%	21	17%	10	8%	34	28%	122	
	Harrington	3	3%	6	7%	17	19%	21	24%	12	13%	30	34%	89	
	Odessa	17	14%	36	29%	9	7%	13	11%	25	20%	23	19%	123	
	Sprague	15	16%	6	6%	14	15%	18	19%	18	19%	22	24%	93	
	Wheat Producers	11	11%	8	8%	11	11%	11	11%	27	28%	30	31%	98	
	LC EDC	1	4%	5	20%	5	20%	6	24%	1	4%	7	28%	25	
	All County (No HS)	94	9%	144	14%	151	15%	179	18%	181	18%	259	26%	1008	
	High Schools	53	15%	31	9%	45	13%	46	13%	86	25%	88	25%	349	
	All County (with HS)	147	11%	175	13%	196	14%	225	17%	267	20%	347	26%	1357	

Table 2C Population Weakness ANOVA

Randomized blocks ANOVA

<i>Mean</i>	<i>n</i>	<i>Std. Dev</i>	
10.333	9	4.610	Lack of Workforce
15.444	9	10.321	Water Supply
16.222	9	6.515	Aging Municipal Revenue for
19.222	9	5.518	Infrastructure Training
20.000	9	6.782	Opportunities Support for
28.000	9	9.987	Businesses
21.833	6	7.808	Reardan
18.333	6	5.680	Davenport
13.000	6	4.099	Creston
23.167	6	14.470	Wilbur
20.333	6	10.838	Almira
14.833	6	9.988	Harrington
20.500	6	9.670	Odessa
15.500	6	5.431	Sprague
16.333	6	9.543	Wheat Producers
18.204	54	9.044	Total

ANOVA table

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Treatments	1,563.43	5	312.685	5.71	.0005
Blocks	581.262,190.07	8	72.657	1.33	.2585
Error	4,334.07	40	54.752		
Total	76	53			

Post hoc analysis (2-tail p-values for pairwise paired observations t-tests)

		Lack of Workforce	Water Supply	Aging Municipal	Revenue for Infrastructure	Training Opportunities	Support for Businesses
		10.333	15.444	16.222	19.222	20.000	28.000
Lack of Workforce	10.333						
Water Supply	15.444	.1541					
Aging Municipal	16.222	.1112	.8504				
Revenue for Infrastructure	19.222	.0120	.3421	.1544			
Training Opportunities	20.000	.0003	.2594	.3848	.8175		
Support for Businesses	28.000	.0013	.0389	.0093	.0236	.0704	

Table 3 shows the Opportunities category. It shows that the population of Lincoln County believes that Value added agricultural products are the County’s main opportunity. There is no consensus on a secondary opportunity.

Table 3A

Opportunity	Avg Votes	Stand dev	% Votes	Significance
Value added ag products	23.1	5.8	22.7%	95% 1st
High speed internet	15.9	6.5	15.2%	Statistical tie for 2nd
External government support	14.4	5.6	14.6%	Statistical tie for 2nd
Business clusters	15.6	6.1	15.7%	Statistical tie for 2nd
Bio fuels	14.3	8.6	14.0%	Statistical tie for 2nd
Expanded wheat production	18.3	7.5	17.8%	Statistical tie for 2nd

Table 2B shows that expanding wheat production is the leading opportunity for Almira and high school students. Business clusters are the leading opportunity for Creston and Reardan. External governmental support is the leading opportunity for Sprague. Interestingly, Odessa has identified bio-fuels as their significant leading opportunity at 35 votes or 31%.

Again the inclusion of the high school students would have skewed the results, allowing expanded wheat production to become the clear secondary opportunity.

