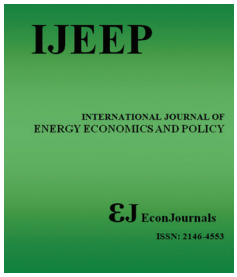

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Social Development from Nuclear and Other Energy: A Myth or Reality from Indonesia

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ABSTRACT

The purpose of this research in Indonesia is to explore the trends and patterns of social development defined by the energy sources during the time of 1985-2017 with a range of statistical methods and procedures. The above stated purpose is addressed with the help of multiple regression methods which is the most cited measure for examining the determinantal impact of independent variables on dependent variables. Therefore, this study has utilized the same method where results are provided in five different 4 different tables. As a complementary work, descriptive measures for example, athematic mean, standard deviation of the mean, and minimum maximum values during the study period are also presented and explained. Both positive and negative influence of energy factors on all five social development measures is examined, however, four out of five measures of social development are found to be insignificant when the effect of fossil fuel is tested. Addition to this, alternative and nuclear energy is positively defining the vulnerable employment of male and females, and negatively affecting the labor force participation and Life expectancy at birth, female (years). The research is suggested to the department of social development specifically in Indonesia, and country-level administrative authorities while exploring the impact of energy variables on development of Indonesian community.

Keywords: Social Development, Energy Sources, Nuclear Energy
JEL Classifications: O11, K32, O44

1. INTRODUCTION

Development has many dimensions. However, its social and economic perspective is accepted as one of the most cited and researched standpoint in the previous and current period (Blowfield and Frynas, 2005; Breen and Jonsson, 2005; Bühler and Nikitin, 2020; Pawłowski, 2008; Poltarykhin et al., 2020; Wiesner, 2017). Economic development or sometime known as economic welfare explores the level of quality of living standards and prosperity in any economy (Feldman and Storper, 2018; Fritz and Koch, 2016). A country with more economic welfare and developments is assumed to be the more stable, having satisfaction among its community members, and growth comparatively to other regions/states. For welfare of the population, both social and economic factors are presented by the economists and researchers. In order to measure the economic welfare in the country, the most cited and accepted measure is gross domestic product which reflects the welfare of the population not as a whole, but in terms of individuals in the community who are consuming and purchasing goods and services (Chambers et al., 2019; Kamran et al., 2016; Usman et al., 2012; Morantes Quintana et al., 2020; Moreno-Brid et al., 2020; Espinosa-Espinosa et al., 2020; Flores and Argaez, 2020; Gil-León, 2020). Authors and researchers are exploring the role of economic development in different countries through time series, cross sectional and panel data analyses. On the other hand, social development has got range of measures which are spoken through theoretical and empirical literature work.

For the community members, it is quite essential for the government to provide them with maximum opportunity to work.

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For this reason, social development is all about to effort for the well-being of the society (Coulthard et al., 2011; McGregor, 2008; Jubhari et al., 2020; Kadhim et al., 2020). Some authors believe that social development means to put huge amount of investment in the community and in the people for the removal of set of barriers so that they can achieve their stated objectives and desired goals. Authors believe that for the reduction of poverty in any society social development is a significant tool and for this reason more investment in the people can provide some outclassing results (Anríquez and Stamoulis, 2007; Banks and Hulme, 2012; Cremin and Nakabugo, 2012; Kamran et al., 2020; McNamera, 2003; Spence and Smith, 2010).

Like other theoretical assumption, social development theory tries to explain the structural framework of the society and qualitative changes which can help the society towards betterment and stability (Ramanathaiyer and MacPherson, 2018). With the range of behaviors, development indicates an upward movement in the society. Some researchers have argued that development is the process of social change not in terms of polices but also through set of results. For the better organization, social change is leading towards the creation of more awareness in the community members (Doan-Bao et al., 2018; Grant and Low-Choy, 2020; Kagan et al., 2019; Ruebottom, 2018). Similarly, the concept of development is surrounded by variety of factors representing the capacity of the society towards organization of the resources. This step can reasonably provide the status of analyzing the opportunities and working towards overcoming the set of social challenges.

World bank group has defined the social development under the context of putting people into the first priority whenever dealing with the development process (Thacker and Cuadra, 2019; Jia and Zhang, 2020). It is supposed that social development can promote and work for the acceptance of social inclusion of those who are needy in the society through resilient and cohesive societies. For this reason social development reflects some complex relationship patterns between the states and societies. It is also believing that economic growth in the country is because of social development with the high quality of life.

