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ANALYTICAL STUDY OF RELATIONSHIPS AMONG DEMOGRAPHIC, ECONOMIC, DEVELOPMENT INDICATORS, AND CORRUPTION IN THE WORLD COUNTRIES

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Abstract

Discussing corruption is extremely difficult as it is a hidden phenomenon in all world countries. The main objectives of the study are to identify the descriptive analysis for corruption indicators and to investigate the relationship between corruption index and demographic, economic, development indicators in the world countries. Data were collected from various sources. The sample involved one hundred thirty eight countries. The statistical methods include descriptive statistics, correlation coefficients, and multiple regression. The results of both correlation coefficients and multiple regression imply that decreased corruption are more likely to occur among countries that have more life expectancy at birth, more female participation in labor force, a higher GDP, high GDP per capita, good quality of infrastructure, more quality of education, more advanced in markets efficiency, highly technology development, and more innovations development. Also, the results suggest that increased corruption is more likely to occur among countries that have more population, more infant mortality rate, highly inflation percent, and more country credit rating. The data from world countries show that this finding is consistent with the research hypotheses. Clearly, corruption will not disappear from world countries, but all efforts are aiming to restrict corruption, and to improve features of social and economic life.

Keywords: Development, Economic, Demographic, Global Corruption, World countries.

1. Introduction

Corruption is attracting the attention of many researchers and scientists around the world. Certainly, the corruption will not disappear from any country. Discussing corruption is extremely difficult as it is a hidden phenomenon in all world countries. Corrupting parties, on the other hand, use their authority powers and privileges to keep their transactions secret. That makes it too difficult to establish how wide and deep corruption is penetrating in the economies and the social life of individuals.

World countries corruption still entails considerable risks and the level of anti-corruption protection is unsatisfactory. The current legal frameworks for global corruption is still insufficient. The use of anti-corruption agencies have grown rapidly in recent years after the signing of United Nation Convention Against Corruption (UNCAC). The role of multilateral institutions has been crucial in the fight against corruption. UNCAC provides a general guideline for world countries. Both transparency International and the World Bank provide aid to national governments in terms of diagnostic and design of anti-corruption policies.

The World Bank Worldwide Governance Indicators show constant improvement for some countries. Several countries have joined the Organization for Economic Co-operation and Development Anti-Bribery Convention in 2000 and implementing relevant legislation. Traditionally anti-corruption policies have been based on successful experiences and common senses. In recent years there has been efforts to provide a more systematic evaluation of the effectiveness of anti-corruption policies. Anti-corruption policies that may be generally recommended for developing countries may not be suitable for some countries. Anti-corruption policies in fragile countries have to be carefully adjusted. International Penal Code criminalizes attempted corruption, bribery, abuse of office, gifts with intention to influence, the use of public resources for private gain, and extortion. Also, the Anti Money Laundering Law criminalizes money laundering.

In many societies corrupt practices, as specified by legal or administrative rules, may often be customary and widely accepted as normal behavior. Such behavior, in some third world countries or controlled economies, may be essential for achievement of socially necessary outcomes. Available information show that three trillion dollars is spent annually as corruption cost worldwide. In 2016 the highest rate of corruption was found in Venezuela, Korea Democratic Republic, Chad, and Mauritania, while the lowest rate was found in Switzerland, Sweden, New Zealand, and Finland (CPI). The scientific efforts are meant to present the recommendations for restrict corruption and to protect as much as possible the poor and weak in our societies. In the end all corruption costs are paid by the consumer, the tax-payer, and the poor persons, they need protection.

In spite of such claims, and the a lot of evidence to support them, there exists relatively little theoretical and analytical works on the relationships between corruption, development, economics, and demography indicators. The purpose of this study is to go some way towards analyzing the corruption using the publications of several cross-country data sets that are widely regarded as providing measures of corruption. It discusses issues related to the indicators of corruption in world countries. It is to examine and investigate the relationships between corruption; that has flourished during recent years; and demographic, economic, and development indicators. Moreover, It also emphasizes the costs of corruption in terms of demographic, economic, and development indicators.

There are several aspects to understand corruption in the world countries, but the scientific background is based on nine items (GCR, 2016-2017). They best fit to explain how corruption takes place in countries and how effects their development and economy. These items selected define and

explain corruption in this study, including absence of public trust in politicians, irregular payments and bribes, favoritism in decisions of government officials, wastefulness of government spending, burden of government regulation, inefficiency of legal framework in settling disputes, lack of transparency of government policymaking, weakness of auditing and reporting standards, and absence of protection of minority shareholders' interests.

This current study will answer the following questions. Which world countries will need to end all corruption exposures? What are the demographic indicators; such as total population, infant mortality rate, life expectancy at birth, and female participation in the labor force; impede or facilitate corruption? What are the effects of corruption on the economic indicators; such as gross domestic product per capita, inflation, gross general government debt, and country credit rating; upon corruption in world countries? What are the development indicators; such as variables of infrastructure quality, education quality, goods markets efficiency, technology development, and innovations development; paralyze or assist corruption?

The Study Objectives: The objectives of this study are to: (1) Identify the descriptive analysis for corruption indicators in the world countries, (2) Investigate the relationship between corruption index and demographic, economic, development indicators in the world countries, and (3) Determine empirically which of these indicators that are most significant in affecting corruption index.

The Study Significance: The significance of this study is exposing and revealing an analytical view of corruption globally. It includes one hundred and thirty eight countries compared to other previous studies that covered only one or few countries. Moreover, it incorporates a larger number of independent variables, thirty two variables, more than any previous study. Furthermore, most studies of corruption is incomplete because researchers use only a single group of indicators, that never did study the demographic, economic, and development indicators. The findings will be useful for identifying policies that have the greatest promises for stimulating and reducing corruption rates.

2. Theoretical Framework And Literature Review

At present, the corruption phenomena can occur in all world countries and on different scales. Corruption can occur in any sector of the country, whether in the public sector or in the private sector or even in the NGOs. However, only in democratically controlled countries is there an interest of the public to develop internal mechanisms to fight active or passive corruption, whereas in dictatorially countries there is no public control. Morris (1991) in his book writes "that corruption is the illegitimate use of public power to benefit a private interest", while Kaufmann and Vicente (2005) extends the concept of corruption to include legal corruption in which power is abused within the confines of the law, as those with power often have the ability to make laws for their protection.