Table 2B Population Opportunities Data

		OPPORTUNITIES												
		Value-added ag		High Speed Internet		External Government Support		Cluster Business		Biofuels		Expand Wheat		Total
Populations	Reardan	22	17%	21	17%	20	16%	28	22%	20	16%	16	13%	127
	Davenport	26	25%	22	21%	18	17%	11	10%	12	11%	16	15%	105
	Creston	14	21%	3	4%	12	18%	15	22%	12	18%	11	16%	67
	Wilbur	28	26%	19	17%	21	19%	12	11%	10	9%	19	17%	109
	Almira	28	23%	23	19%	12	10%	9	7%	15	12%	34	28%	121
	Harrington	19	23%	16	20%	11	14%	14	17%	8	10%	13	16%	81
	Odessa	24	21%	11	10%	15	13%	12	11%	35	31%	15	13%	112
	Sprague	16	19%	11	13%	18	22%	16	19%	8	10%	14	17%	83
	Wheat Producers	31	28%	17	15%	3	3%	23	21%	9	8%	27	25%	110
	LC EDC	9	33%	7	26%	3	11%	3	11%	4	15%	1	4%	27
	All County (No HS)	217	23%	150	16%	133	14%	143	15%	133	14%	166	18%	942
	High Schools	67	19%	62	18%	32	9%	46	13%	45	13%	101	29%	353
	All County (with HS)	284	22%	212	16%	165	13%	189	15%	178	14%	267	21%	1295

Table 3C Population Opportunities ANOVA

Randomized blocks ANOVA

<i>Mean</i>	<i>n</i>	<i>Std. Dev</i>	
23.111	9	5.819	Value-added ag
15.889	9	6.509	High Speed Internet
14.444	9	5.637	External Government Support Cluster
15.556	9	6.146	Business
14.333	9	8.646	Biofuels
18.333	9	7.450	Expand Wheat
21.167	6	3.920	Reardan
17.500	6	5.788	Davenport
11.167	6	4.262	Creston
18.167	6	6.494	Wilbur
20.167	6	9.786	Almira
13.500	6	3.834	Harrington
18.667	6	9.223	Odessa
13.833	6	3.710	Sprague Wheat
18.333	6	10.783	Producers
16.944	54	7.154	Total

ANOVA table

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Treatments	504.61	5	100.922	2.42	.0524
Blocks	539.00	8	67.375	1.61	.1513
Error	1,669.22	40	41.731		
Total	2,712.83	53			

Post hoc analysis (2-tail p-values for pairwise paired observations t-tests)

	Biofuels	External Government Support	Cluster Business	High Speed Internet	Expand Wheat	Value-added ag
Biofuels	14.333					
External Government Support		14.444				
Cluster Business			15.556			
High Speed Internet				15.889		
Expand Wheat					18.333	
Value-added ag						23.111
		.9727				
	.7420	.7154				
	.6900	.5950	.9126			
	.3394	.3200	.4342	.2840		
	.0295	.0193	.0306	.0016	.0195	

Table 4 shows the Threats category. It shows that the population of Lincoln County believes that outmigration of youth, declining population are probably the leading threats, but these are statistically tied with costly regulations and mandates, and adverse governmental policies regarding ag. The costly regulations and mandates, and adverse governmental policies regarding ag are also statistically tied with the rest of the options for the secondary threat.

Table 4A

Threats	Avg Votes	Stand dev	% Votes	Significance
Reduced external gov support	16.9	8.2	14.8%	Statistical tie for 2nd
Costly regulations and mandates	20.2	8.8	18.0%	Statistical tie for 1st and 2nd
Outmigration	24.3	7.3	21.5%	Statistical tie for 1st
Regional water issues	13.6	9.3	11.2%	Statistical tie for 2nd
Government policies regarding ag	15.2	9.6	13.5%	Statistical tie for 1st and 2nd
Declining population	24.6	11.4	21.1%	Statistical tie for 1st

Table 4B shows that costly regulations and mandates and adverse government policies regarding agriculture are clear leading threats for wheat producers at 39 votes or 35%. Regional water issues are a leading threat for Odessa at 31 votes or 25%.

Table 4B Population Threats Data

		THREATS												
		External Government		Municipal regulations		Outmigration		Water issues		Government Ag Policies		Declining Population Base		Total
Populations	Reardan	30	21%	28	20%	22	15%	25	18%	15	11%	22	15%	142
	Davenport	15	13%	16	14%	35	30%	15	13%	9	8%	26	22%	116
	Creston	20	26%	9	12%	23	29%	7	9%	5	6%	14	18%	78
	Wilbur	27	17%	21	13%	35	22%	15	9%	14	9%	48	30%	160
	Almira	14	11%	27	21%	26	20%	13	10%	18	14%	33	25%	131
	Harrington	8	11%	22	29%	13	17%	3	4%	13	17%	17	22%	76
	Odessa	17	14%	9	7%	26	21%	31	25%	12	10%	27	22%	122
	Sprague	17	18%	15	16%	22	23%	5	5%	12	13%	25	26%	96
	Wheat Producers	4	4%	35	31%	17	15%	8	7%	39	35%	9	8%	112
	LC EDC	1	4%	6	23%	11	42%	3	12%	1	4%	4	15%	26
	All County (No HS)	153	14%	188	18%	230	22%	125	12%	138	13%	225	21%	1059
	High Schools	68	19%	71	20%	71	20%	39	11%	43	12%	60	17%	352
All County (with HS)	221	16%	259	18%	301	21%	164	12%	181	13%	285	20%	1411	