2. LITERATURE REVIEW

Although both social development and energy consumption are addressed in the literature, yet there combine investigation is very little observed. Akizu-Gardoki et al. (2018) argues that for the development of humans, energy consumption is among the key indicator. However, the growth of energy and its role in the human development is not so much sustainable. To explore this issue author has constructed a research investigation for the sample of 126 countries from 2000 to 2014. Findings based on the footprint based tool shows that there is an overall decline of decoupling index for 93 countries out of total sample of 126. Whereas research work of Zhao et al. (2020) considers the injustice of energy of hydropower with the development and social exclusion in China. Authors state that a lot of countries in the world economy are improving their energy access through hydropower and for meeting their energy demands too. It is believed that more social development can be reflected through energy sources. Mohtar et al. (2019) investigate the association between the water, transportation and energy. It is believed that set of the energy variables are playing their role towards the development of society. Table 1 is providing an overview about some of the literature contributions.

Kok and Benli (2017) have examined the relationship between energy diversity, nuclear energy, and sustainable development in the economy of Turkey. It is believed that there is a significant need of sustainable energy policy in Turkey in order to properly address the need of energy. However, both renewable and non-renewable energy sources should be under consideration in order to work for the stability and growth of Turkish economy. Whereas, the reasonable usage of nuclear energy may play its significant role while increasing the energy diversity and external dependency of the Turkish economy. Park (2019) has examine the trends in public perception towards the nuclear energy in South Korea based on the big data analysis. Author claims that it is difficult to explore and capture the trends like public acceptance towards such decisions. His study has applied the big data techniques along with sentiment and query analysis approaches to answer the queries about the nuclear energy. The findings o their study show that various incidents as associated with the nuclear energy have their consistent or temporary kind of affects while exploring the public attitude. Kirikkaleli et al. (2020) have aimed to investigate the casual association between the nuclear energy consumption and economic growth for the UK economy. The findings through wavelet coherence reveal the fact that changes in the economic growth is leading towards change in the energy consumption for the UK at different frequencies during the study time of 1998-2017. However, during the time of 2002-2006 there is short-run relationship between the consumption of nuclear energy and economic growth. Luqman et al. (2019) have applied the non-linear autoregression distributed lag model for examining the association

Table 1: Literature overview

Study duration and region	Key variables	Findings	Reference
1977-2013, 11 countries	Climate change policy, energy consumption, economic growth and ecological footprint. Financial development	Bidirectional causality between growth and ecological footprints	(Destek and Sarkodie, 2019)
Iceland, Greenland	Human development, social license, energy development	Human development contributes towards the energy development	(Smits et al., 2016)
United States	Social cost, energy development	Significant measures are required to control the greenhouse gas emission	(Stoellinger et al., 2016)
Turkey	Nuclear energy, sustainable development	There is a need to reduce the external dependency with the searching of new energy sources	(Kok and Benli, 2017)

between the nuclear energy, renewable energy and economic growth for the economy of Pakistan. The study findings reveal that there is a positive relationship between the nuclear energy consumption and economic growth but it is asymmetric in nature. However, the factor of oil consumption has its negative impact on the renewable energy consumption. Finally, the oil prices are found to have neutral impact on the renewable and nuclear energy consumption in the selected economy.

3. OPERATIONAL VARIABLES AND MEASURING UNITS

World bank group has provided a set of indictors, reflecting the title of social development. Details for the selected measures is provided below:

3.1. Adolescent Fertility Rate

It is defined as the birth to women between the age of 15-19 years in per 1000 women which are considered by world health organization. This indicator is known as a subset of age specific fertility rate or ASFR. Word bank group under the title of world development indicator has recognized Adolescent fertility rate as social development indicator which is measured through births per 1,000 women ages 15-19 respectively.

3.2. Labor Force Participation Rate, Female

This rate of labor participation specifies the rate or proportion of the population which is in the age of 15 and older and economically active. It means that all those individual who work for the production of goods and services during a specific period of time. For its measurement (% of female population ages 15+) modeled ILO estimate is used.