Many Definitions of corruption have been proposed. According to Pinto-Duschinsky (1987) corruption is "an abandonment of expected standards of behavior by those in authority for the sake of unsanctioned personal advantage." Corruption is the misuse of public power by elected politicians or appointed civil servants for private gain. Moreover, scientific definition for the concept of corruption was developed by Duyne (2014). He indicated that the corruption is an improbity or decay in the decision-making process in which a decision-maker consents to deviate or demands deviation from the criterion which should rule his or her decision-making, in exchange for a reward or for the promise or expectation of a reward, while these motives influencing his or her decision-making cannot be part of the justification of the decision. Corruption is a form of dishonest or unethical conduct by a person entrusted with a position of authority, often to acquire personal benefit. It may

include many activities including bribery and embezzlement, though it may also involve practices that are legal in many countries.

Also, corruption ranges from small favors between a small number of people, petty corruption (Elliott, 1997); to corruption that affects the government on a large scale, grand corruption; and corruption that is so prevalent that it is part of the everyday structure of any society. Petty corruption occurs at a smaller scale and takes place at the implementation end of public services when public officials meet the public (Hamilton, 2017). Grand corruption is defined as corruption occurring at the highest levels of government in a way that requires significant subversion of the political, legal and economic systems.

The government system in many countries is divided into the legislative, executive, and judiciary branches in an attempt to provide independent services that are less subject to grand corruption due to their independence from one another (Alt, 2015). Systemic corruption is corruption which is primarily due to the weaknesses of an organizations or processes. Factors which encourage systemic corruption include conflicting incentives, discretionary powers, monopolistic powers, lack of transparency, and a culture of impunity. Specific acts of corruption include bribery, extortion, and embezzlement in a system where corruption becomes the rule rather than the exception (Znoj, 2009). Increasingly, a number of indicators and tools have been developed which can measure different forms of corruption with increasing accuracy (Hamilton, 2017).

There are two equations for understanding corruption. <u>First</u>, Klitgaard (1998) postulate that corruption will occur if the corrupt gain is greater than the penalty multiplied by the likelihood of being caught and prosecuted:

$$\text{Corrupt gain} > \text{Penalty} \times \text{Likelihood of being caught and prosecuted}$$

These equations seem to be lacking one aspect: a high degree of monopoly and discretion accompanied by a low degree of transparency does not automatically lead to corruption without any moral weakness or insufficient integrity. <u>Second</u>, the original Klitgaard (1998) equation has therefore been amended by Stephan (2012) into:

$$\text{Degree of corruption} = \text{Monopoly} + \text{Discretion} - \text{Transparency} - \text{Morality}$$

According to Stephan (2012), the moral dimension has an intrinsic and an extrinsic component. The intrinsic component refers to a mentality problem, the extrinsic component to external circumstances like poverty, inadequate remuneration, inappropriate work conditions and inoperable or overcomplicated procedures which demoralize people and let them search for "alternative" solutions. consistent with the amended Klitgaard (1998) equation, limitation of monopoly and regulator discretion of individuals and a high degree of transparency through independent oversight by non-governmental organizations and the media plus public access to reliable information could reduce the problem. Olken and Pande (2012) have independently addressed the important role information plays in fighting corruption with evidence from both developing and developed countries. Thus, from the two previous equations, countries should improve efforts and work together with all social, economical, political forces to restrict corruption and alleviating its effects and consequences.

According to a survey study by Dimant and Tosato (2017), the following factors have been attributed as causes of corruption: higher levels of market and political monopolization, low levels of democracy, weak civil participation and low political transparency, higher levels of bureaucracy and

inefficient administrative structures, low economic freedom, gender inequality, low degree of integration in the world economy, and low levels of government decentralization. Furthermore, there are other causes of corruption such as high percent rate of poverty, political instability, weak property rights, low levels of education, and low Internet access. There are several corruption aspects in many countries such as: favoritism and nepotism, bribery, embezzlement and theft, fraud, and Abuse of discretion (Wang, 2013). Some countries do not forbid these forms of corruption. Though corruption is often viewed as illegal, there is an evolving concept of legal corruption as developed by Kaufmann and Vicente (2011). It might be termed as processes which are corrupt, but are protected by a legal framework or at least not proscribed by law.

Related to relationship between corruption and some sectors in world countries, Legvold (2009) stated that corruption is not specific to poor, developing, or transition countries. In western countries, cases of bribery and other forms of corruption in all possible fields exist. In healthy sector, there are various corruption can ultimately present a danger for public health, they can discredit specific essential institutions or contribution in low level of healthy for people such as high rate of Infant mortality. Moreover, corruption is strongly negatively associated with the rate of economic growth (MO, 2001). The cost of corruption is in that it impedes sustainable economic growth. Corruption reduces the returns of productive activities. If the returns to production fall faster than the returns to corruption, resources will flow from productive activities to corruption activities over time. Furthermore, corruption creates the opportunity for increased inequality, reduces productivity growth, decreased investment, and declined job opportunities for both men and women. Also, the effect of corruption in all infrastructure aspects are to increase costs and construction time, lower the quality and decrease the benefit (Locatelli, et al., 2017).

Corruption in education is a worldwide phenomenon. Corruption in admissions to universities is traditionally considered as one of the most corrupt areas of the education sector (Osipian, 2015). In some countries, the general public is well aware of the high level of corruption in schools, colleges, and universities, including thanks to the media (Osipian, 2007). In many societies and international organizations, education corruption remains a taboo (Heyneman, et. al., 2008). Gupta, et al. (2000) find that corruption has the effect of reducing the provision of education and health care.

Amongst all that has been written on the corruption, Sen (1999) declares that corruption is "one of the major stumbling blocks in the path to successful economic progress", while the World Bank (www.worldbank.org) states that corruption is "the single greatest obstacle to economic and social development". The evidence from studies emphasize that corruption and development are strongly connected in a relationship. In one set of analyses it is estimated that relatively small increases in the incidence of corruption can have substantial adverse effects on investment and growth (Gyimah-Brempong and Wilson, 2004; Keefer and Knack, 1997; Li et al. 2000; Mauro 1995). In accordance with empirical evidence, the model of Blackburn and Sarmah (2005) predicts that low (high) levels of development are associated with high (low) levels of corruption and low (high) rates of life expectancy. With non-corruption, economic and social development are conducive to longer lifetimes as technological progress, increased education, rising per capita incomes, better standards of sanitation, decreased infant mortality rate, and greater provision of health care, then advances awareness of knowledge (Kalemli-Ozcan, 2002). The conclusion is that corruption tends to reduce the provision and quality of public goods and services that enhance individuals' human capital in terms of both educational ability, growing individuals' income, and health status.