Table 4C Population Threats ANOVA

Randomized blocks ANOVA

<i>Mean</i>	<i>n</i>	<i>Std. Dev</i>	
16.889	9	8.223	External Government
20.222	9	8.843	Municipal regulations
24.333	9	7.314	Outmigration
13.556	9	9.342	Water issues
15.222	9	9.641	Government Ag Policies
24.556	9	11.436	Declining Population Base
23.667	6	5.317	Reardan
19.333	6	9.438	Davenport
13.000	6	7.294	Creston
26.667	6	13.064	Wilbur
21.833	6	8.035	Almira
12.667	6	6.653	Harrington
20.333	6	8.937	Odessa
16.000	6	7.155	Sprague
18.667	6	14.868	Wheat Producers
19.130	54	9.775	Total

ANOVA table

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Treatments	981.65	5	196.330	2.59	.0402
Blocks	1,053.2	8	131.657	1.74	.1192
Error	3,029.1	40	75.730		
Total	5,064.0	9			

Post hoc analysis (2-tail p-values for pairwise paired observations t-tests)

	Water issues	Government Ag Policies	External Government	Municipal regulations	Outmigration	Declining Population Base
	13.556	15.222	16.889	20.222	24.333	24.556
Water issues	13.556					
Government Ag Policies	15.222	.7338				
External Government	16.889	.2889	.7567			
Municipal regulations	20.222	.1848	.0287	.4797		
Outmigration	24.333	.0081	.0882	.0206	.3753	
Declining Population Base	24.556	.0269	.1392	.0464	.4213	.9328

Of interesting note, there is a separate population group consisting of City Council Members from Creston, Harrington, and Wilbur. Previously these responses were included in the individual community data. However, since Council Members are elected officials, there may be value in comparing what the populations' representatives think with what the population thinks. Unfortunately, there are roughly only 24 survey responses. If survey instructions were followed, this means only 12 council members responded. This means there are not enough council responses to draw any significant conclusions. The Council Members' responses are presented in the various parts of Table 5 on the next page.

Significantly, City Councils may differ from public opinion in their perception of weaknesses, opportunities, and threats. Again, there is not enough information to know for certain, but City Councils identify Insufficient municipal revenue to support infrastructure and public safety and Aging and limited municipal infrastructure (water & sewer systems) as significant weaknesses. The general population identified Lack of educational opportunities in or after high school and Insufficient support for local business as significant weaknesses. Council Members identify continuing to seek external governmental financial support for industrial development as their primary opportunity. The population identifies the potential for value added ag products (changed or enhanced to increase value) as the best opportunity. Finally, City Councils view costly government regulations and mandates required of municipalities as the worst threat. They are not particularly concerned with the public's perceived threat of declining population.

Table 5A

		CITY COUNCIL STRENGTHS												
		Dryland Wheat		Recreation		Open Space		Proximity		Willingness to Work		Trans Infrastructure		Total
Populations	Creston City Council	2	50%	0	0%	0	0%	1	25%	1	25%	0	0%	4
	Harrington City Council	5	50%	2	20%	0	0%	1	10%	1	10%	1	10%	10
	Wilbur City Council	5	45%	2	18%	1	9%	1	9%	2	18%	0	0%	11
	All Councils	12	48%	4	16%	1	4%	3	12%	4	16%	1	4%	25

Table 5B

		CITY COUNCIL WEAKNESSES												
		Lack of Workforce		Water Supply		Aging Municipal		Revenue for Infrastructure		Training Opportunities		Support for Businesses		Total
Populations	Creston City Council	1	25%	0	0%	0	0%	1	25%	2	50%	0	0%	4
	Harrington City Council	0	0%	0	0%	5	50%	5	50%	0	0%	0	0%	10
	Wilbur City Council	1	10%	1	10%	2	20%	5	50%	0	0%	1	10%	10
	All Councils	2	8%	1	4%	7	29%	11	46%	2	8%	1	4%	24