3.3. Life Expectancy at Birth, Female (Years)

Life expectancy at birth, female (years) indicates the total number of years a newly born infant will live in the world if the prevailing layouts of the mortality at the time of birth will remain the same. It is measured in terms of years. Different countries have different Life expectancy at birth, female (years).

3.4. School Enrollment, Primary and Secondary (Gross), Gender Parity Index (GPI)

It is known as the ratio of primary and secondary education for the girls and boys enrolled in public and private schools. Normally less developed or poor countries have lowest ratio of school enrollment comparatively to developed countries. Higher this ratio is beneficial in terms of social development.

3.5. Vulnerable Employment, Male and Female

The concept of vulnerable employment is explained the sum of total employment status for the group of account workers and family workers. Such employment has little opportunity to work in a formal way, there they are lacking with decent working condition. It is measured through % of male/female employment (modeled ILO estimate) as expressed by the world bank data indicators.

3.6. Energy Use (Kg of Oil Equivalent per Capita) and (Kg of Oil Equivalent) per $1,000 GDP (Constant 2011 PPP)

It refers the use of energy from primary source while transforming to other end-use fuels. For findings the total value of this indicator, indigenous production, stock changes plus imports and minus the value of fuel exports and supplied for the shipping purposes.

3.7. Combustible Renewables and Waste

The title of combustible renewable and waste includes the biomass (solid and liquid, overall industrial waste and other municipal waste. It is measured through (% of total energy). Different economies are showing different percentages for this Combustible renewables and waste (% of total energy).

3.8. Fossil Fuel Energy Consumption (% of Total)

The value of fossil fuel energy consumption refers to the fuel comprises of oil, coal, petroleum, and other natural resources like gas. It is measured through percentage of total energy consumed during a year.

3.9. Alternative and Nuclear Energy (% of Total Energy Use)

World bank has defined the alternative and nuclear energy as clean energy which is non-carbohydrate energy and there is no production of carbon oxide at the time of its generation. Various sources like nuclear, geothermal and solar power are observed as clean sources of energy.

3.10. Research Methodology

This study has applied the descriptive statistics and robust regression analysis to analyze the trends in data and the relationship between the study variables. Various benefits are observed in the present literature to analyze the impact of robust regression technique in terms of some significant coefficients with the greater reliability. In its general context, the robust regression equation can be written as follows:

$$y=c+\lambda x_1+Øx_2+\psi x_3....x_n+\mu \quad (1)$$

Where the left side of the equation represents the key dependent variable, c represents the constant value for the outcome factor, λ, Ø, and ψ indicates the robust regression coefficients as determined through multiple regression technique. Whereas the explanatory variables of the model are presented through x_1, x_2 and x_3… x_n which indicates their presence till the maximum number as presented through x_n. Finally, the robust error terms are presented with the help of μ which will indicate the effect of all other regressors which are not added in the model but with their outside influence on the relationship between dependent and independent variables of the study. More specifically, the above equation can be modified in the following manner.

$$\text{Y (Social Development: Adolescent fertility rate} = c+\lambda x_1(\text{EUO})+Øx_2(\text{CRW})+\psi x_3(\text{EU})....¥x_4(\text{FFEC})+Ǿx_5(\text{ANENG})+\Delta x_6(\text{EIMP})+\mu \quad (2)$$

$$Y\ (\text{Social Development: labor Participation Rate}) = c+\lambda x_1(EUO)+Øx_2(CRW)+\psi x_3(EU)\ldots.¥x_4(FFEC)+Óx_5(ANENG)+\Delta x_6(EIMP)+\mu \quad (3)$$

$$Y\ (\text{Social Development: Life Expectancy at Birth (Females)}) = c+\lambda x_1(EUO)+Øx_2(CRW)+\psi x_3(EU)\ldots.¥x_4(FFEC)+Óx_5(ANENG)+\Delta x_6(EIMP)+\mu \quad (4)$$

$$Y\ (\text{Social Development: Volunerable Employement (Male))} = c+\lambda x_1(EUO)+Øx_2(CRW)+\psi x_3(EU)\ldots.¥x_4(FFEC)+Óx_5(ANENG)+\Delta x_6(EIMP)+\mu \quad (5)$$

$$Y\ (\text{Social Development: Volunerable Employement (Female))} = c+\lambda x_1(EUO)+Øx_2(CRW)+\psi x_3(EU)\ldots.¥x_4(FFEC)+Óx_5(ANENG)+\Delta x_6(EIMP)+\mu \quad (6)$$

