BA 5310

Business Research Methods

Final Project - Team #8

Nathan Hammond, Jeremy Hawkins, Clinton Herman

Does a shorter work week (less than 40 hours) result in higher productivity?

TEXAS A&M INTERNATIONAL UNIVERSITY

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Introduction:

The relationship between the GDP and work hours per person per week engaged.

The report is based on the data collected from www.ourworldindata.org. The data was collected to analyze the question “Does a shorter work week (less than 40 hours) result in higher productivity?” With the provided statistics and charts to back up the findings for acceptance, or not of our null hypothesis.

The gross domestic production, referred to as GDP from here on, was compared to the work hours per person per week engaged to answer the question at hand. It is thought that employees might be more productive for their employers if provided a shorter work week, and this question allowed for an interpretation of the question to be answered.

The findings are organized into the following sections: (1) a background, (2) hypothesis, (3) null hypothesis, (4) methodology, (5) statistics, (6) charts, (7) results, (8) conclusion, and (9) references.

Background:

In the United States the eight-hour work day, forty-hour work week is the classical standard. Although this number of hours seems normal, back in the 1890s the average work week was over 100 hours per week (Ward, 2017). Today the US worker, on average, works 44 hours per week, or 8.8 hours per day (Charts from the American Time Use Survey, 2017). In some demanding industries individuals have reported working 50 plus hours per week (Ward, 2017). So why are Americans working so long? The bottom line is to get the job done. The question begs though, does it take that long to get the job done.

In recent studies the question has been asked, would a shorter work week equal more production? In the US our workers work more hours than any other first world nation (Ohio University, 2018). In the US there are two basic types of employees, hourly and salary. Hourly employees are paid by the hour, so their work weeks are controlled more so than a salaried employee.

The impact of working to many hours can be negative also. A meta-analysis conducted by Wong, Chan, and Ngan showed that there was a statistical significance in individuals who worked long hours or lots of overtime with the development of negative related health habits (p value <0.048) and it has a negative effect on physiological health and the development of cardiovascular diseases (p value <0.001) (Wong, 2019). So, if workers could be at work less and get more work done would that work? On a national scale one way to look at this would be to compare the national average hours worked per that country’s gross domestic product (GDP).

Hypothesis (H_1):

Working less hours in a work week will result in a higher production rate as seen in the gross domestic product (GDP)

Null Hypothesis (H_0):

Working less hours in a work week will not result in a higher production rate, as seen in the gross domestic product (GDP).

Methodology:

The data was collected from "…a database with information on relative levels of income, output, input and productivity, covering 182 countries between 1950 and 2017." (Feenstra, 2015) It was then interpreted into the report and charts at www.ourworldindata.org.

Data was removed for anything prior to 2013 in order to keep the most recent 5 years of information to process. A sublevel sort was then completed to remove any lines of data that were lacking in information necessary to produce useable information.

The research presented its limitations within the data, as it was not specifically built for the question being answered. More specific data would need to be collected that would not need to be manipulated. Also, gathering data to compare specifically developed, first world countries to other like countries may present different findings.

Statistics:

In this project we retrospectively reviewed the data from www.ourworldindata.org on the average hours worked per week to see how it affected the gross domestic product of several countries (Roser, 2013). The statistical analyses were run using the IBM SPSS software. The data was collected from 2013 to 2017 from 66 different countries N=396. The work weeks were averaged annually per year (Chart 1). The mean hours worked in a week was 35.9194, with the lower bound at 35.4529 and the upper bound at 36.4128, with a 95% confidence interval. The test of normality showed a p-value of .000 (Chart 2). Then we tested the correlation between the average hours worked in a week against the country's gross domestic product (GDP). Using the Pearson correlation, the p-value was found to be 0.00 (Chart 4).

Chart 1: Descriptives

Summary and interpretation of the work hours per person per week engaged. The mean hours worked in a week was 35.9194, with the lower bound at 35.4529 and the upper bound at 36.4128, with a 95% confidence interval.

Descriptives

			Statistic	Std. Error
Work hours per person per week engaged	Mean		35.9194	.25099
	95% Confidence Interval for Mean	Lower Bound	35.4259	
		Upper Bound	36.4128	
	5% Trimmed Mean		35.8654	
	Median		35.3500	
	Variance		24.946	
	Std. Deviation		4.99456	
	Minimum		26.04	
	Maximum		47.22	
	Range		21.18	
	Interquartile Range		7.07	
	Skewness		.183	.123
	Kurtosis		-.691	.245

Chart 2: Tests of Normality

Numerical assessment of normality for work hours per person per week engaged, showing a p-value of .000.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Work hours per person per week engaged	.073	396	.000	.981	396	.000

a. Lilliefors Significance Correction

Chart 3: Histogram

Charted data of frequency and the work hours per person per week engaged.