The Research Hypotheses: Based on the empirical equations background and literature review, the following hypotheses are tested. Life expectancy at birth, female participation in labor force, GDP per capita, quality of infrastructure, quality of education, markets efficiency, technology development, and innovations development are positively related to world countries that have the lowest rate of corruption index. On the other hand, total population, infant mortality rate, inflation, gross general government debt, and country credit rating are negatively related to world countries that have the highest rate of corruption index.

3. Research Method

Data and Sample: Data were collected from various sources. These include basically the Global Competitiveness Report, GCR, 2016-2017. The GCR has been used by governments, organizations, policymakers, academics, and businesses as a tool that contributes a valuable portrait of an economy's productivity and its ability to achieve sustained levels of prosperity and growth. The Report's index aims to measure critical concepts to complement the traditional sources of statistics and provide a more accurate assessment of the business environment and many drives of economic development by the Executive Opinion Survey (EOS). EOS has become one of the largest executive studies of its kind, collecting the opinions and perceptions of 14.723 business executives in 138 economics. It is essential to apply a detailed sampling methodology in view of collecting the most representative sample of the country' economic structure as well as minimizing the risk of cultural bias.

The data included other sources such as World Economic Forum (2016), World Bank: World Development Report (2016), International Monetary Fund: World Economic Outlook Database (2016), International Telecommunication Union (ITU) World Telecommunication/ICT Indicators (2016), International Labour Organization (2016), International Finance Corporation (2016), and UNESCO (2016) Selected indicators from each of these sources were chosen to represent the variables of this study.

The sample of the study involved one hundred and thirty eight (138) countries; data may not be available for some countries in a particular year such as Barbados, Yemen, Brunei Darussalam, and Democratic Republic of Congo. Some countries have been reinstated in the 2016-2017 edition of the survey after one or more years of exclusion.

Measurement of Variables: Selected variables from each of these sources mentioned above were chosen to represent the dependent and independent variables for this study. Measurement of dependent and independent variables used in the study are explained in Appendix. The following is a brief statement on the variables to be used and their measurement.

The Dependent Variables (Corruption index Y): is treated and measured by a composite value that incorporates, nine variables, public trust in politicians (Ya), irregular payments and bribes (Yb), favoritism in decisions of government officials (Yc), wastefulness of government spending (Yd), burden of government regulation (Ye), efficiency of legal framework in settling disputes (Yf), transparency of government policymaking (Yg), strength of auditing and reporting standards (Yh), and protection of minority shareholders' interests (Yi).

Independent Variables:

1. **Demographic Indicators: Total population** measured at midyear in millions. **Infant mortality rate** is the number of infants dying before reaching one year of age per 1.000 live births in a given

year. **Life expectancy at birth** indicates the number of years a newborn infant would live if prevailing pattern of mortality at the time of its birth were to stay throughout its life. **Female participation in the labor force**, this measure is the percentage of women aged 15-64 participating in the labor force divided by the percentage of men aged 15-64 participating in the labor force.

2. **Economic Indicators: Gross Domestic Product (GDP) per capita US$** is a measure of a country's economic output that accounts for population it divides the country's GDP by its total population. **Inflation** is a measure of an annual percent change in consumer price index. **Gross general government debt** as a percentage measure of the country's GDP, Gross government debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future. **Country credit rating** is a measure of an assessing the probability of sovereign debt default on a 0-100 (100 representing the least chance of default).

3. **Development Indicators:**

3.1. **Infrastructure Quality:** is measured by a composite value that incorporates, six variables, quality of overall infrastructure, quality of roads, quality of railroad infrastructure, quality of port infrastructure, quality of air transportation infrastructure, and quality of electricity supply.

3.2. **Education Quality:** is measured by a composite value that incorporates, four variables, quality of primary education, quality of education system, quality of math and science education, and quality of management school.

3.3. **Goods Markets Efficiency:** is measured by a composite value that incorporates, five variables, intensity of local competition, extent of market domains, agricultural policy cost, value chain breadth, and production process sophistication.

3.4. **Technology Development:** is measured by a composite value that incorporates, three variables, availability of latest technologies, firm-level technology absorption, and internet users.

3.5. **Innovations Development** is measured by a composite value that incorporates, six variables, country capacity to retain talent, country capacity to attract talent, capacity for innovations, quality of scientific research institutions, availability of scientists and engineers, and PCT patent applications.

Statistical Methods: Descriptive analysis will be used to explain the corruption indicators in the world countries. Spearman correlation coefficients will identify the relationship between the dependent variables (corruption index) and independent variables (demographic indicators; economic indicators; and development indicators). Estimates of the amount of variance in corruption index that can be explained by each of the independent variables separately and collectively will be made using multiple regression analysis.

4. Results And Discussion

First: Results of Descriptive Analysis:

The descriptive analysis for corruption index in the world countries (N=138) are presented in Table 1. The frequencies and percentages were used as a descriptive measure for dependent variables. The result indicated that the highest number of countries that had corruption took 3 (54 countries represented as 39.1%) on a scale from 1 to 7 (being 1 very common and 7 never occurs), while the lowest number of countries that took 2 (2 countries represented as 1.4%). In general, the results of descriptive analysis revealed that the highest number of countries in all corruption indicators took 3 or 4 on a scale from 1 to 7 (being 1 extremely low corruption and 7 extremely high corruption), while the lowest number of countries that took 1 or 2.

Table 1. Descriptive Analysis for Corruption Index (Dependent Variable) in World Countries (N=138)

Corruption Index	Frequency	Percent	Cumulative Percent
Very common (1)	0	0	0
(2)	2	1.4	1.4
(3)	54	39.1	40.6
(4)	53	38.4	79.0
(5)	20	14.5	93.5
(6)	9	6.5	100.0
Never occurs (7)	0	0	100.0
Total	138	100.0	100.0

Sources: Global Competitiveness Report (GCR) 2016-2017

Second: Results of Correlation Coefficients

This section involves the results of the spearman correlation coefficients. It is used to identify and explain the relationship between corruption index variables and demographic, economic, and development indicators in the world countries.

