Quantitative Methods Project Report

World Happiness Index

Group 4, Sec A

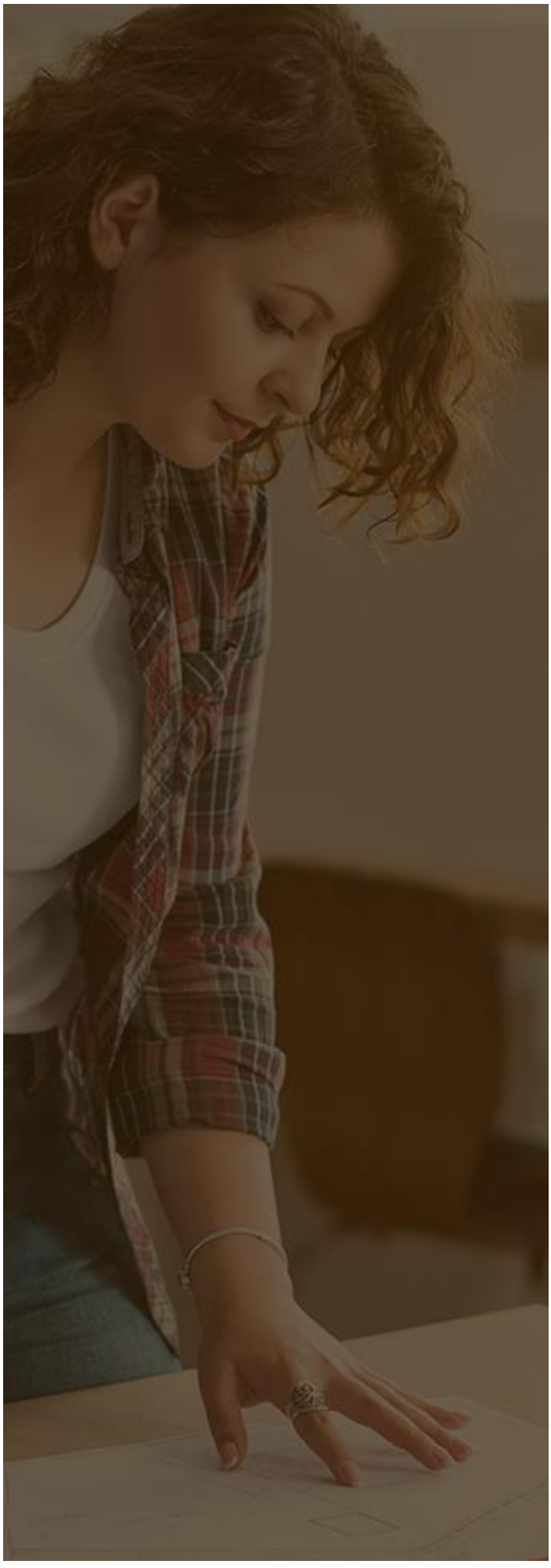

TABLE OF CONTENTS

1. ABSTRACT

Background

The World Happiness Report is an annual publication of the United Nations Sustainable Development Solutions Network. It contains articles, and rankings of national happiness based on respondent ratings of their own lives, which the report also correlates with various life factors. As of March 2020, Finland was ranked the happiest country in the world three times in a row.

Objective

- To study the effect of factors like Logged GDP per capita, Social support, Healthy life expectancy, Freedom to make life choices, Perceptions of corruption etc. on the overall happiness of a country.
- Also, to study the effect that the geographical factors have on the overall lifestyle and happiness by influencing noticeable changes in the measurement parameters.
- To compare and contrast the parameters and infer what are the crucial contributors of a region's happiness.
- Lastly to conclusively mention the parameters most necessary for happiness of the country.

Subject and Method

We took the World Happiness Report which is an annual publication of the United Nations Sustainable Development Solutions Network for the last 3 years. We used secondary data collection methods for the gathering the required data.

Result

After the analysis we should be able to narrow the paramount factors affecting the happiness of a person in a country, region or in general.

- Analysis indicates that maximum Happiness Index is 7.808 while the minimum is 2.567.
- By correlation we were able to show that Corruption has a negative impact on the happiness, also there is a strong correlation of around **0.77** between the happiness of a country and GDP, social support and life expectancy of a country
- The analysis shows that approximately 75% of the observed variation can be explained by the model's input.
- As it can be seen from the regression coefficient, perception of corruption has a negative coefficient which suggests that as it increases, the happiness index tends to decrease.
- It can be concluded that the average mean of Southeast Asia is less than that of Western Europe as our test statistic, $t^* = -5.6301$, is in the rejection region which is $t^* < -1.7011$.

2. LITERATURE REVIEW

The World Happiness Report is a landmark survey of the state of global happiness that ranks 156 countries by how happy their citizens perceive themselves to be. The World Happiness Report 2020 for the first time ranks cities around the world by their subjective well-being and digs more deeply into how the social, urban and natural environments combine to affect our happiness.