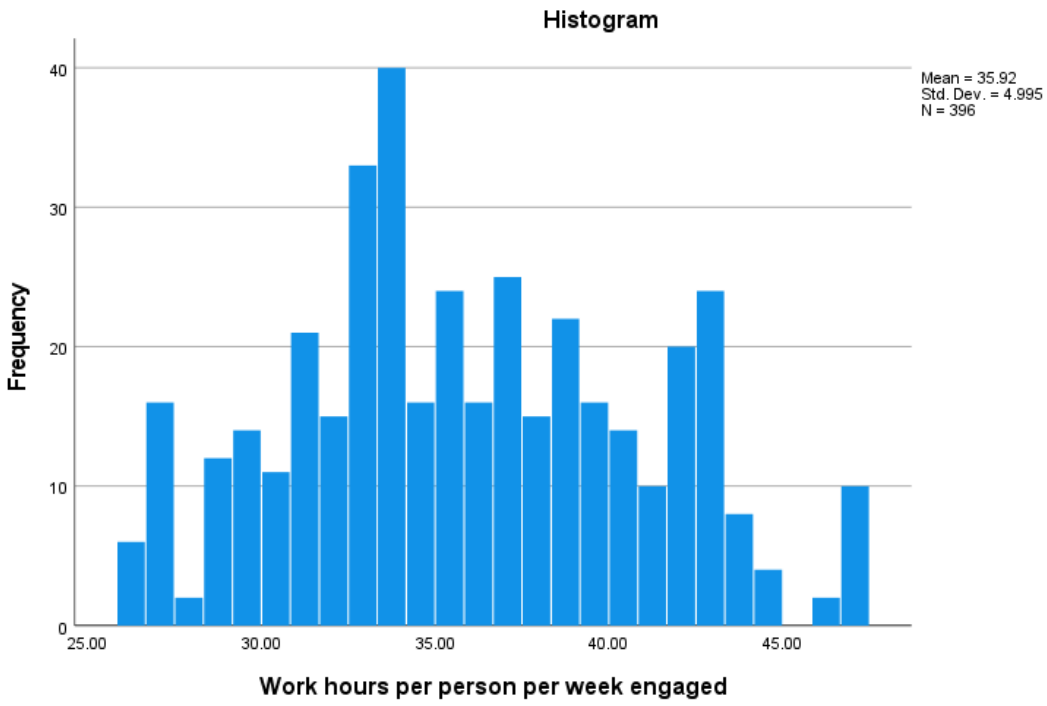

Chart 4: Correlations

Matrixed correlations for the GDP and work hours per person per week engaged. We tested the correlation between the average hours worked in a week against the country's gross domestic product (GDP). Using the Pearson correlation, the p-value was found to be 0.00.

Correlations

		GDP	Work hours per person per week engaged
GDP	Pearson Correlation	1	-.723**
	Sig. (2-tailed)		.000
	N	396	396
Work hours per person per week engaged	Pearson Correlation	-.723**	1
	Sig. (2-tailed)	.000	
	N	396	396

**. Correlation is significant at the 0.01 level (2-tailed).

Results:

As we can see from the four charts, working less hours in a work week results in a higher production rate as seen in GDP. Chart 1 shows that by establishing a 95% confidence interval using the mean, we are able to arrive at an upper and lower bound which contains the true mean 95% of the time. This means that we are 95% certain that our population parameter falls between 35.3429 and 36.4128. Chart 2 reveals that our data do not follow a normal distribution. Our Kolmogorov-Smirnov statistic gives us a relative indicator of curve fit. We have a relatively good fit with our value of 0.073, but a higher statistic is preferred. If it were to be lower than 0.05, we could infer that the lack of fit is significant. The negative Pearson correlation in Chart 3 shows us the extent to which GDP moves in the opposite direction of hours worked per week. This for example, proves our hypothesis (H_1) to be true as an increase in work hours per person per week engaged (beyond 40 hours) tends to result in a fall in GDP. For that reason, and because of the statistical significance (p-value) shown 0.00 in both Chart 2 and Chart 4, we have strong evidence to reject the null hypothesis (H_0).

Conclusion:

In this retrospective study, we looked to see if a decrease in the average hours worked in a week would correlate with an increase in productivity. We hypothesized that a decrease in work hours would result in an increase in productivity. Regarding this data set and statistical analysis, we would reject the null hypothesis.

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