After analyzing the above relationship, regression analysis is also conducted to examine the individual impact of ANENG on the social development indicators.

$$Y\ (\text{Social Development: Adolescent fertility rate}) = c+\lambda x_1(ANENG)+\mu \quad (7)$$

$$Y\ (\text{Social Development: labor Participation Rate}) = c+\lambda x_1(ANENG)+\mu \quad (8)$$

$$Y\ (\text{Social Development: Life Expectancy at Birth (Females)}) = c+\lambda x_1(ANENG)+\mu \quad (9)$$

$$Y\ (\text{Social Development: Volunerable Employement (Male))} == c+\lambda x_1(ANENG)+\mu \quad (10)$$

$$Y\ (\text{Social Development: Volunerable Employement (Female))} == c+\lambda x_1(ANENG)+\mu \quad (11)$$

The findings for all the equations except 1 are provided below.

4. RESULTS AND DISCUSSION

For descriptive results, Figure 1 are showing the overall movement in the variables during the study period, measured through mean, deviation and data ranges. For ANENG highest mean, standard deviation, and rang is found. For individual scores, Table 2 is presenting the similar information as depicted from both of the Figure 1. As shown that AFR has a summation for the mean is 55.92 and standard value of the deviation is 9.47. It means that with the average numeric value of 55.92, AFR can move either positive or negative of 9.47 from this mean point, hence approximately 20 percent deviation as compare to 100 percent of the mean value. For LFPF, standard mean score is 48.59 and only a small trend of standard deviation which is 3.34. Moving towards LEAB, 67.75 is found as an average score during the time span of 1985-2017. However, during this time period, an average standard deviation of 3.60 is also examined. for SEPS mean value is 0.970 and SD numeric score of 0.02, making it the lowest risk in the mean score comparatively to all the variables as found under Table 2. For VEM and ANENG, mean values are 56.52 and 110.89 and dispersion of 7.34 and 12.98 separately.

The 2nd sub portion of the Table 2 (data tendency) is providing the similar measures for the rest of the variables including VEF, EUO, CRW, EU, FFEC, and EIMP. It explains that mean trend is highest for EUO; 48418.90, following by the score of 707.702 (EU), and VEF; 67.90. The variation in overall mean and SD score would explain that all of these variables have been measured through different proxies but over the same time duration in Indonesia.

For examining the social development through a range of energy dynamics, regression coefficients, standard error, level of significance for each of the coefficient as presented through ***,**,and * respectively. In addition, the value of overall variation in each of the dependent variable is also presented under

Figure 1: Data tendency

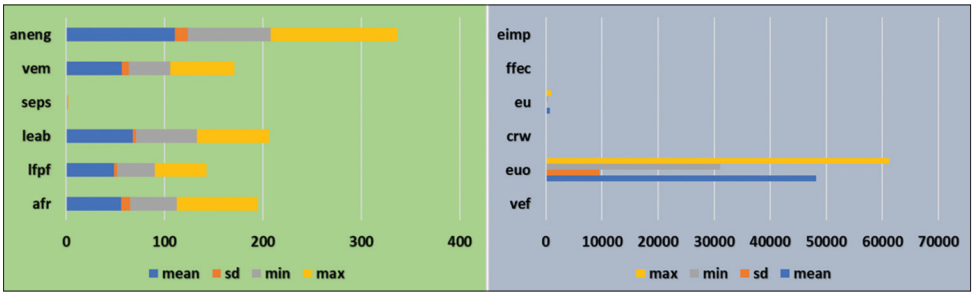


Table 2: Data tendency

STATS	AFR	LFPF	LEAB	SEPS	VEM	ANENG
Mean	55.9262	48.5944	67.7582	0.970502	56.5239	110.894
SD	9.47183	3.34947	3.60598	0.029016	7.34606	12.9823
Min	47.374	38.4963	61.76	0.90843	41.869	84.4207
Max	82.2644	52.243	73.515	1.02226	65.7017	128.619
STATS	**VEF**	**EUO**	**CRW**	**EU**	**FFEC**	**EIMP**
Mean	67.9034	48148.9	1.90737	707.702	32.7849	60.9748
SD	6.29385	9653.5	0.336806	157.445	7.8817	5.28754
Min	56.316	31095.9	1.47196	398.985	23.4886	48.5654
Max	78.732	61179.9	3.00535	944.22	50.4588	67.1548