Spearman correlation coefficients among demographic indicators and corruption index in world countries are presented in Table 2. The results indicated a statistically significant association between corruption index and total population, r= -.165, p<.05, infant mortality rate, r= -.439, p<.01, and life expectancy at birth, r= .429, p<.01 (Table 2).

The results of correlation coefficients among economic indicators and corruption index in world countries are showed in Table 2. The results stated a statistically significant association between corruption index and Gross Domestic Product (GDP) per capita, r= .539, inflation, r= -.277, and country credit rating, r= -.640, p<.01.

Table 2: Spearman Correlation Coefficients among Independent Variables (Demographic and Economic Indicators) and Dependent Variables (Corruption Index) in World Countries (N=138)

Independent Variables	Dependent Variables (Corruption Index Variables)									
	Ya	Yb	Yc	Yd	Ye	Yf	Yg	Yh	Yi	Y
Demographic Indicators										
Total population	-.158	-.266**	-.099	-.186*	-.203*	-.056	-.186*	-.108	-.048	-.165*
Infant mortality rate	-.314**	-.741**	-.388**	-.231**	-.081	-.295**	-.461**	-.620**	-.449**	-.439**
Life expectancy at birth	.318**	.720**	.404**	.251**	.080	.279**	.459**	.626**	.476**	.429**
Female participation in labor force	.094	.164*	.051	.024	.039	.113	.183*	.159*	.091	.114
Economic Indicators										
GDP per capita	.387**	.781**	.423**	.326**	.155*	.402**	.573**	.723**	.592**	.539**
Inflation	-.168*	-.357**	-.221**	-.236**	-.177*	-.209*	-.270**	-.354**	-.329**	-.277**
Gross general government debt	.013	.122	.072	-.131	-.110	-.006	.024	.052	.054	.024
Country credit rating	-.455**	-.756**	-.492**	-.440**	-.251**	-.503**	-.675**	-.775**	-.687**	-.640**

Sources: Global Competitiveness Report (GCR) 2016-2017. (Ya) Public trust in politicians. (Yb) Irregular payments and bribes. (Yc) Favoritism in decisions of government officials. (Yd) Wastefulness of government spending. (Ye) Burden of government regulation. (Yf) Efficiency of legal framework in settling disputes. (Yg) Transparency of government policymaking. (Yh) Strength of auditing and reporting standards. (Yi) Protection of minority shareholders' interests. (Y) corruption index. * Significant at .05 and ** Significant at .01(2-tailed).

Spearman correlation coefficients among development indicators and corruption index in world countries are presented in Table 3. For the first three indicators of development, Table 3 explored the relationship between development indicator and corruption index in the world countries by spearman correlation coefficients. It revealed a statistically significant positive association between corruption index and quality of overall infrastructure, r= .712, quality of roads infrastructure, r= .690, quality of air transportation, r= -.725, quality of electricity supply, r= .639, and infrastructure quality index, r= .713, quality of primary education, r= .674, quality of education system, r= .725, quality of math and science education, r= .546, quality of management school, r = .535, and education quality index, r= .643, intensity of local competition, r= .624, extent of market domains, r= .798, agricultural policy cost, r= .650, value chain breadth, r= .656, production process sophisticate, r= .650, and markets efficiency index, r= .725, p< .01.

For the fourth and the fifth development indicator, The results of spearman correlation stated a statistically significant positive association between corruption index and availability of latest technologies, r= .664, firm-level technology absorption, r= .728, internet users, r= .527, technology development index, r= .657, country capacity to retain talent, r= .764, country capacity to attract talent, r= .758, capacity for innovations, r= .614, quality of scientific research institutions, r= .649, availability of scientists and engineers, r= .571, and innovations development index, r= .741, p< .01 (Table 3).

Discussion of Correlation Coefficients Results

The results of correlation coefficients related to the demographic indicators suggest that reduced corruption Index are more likely to occur among world countries that have the lowest number of total population, lowest number of infant mortality rate, and highest number of life expectancy at birth. Furthermore, the results showed a statistically significant positive association between all corruption index variables and life expectancy at birth, while there is a statistically significant negative association between all corruption index variables and infant mortality rate.

Table 3: Spearman Correlation Coefficients among Independent Variables (Development Indicators) and Dependent Variables (Corruption Index) in World Countries (N=138)