Table 5C

		CITY COUNCIL OPPORTUNITIES												
		Value-added ag		High Speed Internet		External Government Support		Cluster Business		Biofuels		Expand Wheat		Total
Populations	Creston City Council	1	33%	0	0%	1	33%	0	0%	1	33%	0	0%	3
	Harrington City Council	2	20%	3	30%	1	10%	2	20%	1	10%	1	10%	10
	Wilbur City Council	3	25%	0	0%	5	42%	2	17%	0	0%	2	17%	12
	All Councils	6	24%	3	12%	7	28%	4	16%	2	8%	3	12%	25

Table 5D

		CITY COUNCIL THREATS												
		External Government		Municipal regulations		Outmigration		Water issues		Government Ag Policies		Declining Population Base		Total
Populations	Creston City Council	0	0%	1	33%	2	67%	0	0%	0	0%	0	0%	3
	Harrington City Council	1	10%	4	40%	1	10%	1	10%	2	20%	1	10%	10
	Wilbur City Council	3	27%	6	55%	0	0%	0	0%	0	0%	2	18%	11
	All Councils	4	17%	11	46%	3	13%	1	4%	2	8%	3	13%	24

Comparing all of the results, the leading Strengths, Weaknesses, Opportunities, and Threats, as identified by the people of Lincoln County can be determined. The results are summarized in Table 6 below. There are also some interesting outlying data points. Odessa is particularly concerned about water issues. City Councils may be more concerned about revenue and infrastructure issues. Davenport and high school students are concerned about the lack of in-county education opportunities.

Table 6

Strengths	Dry land wheat production	38.8%
Weaknesses	Insufficient support for local businesses	25.5% (statistical tie)
	Lack educational opportunities in or after high school	18.5% (statistical tie)
Opportunities	Potential for value added ag products (changed or enhanced to increase value)	22.7%
Threats	Outmigration of younger population	21.5% (statistical tie)
	Declining population	21.1% (statistical tie)
	Costly government regulations and mandates required of municipalities	18.0% (statistical tie)
	Governmental policies regarding agriculture	13.5% (statistical tie)

Washington State Retail Survey

Discussion

Every year the Eureka Group of Pollock Pines, California publishes the Washington State Retail Survey. The Survey is an independent advisory publication that focuses solely on the \$54 Billion Washington State retail market. The Survey is designed to provide a comprehensive review, including historical information, of retail sales activity in every county and city in Washington. The Gonzaga MBA students were asked to interpret this information, identify any interesting findings, and to forecast Lincoln County Retail Sales revenue for 2012 and 2013.

Retail sales activities include all retail transactions subject to Washington State's sales tax. Major transactions that are not included in the Survey data are transactions that do not involve the State sales tax including certain foods for home consumption, prescription medications, auto fuel, and most importantly, agricultural production commodities, namely wheat and barley.

The Retail Survey contains detailed, 10-year information for Lincoln County, Davenport, and Odessa and general information for the other communities in the County. The Lincoln County Economic Development Office was able to provide additional information from older Retail Surveys going back to 1997. 2010 is the last year with complete information presented in the Retail Survey. 2011 information is not yet published; however the Retail Survey makes a 2011 forecast using an exponential smoothing method. In addition to Lincoln County data, for comparison purposes, Adams County, Spokane County, and the City of Ritzville are included.

As of 2007, the latest year for which there is complete information, Lincoln County enjoyed a combined retail and agricultural economy of approximately \$153.4M. The major components are grain production (\$106.1M or 69%), retail sales (\$27.2M or 18%), and livestock

(\$8.5M or 5.5%). The Retail Survey does not address agricultural products, however for comprehensiveness; a copy of the USDA 2007 Agricultural Census is attached (attachment 4).