Table 2 of the study. It shows that all independent variables are causing an overall change of 89, 78 and 71 percent change in first three dependent variables. For considering the significant impact of each of the independent variable on the dependent variable, the above mentioned level of significances are considered which are calculated through t-value with the cut point of 1.96 or above. Dealing with the individual coefficients and standard error, EUO is found to be positive but insignificant in all three regression models; Reg1-Reg3. Based on the this result and coefficients of 0.000339, 0.000145, and 0.000104, it is stated that the impact of EUO on social development like adolescent fertility rate, labor force participation rate, and life expectancy at birth are not affected by EUO. Therefore, our discussion is accepting that there is no relationship between first independent and first three dependent variables of this research. Moving towards second independent variable known as CRW, researchers have found a significant and negative impact on first three dependent variables. It explains that CRW is causing a decline in adolescent fertility rate, labor force participation rate of the females, and life expectancy at birth female too. The influence of CRW as a negative and significant determinant for the first three dependent variables expresses that dealing in adolescent rate is a good sign by CR, and same case is reflected with the impact of CRW on labor force participation rate for the females which is also a good sign. However, CRW is causing an adverse influence on life expectancy at birth female.

For examining the influence of EU on all first three measure of social development, insignificant relationship is instituted, hence means that there is no impact of EU on Adolescent fertility rate, Labor force participation rate, and Life expectancy at birth in Indonesia. In case of consumption of the fossil fuel, none of the dependent variable under Table 3 is significantly affected except life expectancy at birth. This statement is proved with the value of -0.371, standard error of 0.179, and significance level of 5 percent. It is expressed that more and more consumption of fossil fuel in Indonesia lesser the life expectancy at birth causing an adverse impact on third dynamic of social development. Turning towards analyzing the influence from Alternative and nuclear energy (% of total energy use) on first three indicators of social development in Indonesia under combine effect with the presence of all of the independent variables. It is inferenced that 0.944 would state that nuclear energy is putting a direct and positive effect on Adolescent fertility rate which is finally significant at 10% chance of error. It means that higher the alternative and nuclear energy higher the Adolescent fertility rate which can affect the current and proposed decision making process. Therefore, it is highly suggested that the impact of alternative and nuclear energy on Adolescent fertility rate is not neglectable, hence needs some attention.

For Adolescent fertility rate, and Life expectancy at birth, energy imports net (EIMP) is showing negative impact; -2.685 and -0.397. It means that there is an indirect relationship between import of energy from Indonesia and Adolescent fertility and life expectancy at birth.

For predicting the influence of alternative and nuclear energy along with other independent variables on remaining two dependent variables; Vulnerable employment male and Vulnerable employment female, results are provided in Table 4. The pattern for presenting the results is same as the one in Table 3 like coefficients, standard error, significance level with stars, overall value of R2 and total number of observations with constant value of all dependent variables but in sperate regression results. for EUO the influence on both male and female labor participation is 0.000252 and 0.000135 with standard error of 0.000262 and 0.000152. Initially, the score for the critical ratio through these coefficients and standard errors provides the evidence for the acceptance of significant association between them. However, it is found that there is insignificant impact of EUO on 4th and 5th measure of dependent variables. In the same case, CRW is found to be negative and insignificant determinant of fourth and fifth DV, hence proved no impact from CRW. However, with the EU both vulnerable employment percentage for male and female are found to be negative and significant at 5 percent and 1 percent. Examining this association, the outcome reflects that higher Energy use (kg of oil equivalent) per $1,000 GDP (constant 2011 PPP) means lesser the vulnerable employment for male and females in Indonesia. However, contrary to this, fossil fuel consumption shows no impact on vulnerable employment for both males and females.