Independent Variables (Development Indicators)	Dependent Variables (Corruption Index Variables)									
	Ya	Yb	Yc	Yd	Ye	Yf	Yg	Yh	Yi	Y
1. Infrastructure Quality										
Quality of overall infrastructure	.624**	.813**	.638**	-.063	.415**	.623**	.647**	.669**	.680**	.712**
Quality of roads infrastructure	.556**	.739**	.571**	-.017	.395**	.624**	.604**	.635**	.661**	.690**
Quality of railroad infrastructure	-.050	-.049	-.126	.080	.068	-.026	-.074	-.054	-.014	-.010
Quality of port infrastructure	.056	.011	.056	-.016	.088	.087	.048	.024	-.039	.100
Quality of air transportation	.593**	.772**	.613**	-.054	.413**	.621**	.664**	.719**	.746**	.725**
Quality of electricity supply	.531**	.812**	.572**	-.050	.303**	.499**	.591**	.647**	.592**	.639**
Infrastructure quality index	.606**	.815**	.654**	-.063	.365**	.602**	.652**	.695**	.669**	.713**
2. Education Quality										
Quality of primary education	.604**	.760**	.601**	.091	.373**	.594**	.614**	.638**	.589**	.674**
Quality of education system	.668**	.692**	.664**	.007	.491**	.649**	.642**	.602**	.611**	.725**
Quality of math and science education	.534**	.620**	.563**	.081	.321**	.497**	.489**	.456**	.464**	.546**
Quality of management school	.471**	.579**	.456**	-.018	.247**	.536**	.501**	.622**	.588**	.535**
Education quality index	.581**	.718**	.574**	.109	.375**	.575**	.603**	.612**	.603**	.643**
3. Goods Market Efficiency										
Intensity of local competition	.579**	.616**	.612**	-.085	.401**	.568**	.585**	.526**	.564**	.624**
Extent of market domains	.718**	.761**	.761**	-.075	.540**	.717**	.743**	.681**	.736**	.798**
Agricultural policy cost	.611**	.576**	.597**	.001	.579**	.619**	.619**	.428**	.512**	.650**
Value chain breadth	.562**	.731**	.619**	-.033	.340**	.636**	.622**	.698**	.683**	.656**
Production process sophisticate	.573**	.737**	.590**	-.147	.272**	.575**	.637**	.756**	.675**	.650**
Markets efficiency index	.663**	.774**	.688**	-.099	.454**	.654**	.721**	.712**	.712**	.725**
4. Technology Development										
Availability of latest technologies	.533**	.770**	.555**	-.058	-.073	.544**	.606**	.724**	.078	.664**
Firm-level technology absorption	.586**	.733**	.612**	-.047	.015	.646**	.706**	.752**	.112	.728**
Internet users	.429**	.709**	.432**	-.051	-.152	.378**	.491**	.646**	.103	.527**
Technology Dev. Index	.533**	.786**	.544**	-.078	-.135	.532**	.608**	.737**	.070	.657**
5. Innovations Development										
Country capacity to retain talent	.695**	.641**	.680**	.029	.016	.704**	.705**	.020	.696**	.764**
Country capacity to attract talent	.683**	.588**	.650**	.055	.044	.732**	.702**	.040	.671**	.758**
Capacity for innovations	.531**	.675**	.532**	-.008	-.017	.587**	.573**	.008	.654**	.614**
Quality of scientific research institutions	.589**	.722**	.585**	-.029	-.100	.629**	.594**	-.070	.627**	.649**
Availability of scientists and engineers	.487**	.602**	.526**	.022	-.063	.528**	.540**	-.043	.585**	.571**
Innovations Dev. index	.680**	.710**	.689**	-.005	-.092	.734**	.692**	-.073	.718**	.741**

Sources: Global Competitiveness Report (GCR) 2016-2017.

(Ya) Public trust in politicians. (Yb) Irregular payments and bribes. (Yc) Favoritism in decisions of government officials. (Yd) Wastefulness of government spending. (Ye) Burden of government regulation. (Yf) Efficiency of legal framework in settling disputes. (Yg) Transparency of government policymaking. (Yh) Strength of auditing and reporting standards. (Yi) Protection of minority shareholders' interests. (Y) corruption index.

* Significant at .05 and ** Significant at .01(2-tailed).

In addition, the results explained a few statistically significant negative association between irregular payments and bribes, wastefulness of government spending, burden of government regulation, and transparency of government policymaking as dependent variables with total population. These results implied that less irregular payments and bribes, less wastefulness of government spending, lowest in government administrative requirements, and more transparency of government policymaking are more likely to occur among world countries that have lowest number of total population.

No relationship was found between the female participation in labor force and corruption index, but, there is a few statistically significant positive association between irregular payments and bribes, transparency of government policymaking, and strength of auditing and reporting standards with female participation in labor force (Table 2). These results indicated that less irregular payments and bribes, more transparency of government policymaking, and extra strength of auditing and reporting standards are more likely to occur among world countries that have more female participation in labor force.

In general, these results indicate that increased public trust in politicians, less irregular payments and bribes, decreased favoritism in decisions of government officials, less wastefulness of government spending, increased efficiency of legal framework in settling disputes, more transparency of government policymaking, extra strength of auditing and reporting standards, and more protection of minority shareholders' interests are more likely to occur among world countries that have lowest number of Infant mortality rate, and highest number of life expectancy at birth. Furthermore, corruption are more likely to occur among world countries that have more total population, highest rate of infant mortality, and lowest number of life expectancy.

The findings of correlation coefficients related to economic indicators suggest that increased corruption index are more likely to occur among world countries that have the highest number of GDP per capita, the lowest percentage of Inflation, and the lowest number of country credit rating. In addition, the results showed a statistically significant positive association between all corruption index variables and GDP per capita, while there is a statistically significant negative association between all corruption index variables, Inflation, and country credit rating. There is no statistically significant association between gross general government debt as one of the economic indicators and all of corruption index variables (Table 2).

These results imply that increased public trust in politicians, less irregular payments and bribes, decreased favoritism in decisions of government officials, less wastefulness of government spending, less burden of government regulation, increased efficiency of legal framework in settling disputes, more transparency of government policymaking, extra strength of auditing and reporting standards, more protection of minority shareholders' interests, and decreased corruption Index are more likely to occur among world countries that have the highest number of GDP per capita, the lowest percentage of Inflation, and the lowest number of country credit rating. In general, corruption are more likely to occur among world countries that have the lowest GDP per capita, the highest percentage of inflation, and the highest rating of country credit.

For the first three of development indicators; infrastructure quality, education quality, and goods market efficiency; the results of correlation coefficients involve that decreased corruption index are more likely to occur among world countries that have the good quality of overall infrastructure; maximum quality of infrastructure of roads, air transportation, and electricity supply; more quality of primary education, education system, math and science education, and management school; and more intensity of local competition, more dominated by business groups and firms, the

extra balance of agricultural policy cost for taxpayers, consumers, and producers, more value chain breadth, and the highest production uses of latest technologies.

Furthermore, the results showed a statistically significant positive association between all independent variables of infrastructure quality, education quality, and goods market efficiency with all corruption index variables except wastefulness of government spending. There is no statistically significant relation between quality of railroad infrastructure and quality of port infrastructure as variables of infrastructure quality and all corruption index variables (Table 2).

In common, these results state that increased public trust in politicians, less irregular payments and bribes, decreased favoritism in decisions of government officials, reduced burden of government regulation, increased efficiency of legal framework in settling disputes, more transparency of government policymaking, extra strength in auditing and reporting standards, more protection of minority shareholders' interests, and decreased corruption Index are more likely to occur among world countries that have good quality of infrastructure, more quality of education, and have goods market efficiency.

Related to the fourth and fifth development indicators, technology development and innovations development, the findings of correlation coefficients suggest that decreased corruption Index are more likely to occur among world countries that have more availability of latest technologies, extra technology absorption by businesses and companies, the highest percentage number of individuals that using the internet, increase quality of scientific research institutions, more availability of scientists and engineers, high capacity to retain talent, to attract talent, and to adapt innovations.