Please review attachments 5-18 for reference. Concerning only the County's retail sales, in 2010 Lincoln enjoyed total sales of \$31.4M. Sales for 2011 are expected to report at \$32M. This reflects five-year growth calculated at 3.2%. Washington State only enjoyed growth at 0.6% for the same period. 2011 per capita sales are expected to report at \$3,032, a growth of 2.4% while the State reports per capita sales at \$8,364, a growth of -0.9% (synonymous with a decline of 0.9%). Spokane County expects 2011 per capita sales of \$8,589 with a growth of -0.7% (synonymous with a decline of 0.7%). Adams County expects 2011 per capita sales of \$4,761 with a growth of 2.4%. Taken together, these numbers indicate that the residents of Lincoln County generally make retail purchases in their home county at a little less than half the rate of Spokane County or the State. In other words, Lincoln County residents do not purchase as much locally in Lincoln County, but local buying is growing.

Lincoln County per capita income is expected to report at \$31,806 for 2011, a growth of 4.7% over the same five-year period. This is significantly below the State's expected 2011 per capita income of \$43,474, an increase of 3.3% for the same period. Spokane County is only slightly higher with an expected 2011 per capita income of \$35,086, a growth rate of 3.3%. Adams County is comparable with an expected 2011 per capita income of \$29,529 and a growth rate of 3.9%. While rural per capita income is below urban levels, it does seem to be growing fasted.

Considering per capita sales and income growth; 3.2% and 4.7% respectively, this information compares favorably the five-year average inflation rate of approximately 2.2%.

Table 24, Historical CPI, All Urban Consumers, US City Average, All Items, from the Bureau of Labor and Statistics March 2012 Detailed CPI report is summarized in Table 7 below:

Table 7

Year	Annual Inflation	5 Year Average Inflation
2005	3.4%	
2006	3.2%	
2007	2.8%	
2008	3.8%	
2009	-0.4%	2.56%
2010	1.6%	2.2%
2011	3.2%	2.2%

Specifically, of interesting note, Davenport suffered an approximately \$9.5M economic loss in 2004 (see period 8 on the Davenport Retails Sales chart). More specifically, the loss seems to be isolated to the Food and Beverage Group (approximately \$8M) and the Apparel Group (approximately \$2M). The reduction is also reflected Davenport’s per capita spending, a reduction from \$11,738 in 2003 to \$5,959 in 2004. The per capita reduction indicates that the economic loss is not due to population decline.

Davenport’s economic loss is not echoed in Odessa’s or Ritzville’s data. The economic loss is not apparent in Lincoln County’s data either; the County’s total sales trend is smooth. Indeed, Lincoln County’s reported total sales of \$25.9M in 2003 and \$27.5M 2004. Davenport’s \$9.5M loss should have manifested as a significant decline. Further, Lincoln County’s Food and Beverage and Apparel sales number s are actually lower than Davenport’s. This does not make sense; these totals should be larger as they are compromised of Davenport’s and the other Lincoln County community’s totals.

There is however, a corresponding increase in Spokane County's gross retail sales of nearly \$760M (26.7%) from 2003 to 2004 (\$2.85B to \$3.61B). This is more than 25% growth in one year. Specifically, there is a \$36M (20%) increase in the Food and Beverage Group and a \$36M (18.6%) increase in the Apparel Group. This is an equally unexplained and probably unreasonable economic increase corresponding to Davenport's economic loss. There are certainly incongruities in the data and there may be any number of other plausible explanations. Occam's razor holds that all things being equal, the simplest explanation is probably the correct one. The two simplest explanations are either that the data is wrong or that in 2004 something happened in Spokane County to permanently draw Davenport shoppers.

Further examination of the attached tables and charts (attachments 5 through 18) or the entire Retail Survey may yield additional information for readers. The Washington State Retail Survey and the attached US Census Bureau and USAD Census of Agriculture are the ultimate sources of the data discussed above. Definitional questions are addressed in the Retail Survey, definitions are not replicated here.

Research Data

The Washington State Retail Survey provides historical sales data for Lincoln County. Along with the current copy, the Lincoln County EDC was able to provide older copies of Lincoln County sales data. All told, there is sales data for the County, Davenport, and Odessa from 1997 through 2010. There is data for the rest of the cities in Lincoln County from 2000 through 2010. As data for 2011 has not been reported and tabulated yet, the Retail Survey also provides an exponentially smoothed forecast for expected data for 2011. The 2011 forecast is only used for discussion purposes above and not to address the question below.

Research Questions

1. Using the data presented, forecast the total Lincoln County Retail Sales for 2012 and 2013?

Results and Analysis

A review of the historical sales data in the attachments shows there are three data sets with 14 periods (1997-2010) for Lincoln County, Davenport, and Odessa, eight data sets with 11 periods for the additional remaining towns except Almira, and nine data sets with 7 periods including Lincoln County and all eight municipalities.