- Report starts with the usual national rankings of recent life evaluations, and their changes from a 2008-2012 base period to 2017-2019. The sources of these levels and changes are investigated, with the six key factors being supplemented by an analysis of how well-being inequality is linked to lower average levels of happiness. Then the report turns to show the importance of social environments with special emphasis on trust and social connections and the ability of high trust to improve life evaluations for all, but especially those who are most at risk by lessening the well-being costs of discrimination, unemployment, illness, and low income.

- It provides a ranking of happiness measures, including both life evaluations and measures of positive and negative affect for 186 global cities for which there are samples of sufficient size from the Gallup World Poll.

- World Happiness Report digs deeper into the relative happiness of urban and rural life around the world, showing city dwellers to be generally happier than rural dwellers in most countries, with these advantages being less, and sometimes reversed, in a number of the richer countries.

- Also examines how different aspects of the natural environment influence subjective well-being. The first part of the report does this using natural environmental data for OECD countries combined with happiness measures from the Gallup World Poll, while the second part uses data collected from just-in-time reports from a sample of Londoners, seeing how their emotions change with their activities and features of the local environment surrounding them.

- Report helps in study of the empirical relationships between the Sustainable Development Goals (SDGs) and happiness measures from the Gallup World Poll, mainly the life evaluations that are the focus of earlier part of the report.

- It describes several features of life in the Nordic countries that help to explain why life evaluations in those countries are very high. This also discounts several other proposed explanations that are not supported by the evidence.

World Happiness Report presents new data based on standardized definitions of urban, peri-urban, and rural populations and uses them to compare happiness, generally finding happiness highest in the cities and lowest in rural areas for their sample of countries

3. METHODOLOGY

- **Descriptive statistics**
  It is the brief descriptive coefficients that summarize a given data set, which can be either a representation of the entire or a sample of a population. It is broken down into measures of central tendency (mean, median, mode) and measure of variability (standard deviation, variance, maximum and minimum variables)

- **Regression Analysis-**
  Regression analysis is a powerful statistical method that allows us to examine the relationship between two or more variables of interest. While there are many types of regression analysis, at their core they all examine the influence of one or more independent variables on a dependent variable.

- **Independent t-test-**
  Also called the two-sample t-test, independent-samples t-test or student's t-test, is an inferential statistical test that determines whether there is a statistically significant difference between the means in two unrelated groups.

- **Correlation-**
  It is a statistical measure that indicates the extent to which two or more variables fluctuate together. A positive correlation indicates the extent to which those variables increase or decrease in parallel; a negative correlation indicates the extent to which one variable increase as the other decreases.

- **Software Used-**
  The analysis has been performed in Microsoft excel.

4. DESCRIPTIVE STATISTICS

Table shows the descriptive statistical analysis of the Happiness score, Logged GDP per capita, Social support, Healthy life expectancy, Freedom to make life choices and perceptions of corruption. It indicates that maximum Happiness score is 7.808 while the minimum is 2.567. Also, the mean and standard deviation of Happiness score are 5.473 and 1.098 respectively. The mean value of logged GDP per capita and social support is 9.295 and 0.808 respectively. The mean and standard deviation value of freedom to make life choices are 0.783 and 0.116 respectively. Perception of corruption mean value is 0.733 and standard deviation is 0.173.

Descriptive Statistics									
	N	Mean	Median	Max	Min	Range	Variance	SD	SE
Happiness Index	156	5.473	5.515	7.808	2.567	5.242	1.205	1.098	0.087
Logged GDP per capita	156	9.295	9.456	11.45	6.492	4.958	1.406	1.186	0.094
Social Support	156	0.808	0.829	0.975	0.319	0.655	0.014	0.119	0.009
Healthy life expectancy	156	64.445	66.305	76.804	45.2	31.604	48.535	6.966	0.558
Freedom to make life choices	156	0.783	0.8	0.974	0.396	0.578	0.014	0.116	0.009
Perceptions of corruption	156	0.733	0.783	0.936	0.109	0.825	0.029	0.173	0.013

5. CORRELATION

Table

Particulars	Happiness Index		
	2019-20	2018-19	2017-18
Log GDP per capita	0.7753744	0.7602056	0.768409
Social support	0.7650008	0.7192673	0.761581
Healthy life expectancy at birth	0.7703163	0.7442636	0.758496
Freedom to make life choices	0.5905968	0.5191432	0.534846
Generosity	0.0690431	-0.054011	0.175747
Perceptions of corruption	-0.418305	-0.432576	-0.42123

Assumption

We have assumed the base year to be 2017-18

Analysis (2018-19)

1. There has been a slight decrease in the relation between Log GDP per capita and happiness index from 2017-18, though still there is a strong relation between the two.
2. Correlation between Healthy Life expectancy and Happiness index has been increasing since 2017-18
3. A negative relation exists between freedom to make choices and happiness index in 2018-19 whereas there is a slightly positive relation between happiness index and freedom to make choices.
4. There exists a negative correlation between corruption and Log GDP per capita and it has increased from 2017-18.