The results showed a statistically significant positive association between all independent variables of technology development and innovations development with all corruption index variables except wastefulness of government spending and burden of government regulation. In addition, these results reveal that increased public trust in politicians, less irregular payments and bribes, decreased favoritism in decisions of government officials, increased efficiency of legal framework in settling disputes, more transparency of government policymaking, extra strength in auditing and reporting standards, more protection of minority shareholders' interests, and decreased corruption Index are more likely to occur among world countries that have more availability of latest technologies and the highest capacity of innovations. Moreover, there is no relationship found between all of the innovations development variables and strength of auditing and reporting standards as one of corruption index variables. In general, corruption are more likely to occur among world countries that have less quality of infrastructure, less quality of education, fewer efficiency of goods markets, a lesser amount of technology and innovations.

Furthermore, the results of spearman correlation coefficients support the hypotheses which state that life expectancy at birth, gross domestic product per capita, quality of infrastructure, quality of education, markets efficiency, technology development, and innovations development are positively associated with world countries that have the lowest rate of corruption index. On the other hand, the results of spearman correlation coefficients support the hypotheses which state that total population, infant mortality rate, inflation, and country credit rating are negatively related to world countries that have the highest rate of corruption index. The results of spearman correlation coefficients does not support the other hypotheses regarding the association between corruption index and female participation in labor force and gross general government debt.

Third: Results of Multiple Regression

This section implies the results of the multiple regression analysis. It is used to estimate the effects of a set of independent variables (demographic, economic, and development indicators) on the dependent variables (corruption index) included in this study. Model 1 in Table 4 displays only the demographic indicators that may affect on corruption index in the world countries. The standardized regression coefficient for the infant mortality rate, -.273, and percentage of female participation in labor force, .199, were statistically significant at level 0.05. There is no statistically significant effect between total population, life expectancy at birth, and corruption index. The R^2 for this model was, .180, meaning that the demographic indicators in model 1 explained 18.0 percent of the variance in corruption index.

Model 2 examines the impact of economic indicators on corruption index in the world countries. The standardized regression coefficient for the gross domestic products per capita, .507, and country credit rating, -.293, were statistically significant at level 0.01. Moreover, inflation, and gross general government debt were unrelated effect with corruption index. The R^2, .456, in model 2 explains 45.6 percent of the variance in corruption index.

Table (4) Multiple Regression of Independent Variables (Demographic, Economic, and Development Indicators) on Dependent Variables (Corruption Index) in World Countries (N=138)

Independent Variables (Demographic, Economic, and Development Indicators)	Corruption Index (Dependent Variable)							
	Model 1		Model 2		Model 3		Model 4	
	B	Beta	B	Beta	B	Beta	B	Beta
Demographic Indicators								
Total population	.001	.020						
Infant mortality rate	-.115	-.273*					-.064	-.225*
Life expectancy at birth	.158	.149						
Female participation in labor force	.164	.199*					.025	.049
Economic Indicators								
Gross domestic product per capita			.054	.507**			.036	.207*
Inflation			-.009	-.033				
Gross general government debt			-.014	-.034				
Country credit rating			-.059	-.293**			-.017	-.028
Development Indicators								
Infrastructure quality index					.187	.242*	.173	.236*
Education quality index					.104	.103		
Markets efficiency index					.252	.196*	.149	.419**
Technology development index					.000	.001		
Innovations development index					.374	.338**	.119	.309**
R Square	.180		.456		.532		.598	
Adjusted R Square	.156		.447		.518		.581	
Significant F	.000		.000		.000		.000	

Sources: Global Competitiveness Report (GCR) 2016-2017. * Significant at .05 and ** Significant at .01.

Model 3 in Table 4 displays the regression of development indicators, independent variables, on corruption index as a dependent variable in world countries. The results suggest that the standardized regression coefficient for infrastructure quality index, .242, markets efficiency index, .196, were statistically significant at level .05, and innovations development index, .338, was

statistically significant at level .01. Other variables, education quality index and technology development index, in this model did not have an effect on corruption Index. The coefficient of determination, R^2= .532, indicates that the set of development Indicators in Model 3 explained 53.2 percent of the variance in corruption index.

Discussion of Multiple Regression Results:

As related to Model 1 in Table 4, the results indicate that increase in the highest female percentage of participation in labor force was associated with the decrease corruption index, while the results indicate that increase in infant mortality rate was associated with the increase corruption index. The results of Model 2 imply that decreased corruption Index are more likely to occur among world countries that have the highest number of Gross Domestic Product (GDP) per capita and the lowest number of country credit rating. Also, the results of Model 3 suggest that decreased corruption Index are more likely to occur among world countries that have more infrastructure quality, extra markets efficiency, and more availability of Innovations. The results from Model 4 in Table 4 indicate that the variables of infant mortality rate, gross domestic products per capita, infrastructure quality index, markets efficiency index, and innovations development index, were the best predictors of the given corruption index. Also, the results suggest that corruption index is more likely to occur among the world countries which are have lowest rate of infant mortality rate, highest number of GDP per capita, more quality of infrastructure, extra efficiency of markets, and high capacity of innovations.

Furthermore, the results of multiple regression analysis support hypotheses which state that female participation in labor force, gross domestic product per capita, quality of infrastructure, markets efficiency, and innovations development are positively associated with world countries that have the lowest rate of corruption index. On the other hand, the results of multiple regression analysis support hypothesis which state that infant mortality rate and country credit rating are negatively related to world countries that have the highest rate of corruption index. The results of multiple regression analysis does not support the other hypotheses regarding the association between corruption index and total population, life expectancy at birth, inflation, gross general government debt, quality of education, and technology development.

5. Conclusion

Global corruption must be considered as one of the most serious problems facing humanity today, because in the world as a whole, approximately that three trillion dollars is spent annually as corruption cost worldwide. Therefore, the main objective of this study is to examine the relationships between corruption index and demographic, economic, development indicators in the world countries. This is one of the studies which has undertaken detailed examination of possible interaction effects between a number of variables related to corruption and countries' demographic, economic, development indicators. Data were collected from various sources, basically from the Global Competitiveness Report, GCR, 2016-2017. The sample involved one hundred thirty eight countries.