Simple linear regression was performed for each of the three groups of data, 14 periods, 11 periods, and 7 periods. However, as discussed above, there is an incongruity in the data from 2000-2003. The County total sales should be greater than the sum of the cities sales for those years. It is not. The Retail did not present an explanation is for this. This may affect the accuracy of the 14 period (1997-2010) and 11 period (2000-2010) regressions if this data is indeed incorrect. The results and plots are below.

14 Period Regression

Regression Analysis

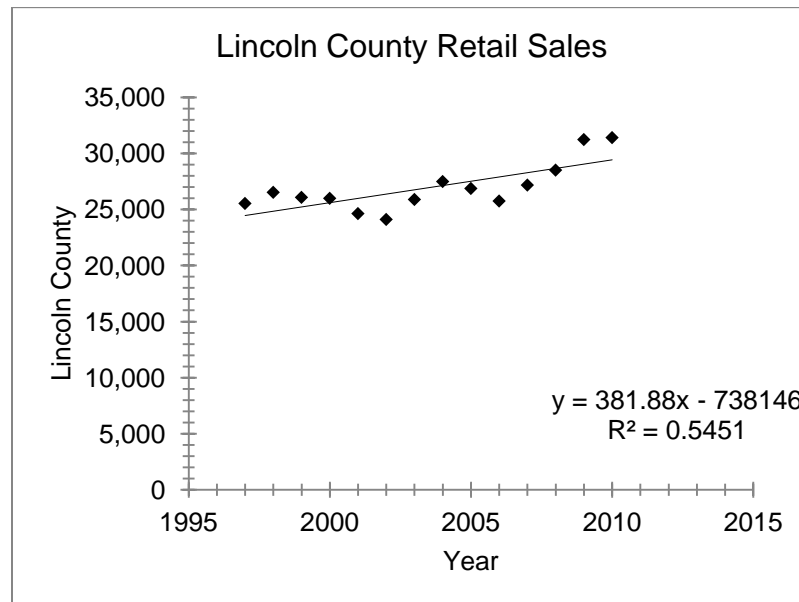
r^2 0.545
 Adjusted r^2 0.507
 r 0.738
 Std. Error 1518.913
 14 observations
 1 predictor variable
 Lincoln County is the dependent variable

ANOVA table

Source	SS	df	MS	F	p-value
Regression	33,176,321.4462	1	33,176,321.4462	14.38	.0026
Residual	27,685,166.2681	12	2,307,097.1890		
Total	60,861,487.7143	13			

Regression output

variables	coefficients	std. error	t (df=12)	p-value	confidence interval	
					95% lower	95% upper
intercept	-738,146.2725	201,758.7927	-3.659	.0033	-1,177,740.9180	-298,551.6271
Year	381.8769	100.7030	3.792	.0026	162.4640	601.2898



This model is greater than 99% significant (p-value = 0.0026) but the r^2 value is low. It only explains 54% of the variation in annual sales.

11 Period Regression

Regression Analysis

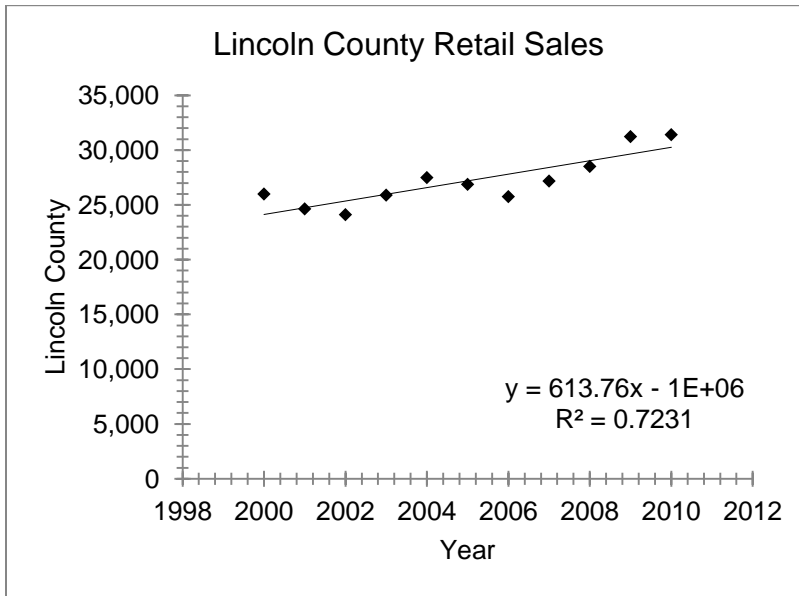
r^2 0.723
 Adjusted r^2 0.692
 r 0.850
 Std. Error 1327.655
 11 observations
 1 predictor variable
 Lincoln County is the dependent variable