Analysis (2019-20)

1. There has been an increase in the relation between Log GDP per capita and happiness index from 2017-18.
2. Correlation between Healthy Life expectancy and Happiness index has increased from 2017-18
3. There has been decrease in the relationship between generosity and happiness index from 0.17 and 0.06.
4. There exists a negative correlation between corruption and Log GDP per capita but it has decreased from 2017-18.

Table shows the correlation between the index of happiness and the GDP per capita of the country, social support, life expectancy, freedom to make choices, generosity and corruption perception over 5 years. It can be concluded from the table that there is **a strong correlation** of **around 0.77** between the happiness of a country and GDP, social support and life expectancy of a country. It can also be seen that that there is a **negative correlation of about 0.**4 between the **index and corruption** which means that more the corruption, less will be the happiness in the country. We can know the extent of happiness that the people of a country can get due to a certain factor but cannot know the actual causes. **The happiness index has the strongest correlation with Logged GDP per capita since the last three years**.

6. POOLED T-TEST (INDEPENDENT T-TEST)

Independent Sample Test									
	t-test for equality of means								
	Count	Mean	Std. Error	Std. Dev	Skewness	Mean Diff	Std. Dev(pooled)	DF	t
Southeast Asia	9	5.383367	0.218955	0.656866	-0.0357	-1.515852	0.675789078	28	1.7011
Western Europe	21	6.899219	0.149089	0.683212	-0.78989				

Two unrelated populations are compared with following Null Hypothesis (H_0) and Alternative hypothesis (H_a):

H_0: The average happiness index of Southeast Asia equals to that of Western Europe($\mu_1=\mu_2$)

H_a: The average happiness index of Southeast Asia is less than that of Western Europe($\mu_1<\mu_2$)

Assumptions:

- Both the populations are independent to each other.
- Since the sample sizes are less than 30 and almost same and ratio of their standard deviation, $s_1/s_2 = 0.96$ which is approx. equals to 1. We can assume that their variances are equal by the Rule of Thumb.
- The population is almost normally distributed as their skewness lies between -1 and +1

There is enough evidence to reject the null hypothesis and conclude that the average mean of Southeast Asia is less than that of Western Europe as our test statistic, $t^* = -$ -5.6301, is in the rejection region which is $t^* <$ -1.7011.

Further, Significance of this mean difference is less than 0.05 which shows that it is statistically significant.

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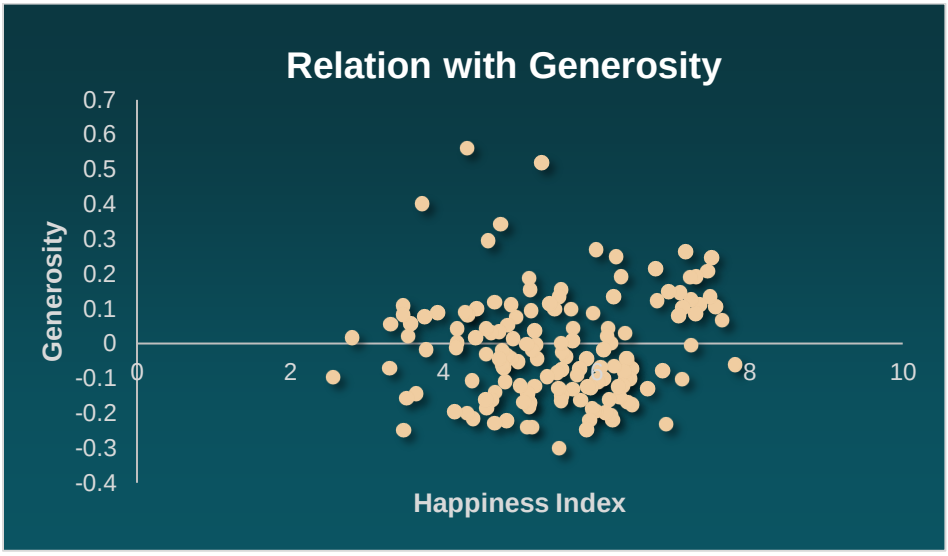
7. REGRESSION ANALYSIS