The results of both spearman correlation coefficients and multiple regression analysis imply that decreased corruption are more likely to occur among countries; such as Switzerland, Singapore, Sweden, Finland, Norway, New Zealand, Luxembourg, Netherlands, United Kingdom, and Japan; that have more life expectancy at birth, more female participation in labor force, high gross domestic product per capita, good quality of infrastructure, more quality of education, more advanced in markets efficiency, highly technology development, and more innovations development. In addition,

the results suggest that increased corruption is more likely to occur among countries; such as Venezuela, Yemen, Chad, Bosnia and Herzegovina, Argentina, Brazil, Mauritania, Madagascar, Moldova, and Bolivia; that have more population, more infant mortality rate, highly inflation percent, and more country credit rating. The data from world countries shows that this finding is consistent with the research hypotheses. Several studies have found positive and negative associations between corruption and these variables that were used in this study.

Based on the previous studies and concerning with the results of this study, there are some of suggestions and recommendation that can be summarized to avoid the problems of corruption and alleviate its effects in world countries. The study suggests that the success in reducing corruption in world countries will contribute to achieve the following: increase economic development; create more equitable income distribution; alleviation poverty; improve government services (especially in health and education), strengthen capacity of infrastructure; increase markets efficiency, and increase the use of technologies and innovations.

Moreover, the results of the study indicate that timely improved technology development and markets efficiency as well as increase female participation in labor force are an important pre-condition to prevent corrupt behaviors. Anti-corruption policies can improve the economical environment. There is evidence, from the results of the study, that lower corruption may facilitate enhancing business, improving productivity, increasing GDP per capita, and decreasing inflation and debts. Corruption may have a direct impact on the economics' countries. Corruption also generates economic distortion in the public and private sectors by diverting public investment into capital projects where bribes are more plentiful. The results of the study argue that corruption consider as one of the factors behind the disorder economic and social development in Africa, Asia, and Latin America. Therefore, countries' administrations should take a cut on corrupt transactions or provided conditions for development, through infrastructure investment, improvement of the technologies and innovations environment.

Liberties of information technology and innovations application are guaranteed under the world countries constitutions, but several corruption restrictions undermine these freedoms in practice. Consequently, build mechanisms can enhance information transferee, extra technology absorption by businesses and companies, and more adapting innovations. In general, the study suggest that among more developed economies; a low incidence of corruption associated with a high levels of development and technology, and growing economy; while among less developed economies; corruption is acute and widespread associated with a repressed of development, feeble of technology, and breakdown economy. Corruption will not disappear from world countries, but all efforts are aiming to restrict corruption, to protect as much real development aspect as possible, and to improve feature of social and economic life. Therefore, create bottom-up mechanisms, promoting citizens participation, enhancing civil society participation, encouraging the values of integrity, accountability, and transparency are crucial components of fighting corruption. also, development of strategies for good governance by involving citizens willing to fight against corruption.

The studies of preventing and combating corruption requires a comprehensive approach, but only in a climate of transparency, accountability and participation by all members of society as much as possible. Governments, private sectors, media, civil society organizations, and the general public need to work together with researchers and scientists to explain the corruption disadvantages and the effects on social and economic development. The future studies related to corruption should contain innovation of globally accepted corruption standards applicable to both the public and private sectors. There are some unanswered questions in this study, particularly regarding the manner in

which these factors manifest themselves in different countries. Also, the results of this study sums up all the countries, so what will happen if the world countries are divided by developed and developing countries with the corruption phenomenon? Future studies should answer these questions.

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Appendix

Measurement of Variables

The following is a brief statement on the variables to be used and their measurement.

The Dependent Variables:

Corruption index (Y) is treated and measured by a composite value that incorporates, nine variables, public trust in politicians (Ya), irregular payments and bribes (Yb), favoritism in decisions of government officials (Yc), wastefulness of government spending (Yd), burden of government regulation (Ye), efficiency of legal framework in settling disputes (Yf), transparency of government policymaking (Yg), strength of auditing and reporting standards (Yh), and protection of minority shareholders' interests (Yi). It is calculated by the range from 1= very common to 7= never occurs.

Below is a description of each dependent variable that included the full question and associated answers.

1. **Public trust in politicians (Ya)** is measured by this question, in your country, , how would you rate the ethical standards of politicians? The answer ranges from 1= extremely low to 7= extremely high.

2. **Irregular payments and bribes (Yb)** is measured by the average score across the five components of the following Executive Opinion Survey question: in your country, how common is it for firms to make undocumented extra payments or bribes connected with (a) imports and exports, (b) public utilities, (c) annual tax payment, awarding of public contracts and licenses, and (e) obtaining favorable judicial decisions? In each case, The answer ranges from 1= very common to 7= never occurs.

3. **Favoritism in decisions of government officials (Yc)** is measured by this question, in your country, to what extent do government officials show favoritism to well-connected firms and individuals when deciding upon policies and contracts? The answer ranges from 1= always show favoritism to 7= never show favoritism.

4. **Wastefulness of government spending (Yd)** is measured by this question, in your country, how efficiently does the government spend public revenue? The answer ranges from 1= extremely inefficient to 7= extremely efficient in providing goods and services.

5. **Burden of government regulation (Ye)** is measured by this question, in your country, how burdensome is it for companies to comply with governmental administrative requirements (e.g. permits, regulations, reporting)? The answer ranges from 1= extremely burdensome to 7= not burdensome at all.

6. **Efficiency of legal framework in settling disputes (Yf)** is measured by this question, in your country, how efficient are the legal framework and judicial systems for private businesses and companies in settling disputes? The answer ranges from 1= extremely inefficient to 7= extremely efficient.

7. **Transparency of government policymaking (Yg)** is measured by this question, in your country, how easy is it for companies and businesses to obtain information about changes in government policies and regulations affecting their activities? The answer ranges from 1= extremely difficult to 7= extremely easy.

8. **Strength of auditing and reporting standards (Yh)** is measured by this question, in your country, how strong are financial auditing and reporting standards? The answer ranges from 1= extremely weak to 7= extremely strong.

9. **Protection of minority shareholders' interests (Yi)** is measured by this question, in your country, to what extent are the interests of minority shareholders protected the legal system? The answer ranges from 1= not protected at all to 7= fully protected.