ANOVA table

Source	SS	df	MS	F	p-value
Regression	41,437,638.1455	1	41,437,638.1455	23.51	.0009
Residual	15,864,006.5818	9	1,762,667.3980		
Total	57,301,644.7273	10			

Regression output

variables	coefficients	std. error	t (df=9)	p-value	confidence interval	
					95% lower	95% upper
intercept	-1,203,407.5455	253,807.0963	-4.741	.0011	-1,777,559.0851	-629,256.0058
Year	613.7636	126.5869	4.849	.0009	327.4041	900.1232



This model is greater than 99% significant and even more so than the previous model. The r^2 value indicates that this model predicts 72.3% of the variation in annual sales.

7 Period Regression

Regression Analysis

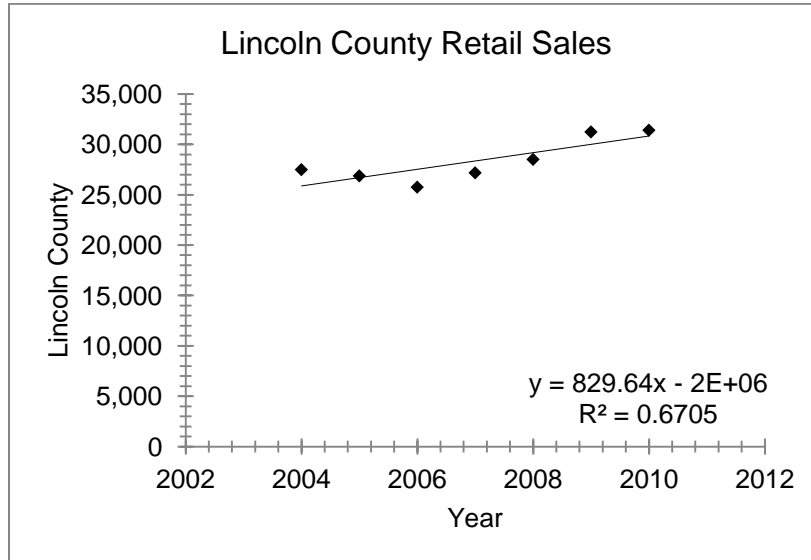
r^2 0.671
 Adjusted r^2 0.605
 Std. Error 1376.293
 7 observations
 1 predictor variable
 Lincoln County is the dependent variable

ANOVA table

Source	SS	df	MS	F	p-value
Regression	19,272,603.5714	1	19,272,603.5714	10.17	.0243
Residual	9,470,916.1429	5	1,894,183.2286		
Total	28,743,519.7143	6			

Regression output

variables	coefficients	std. error	t (df=5)	p-value	confidence interval	
					95% lower	95% upper
intercept	-1,636,743.6429	522,010.8933	-3.135	.0258	-2,978,615.3627	-294,871.9230
Year	829.6429	260.0950	3.190	.0243	161.0474	1,498.2383



This model is only approximately 97.5% significant, not as much as the previous models.

Further, it only predicts 67 % of the variation in annual sales.

The results of the regressions are summarized in the Table 6 below:

Table 8

Regression	p-value	r2	Regression Equation	2011 Forecast (millions)	2012 Forecast (millions)	2013 Forecast (millions)
14 period	0.0026	0.545	$y = 381.88x - 738,146$	\$29.8	\$30.2	\$30.6
11 period	0.0009	0.723	$y = 613.76x - 1,203,407$	\$30.9	\$31.5	\$32.1
7 period	0.0243	0.671	$y = 829.64x - 1,636,743$	\$31.7	\$32.5	\$33.3
			Where "x"= the year	Forecasts are rounded \$100,000		

The 14 period forecast is the most conservative forecast, but it is least accurate. The 7 period forecast is the most positive, but it is not as accurate as the 11 period forecast. The 11 period forecast is the most accurate and the "middle ground" of the three forecasts however there may be data problems as discussed above.