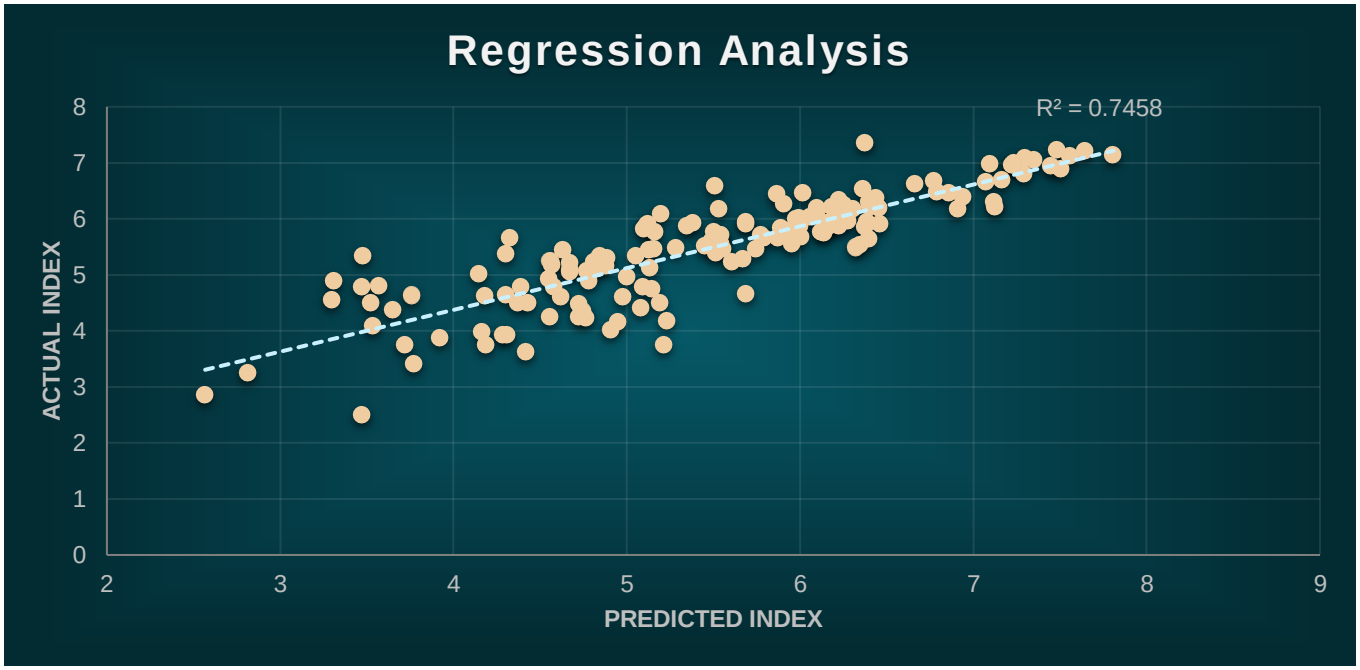
After correlation, multiple regression was performed to further analyze the World's Happiness Index.

Four assumptions of regression were tested to check if it can be applied of not.



All other variables except generosity showed a linear relationship with the Happiness Index. Hence, it is not significant in measuring the Happiness index. All other assumptions were satisfied for our model.

Following is the regression analysis of World's Happiness Index for the year 2019-20:



The model we have derived is correct as the predicted and original value have a linear relationship.

	Coefficients	P-value
Intercept	-1.938919277	0.002614142
Logged GDP per capita	0.213701873	0.009433997
Social support	2.741900725	5.79975E-05
Healthy life expectancy	0.034696118	0.008393971
Freedom to make life choices	1.921957946	0.000111101
Perceptions of corruption	-0.727545748	0.018164919

The equation of regression is $-1.94+0.22X_1+2.74X_2+0.03X_3+1.92X_4-0.73X_5$

Where,

X_1 = Logged GDP per capita

X_2 = Social Support

X_3 = Healthy Life Expectancy

X_4 = Freedom to make life choices

X_5 = Perceptions of corruption

The R^2 value came out to be 0.75, which shows that variability of data from regression model is not that much.

The analysis shows that approximately 75% of the observed variation can be explained by the model's input.

As it can be seen from the regression coefficient, perception of corruption has a negative coefficient which suggests that as it increases, the happiness index tends to decrease. (The same was inferred from the correlation above.)

8. CONCLUSION

- Correlation between Healthy Life expectancy and Happiness index has increased from 2017-18
- There has been decrease in the relationship between generosity and happiness index from 0.17 and 0.06.
- The R^2 value came out to be 0.75, which shows that variability of data from regression model is not that much.
- There is enough evidence to reject the null hypothesis and conclude that the average mean of Southeast Asia is less than that of Western Europe as our test statistic, $t^* = -$ -5.6301, is in the rejection region which is $t^* <$ -1.7011.
- People in South East Asia are less happy as compared to the Western Europe.
- Lastly, perception of corruption in negatively correlated with the happiness index, hence with increase in corruption within a country, its Happiness Index decreases.
- Conclusively we can say that GDP, social support and healthy life expectancy affect the state of happiness the most.

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