Independent Variables:

First: Demographic Indicators:

1. **Total population** measured on scale of 1 to 10. The highest size of population is 10 and the lowest is 1.

2. **Infant mortality rate** is measured on scale of 1 to 10. The highest number of Infant mortality is 10 and the lowest is 1.

3. **Life expectancy at birth** measured on scale of 1 to 10. The highest number of years is 10 and the lowest is 1.

4. **Female participation in the labor force** measured on scale of 1 to 10. The highest ratio of women to men in the labor force is 10 and the lowest is 1.

Second: Economic Indicators:

1. **Gross Domestic Product (GDP) per capita US$** is measured on scale of 1 to 10. The highest number is 10 and the lowest is 1.

2. **Inflation** is a measure of an annual percent change in consumer price index.

3. **Gross general government debt** as a percentage measure of the country's GDP measured on scale of 1 to 10. The highest number is 10 and the lowest is 1.

4. **Country credit rating** measured on scale of 1 to 10. The highest number is 10 and the lowest is 1.

Third: Development Indicators:

1. **Infrastructure Quality:** Infrastructure quality index is measured by a composite value that incorporates, six variables. It is calculated by the range from 1= extremely poor-among the worst in the world to 7= extremely good-among the best in the world. The following is a statement of the six variables and their measurement: **(A) Quality of overall infrastructure** is measured by this question, in your country, how do you assess the general state of infrastructure (e.g., transport, communications, and energy)? The answer ranges from 1= extremely underdeveloped-among the worst in the world to 7= extensive and efficient-among the best in the world. **(B) Quality of roads** is measured by this question, in your country, how is the quality (extensiveness and condition) of roads infrastructure?; **(C) Quality of railroad infrastructure** is measured by this question, in your country, how is the quality (extensiveness and condition) of the railroads system?; **(D) Quality of port infrastructure** is measured by this question, in your country, how is the quality (extensiveness and condition) of seaports?; and **(E) Quality of air transportation infrastructure** is measured by this question, in your country, how is the quality (extensiveness and condition) of airports?. The answer for four questions ranges from 1= extremely poor-among the worst in the world to 7= extremely good-

among the best in the world. **(F) Quality of electricity supply** is measured by this question, in your country, how reliable is the electricity supply (lack of interruptions and lack of voltage fluctuations)? The answer ranges from 1= extremely unreliable to 7= extremely reliable.

2. **Education Quality:** Education quality index is measured by a composite value that incorporates, four variables. It is calculated by the range from 1= extremely poor-among the worst in the world to 7= excellent-among the best in the world. The following is a statement of the four variables and their measurement: **(A) Quality of primary education** is measured by this question, in your country, how do you assess the quality of primary education? The answer ranges from 1= extremely poor-among the worst in the world to 7= excellent- among the best in the world. **(B) Quality of education system** is measured by this question, in your country, how well does the education system meet the needs of a competitive economy? The answer ranges from 1= not well at all to 7= extremely well. **(C) Quality of math and science education** is measured by this question, in your country, how do you assess the quality of math and science education? The answer ranges from 1= extremely poor-among the worst in the world to 7= excellent-among the best in the world. **(D) Quality of management school** is measured by this question, in your country, how do you assess the quality of management school? The answer ranges from 1= extremely poor-among the worst in the world to 7= excellent-among the best in the world.

3. **Goods Markets Efficiency:** Goods markets efficiency index is measured by a composite value that incorporates, five variables, intensity of local competition, extent of market domains, agricultural policy cost, value chain breadth, and production process sophistication. It is calculated by the range from 1= extremely poor-among the worst in the world to 7= extremely good-among the best in the world. The following is a statement of the four variables and their measurement: **(A) Intensity of local competition** is measured by this question, in your country, how intense is competition in the local market? The answer ranges from 1= not intense at all to 7= extremely intense. **(B) Extent of market domains** is measured by this question, in your country, how do you characterize corporate activity? The answer ranges from 1= dominated by a few business groups to 7= spread among many firms. **(C) Agricultural policy cost** is measured by this question, in your country, how do you assess the agricultural policy? The answer ranges from 1= excessively burdensome for the economy to 7= balance well the interests of taxpayers, consumers, and producers. **(D) Value chain breadth** is measured by this question, in your country, how broad is companies' presence in the value chain? The answer ranges from 1= narrow, primarily involved in individual steps of the value chain to 7= broad, present across the entire value chain. **(E) Production process sophistication** is measured by this question, in your country, how sophisticated are production processes? The answer ranges from 1= not at all, production uses labor intensive processes to 7= highly, production uses latest technologies.

4. **Technology Development:** Technology development index is measured by a composite value that incorporates, three variables, availability of latest technologies, firm-level technology absorption, and internet users. It is calculated by the range from 1= extremely poor-among the worst in the world to 7= extremely good-among the best in the world. The following is a statement of the four variables and their measurement: **(A) Availability of latest technologies** is measured by this question, in your country, to what extent are the latest technologies available? The answer ranges from 1= not at all to 7= to a great extent. **(B) Firm-level technology absorption** is measured by this question, in your country, to what extent do businesses adopt the latest technologies? The answer ranges from 1= not at all to 7= to a great extent. **(C) Internet users** refer to percentage of individuals using the internet from any location and for any propose. It measured on scale of 1 to 10. The highest percentage of users is 10 and the lowest is 1.

5. **Innovations Development:** Innovations development index is measured by a composite value that incorporates, five variables, country capacity to retain talent, country capacity to attract talent, capacity for innovations, quality of scientific research institutions, and availability of scientists and engineers. It is calculated by the range from 1= extremely poor-among the worst in the world to 7= extremely good-among the best in the world. The variables of **(A) Country capacity to retain talent**, **(B) Country capacity to attract talent**, and **(C) Capacity for innovations** are measured by this questions, in your country, to what extent does your country retain talented people?; to what extent does your country retain attract talented people from abroad?; and to what extent do companies have the capacity to innovate?; respectively. The answer for the questions ranges from 1= not at all to 7= to a great extent. **(D) Quality of scientific research institutions** is measured by this question how do you assess the quality of scientific research institutions? The answer ranges from 1= extremely poor to 7= extremely good. **(E) Availability of scientists and engineers** is measured by this question, in your country, to what extent are scientists and engineers available? The answer ranges from 1= not available at all to 7= widely available.