The Retail Survey made a forecast of \$32 million for 2011 based on the last five years. This seems to match the 7 period forecast of \$31.7 million for 2011. However there has been significant economic turmoil in this short period. These ambitious forecasts could be reflecting recovery rather than growth.

Even though there may be some data issues, it is the best course to use the longer termed, more accurate, and more conservative 11 period forecast that is probably more reflective of growth rather than recovery. The forecast total retail sales for Lincoln County for 2012 is \$31.5 million and for 2013 is \$32.1 million. As more information becomes available (actual 2011 data and partial 2012 data), these forecasts can be updated.

If it is assumed that agricultural portion of Lincoln County's economy will grow at the same rate, (3.2% through 2010 and 2% thereafter), the County should see a total economy of approximately \$175.8 million in 2012 and \$179.3 million in 2013.

Conclusion/Recommendations

The residents of Lincoln County have clearly identified dry land wheat production as the leading strength. Value added agriculture is the leading opportunity. Weaknesses and Threats are not as clear; insufficient support for local businesses and the lack of educational opportunities in or after high school seem to be a statistical tie for the leading weakness. The leading threat is even more obscure; outmigration of younger people, declining population, costly government regulations and mandates required of municipalities, and governmental policies regarding agriculture are all in a four-way statistical tie.

The forecast retail sales revenue for 2012 is \$31.5 million dollars and the forecast retail sales revenue for 2013 is \$32.1 million dollars. If it is assumed that agricultural portion of Lincoln County's economy has been growing at the same rate (3.2% through 2010 and 2% thereafter), these values represent 15-20% of Lincoln County's total agricultural and retail sale economy projections of approximately \$175.8 million in 2012 and \$179.3 million in 2013. Unfortunately, the last USAD Census of Agriculture is dated 2007. The Census of Agriculture is published every five year, so the next report should come out this year.

Clearly, Lincoln County should capitalize on its strengths and opportunities. The County is a national juggernaut of wheat production. It enjoys the land availability, the weather, the infrastructure, the capitalization, and the experience to maintain this competitive position. Residents should move to protect and even enhance agriculture and wheat production as an economic engine. The identified opportunity of value added agriculture may be a little more difficult to work with. Due to grain's commoditized nature in the international grain market, it is difficult to specifically add value for local or international value. However, anything that reduces costs in effect preserves value. Therefore added value could however take the form of

reduced production and transportation costs through improved infrastructure (rail and or over-road) or increased efficiencies (newer machinery and practices). County leadership should move to provide a regulatory friendly environment for agriculture locally and advocate for it at the State level. Finally there may be some opportunity in emerging local organic and craft markets for grain products or the Community Supported Agriculture (CSA) movement that supports farmers' markets.

Weaknesses are essentially an indication of things that could use improvement.

Considering the perceived lack of support for local business, residents should engage with city, County, and State agencies to advocate for a supportive environment. Even more to the point, if residents perceive a lack of support for local business, then they should individually provide that support. In other words, buy locally. Considering the lack of education opportunities, a possibility is for local schools to partner with State colleges to provide facilities to support satellite classes or 'tele-education'. Potentially each high school could become a tele-classroom for any college in the State.

Outmigration of younger people and declining population are possibly strongly related. If younger people are leaving the county, then it is extremely likely they may not return and the population will decline. Creating more jobs, or working on a better education system could be potential ways to retain the younger population or even promote population growth. Focusing on an area that appeals to people is the best way to create population booms. For example, making it a community that people may want to retire in could bring in a certain older demographic to counteract the younger demographic leaving to pursue other jobs or education. Costly regulations and mandates is simply a matter of revisiting these matters and advocating for relief. Some may be necessary and vital, but if there are any cuts that could potentially be made, it

would not only make business owners and the community happier, but it would also promote the idea of creating jobs in the County.

Overall, Lincoln County is strong. Lincoln County should expect to see an increase in revenue in 2012 and 2013 that out performs the urban counties and the State. The growth should match and maybe even beat inflation. The strengths and opportunities are difficult to improve, but they should be protected. Effort should be placed on improving weaknesses and mitigating threats. Doing the opposite, or doing nothing at all, could cause growth to stagnate or even decrease.