As explained earlier, one of the key contribution of this research is to examine the alternative and nuclear energy has provided the evidence for their positive impact on both DVs under Table 3. The coefficient for alternative and nuclear energy are 0.273 and 0.210, statistically significant at 1 percent. In the last, EIMP is found to

Table 3: Relationship between DV1-DV3 with independent variables

Variables	(Regression: 1) Social Development: Adolescent fertility rate (births per 1 000 women ages 15-19)	(Regression: 2) Social Development: Labor force participation rate female (% of female population ages 15+) (modeled ILO estimate)	(Regression: 3) Social Development: Life expectancy at birth female (years)
EUO	0.000339 (0.000434)	0.000145 (0.000234)	0.000104 (6.88e-05)
CRW	–1.291*** (0.813)	–2.253*** (0.516)	–0.697*** (0.045)
EU	–0.0129 (0.0384)	–0.0237 (0.0207)	0.00819 (0.00609)
FFEC	–0.540 (1.132)	0.110 (0.610)	–0.371** (0.179)
ANENG	0.944*** (0.104)	–0.138** (0.0562)	–0.0394** (0.0165)
EIMP	–2.685** (1.012)	0.930 (0.545)	–0.397** (0.160)
Constant	224.9* (119.6)	17.60 (64.47)	97.78*** (18.95)
Observations	32: 1985–2017	32:1985–2017	32:1985–vv2017
R-squared	0.890	0.741	0.780

Robust Standard errors below each coefficients, ***,**,* indicates level of sig. at 1, 5 and 10%

Table 4: Relationship between DV4 and DV5 with Independent variables

Variables	(Regression: 4) Social Development: Vulnerable employment male (% of male employment) (modeled ILO estimate)	(Regression: 5) Social Development: Vulnerable employment female (% of female employment) (modeled ILO estimate)
EUO	0.000252 (0.000262)	0.000135 (0.000152)
CRW	–0.483 (1.696)	–0.122 (0.984)
EU	–0.0603** (0.0232)	–0.0420*** (0.0134)
FFEC	0.582 (0.683)	–0.133 (0.396)
ANENG	0.273*** (0.0629)	0.210*** (0.0365)
EIMP	1.539** (0.610)	0.0912 (0.354)
Constant	–55.02 (72.15)	67.08 (41.87)
Observations	32: 1985–2017	32:1985–2017
R-squared	0.926	0.967

Standard errors below the coefficients, ***, **, * indicates level of sig. at 1, 5 and 10%

Table 5: Relationship between DV1-DV5 and alternative and nuclear energy

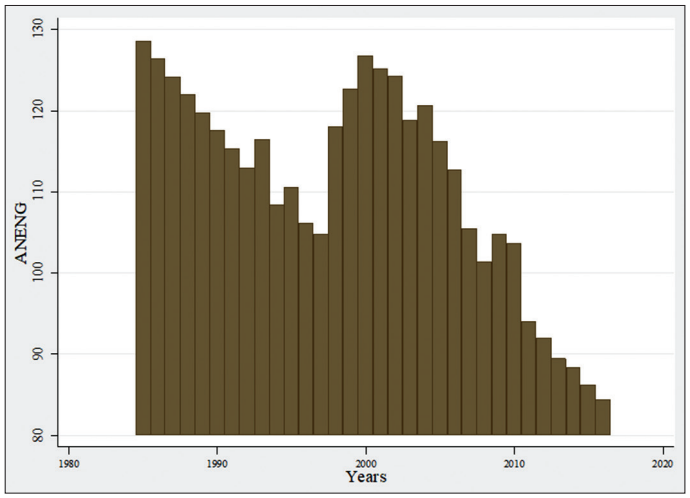
Variables	(Regression: 6) Model 1	(Regression: 7) Model 2	(Regression: 8) Model 3	(Regression: 9) Model 4	(Regression: 10) Model 5
ANENG	0.400*** (0.112)	–0.191*** (0.0314)	–0.214*** (0.0302)	–0.00124*** (0.000343)	0.469*** (0.0482)
Constant	11.82 (12.48)	69.69*** (3.502)	91.29*** (3.372)	1.107*** (0.0383)	4.972 (5.385)
Observations	32: 1985–2017	32: 1985–2017	32: 1985–2017	32: 1985–2017	32: 1985–2017
R-squared	0.299	0.553	0.625	0.302	0.759

Standard errors below the coefficients, ***,**,* indicates level of sig. at 1, 5 and 10%

be causing an increasing in vulnerable employment for the males which is found to be unsuitable for the social development of Indonesia. Figure 2 expresses the trends of alternative and nuclear energy in Indonesia from 1985 to 2018. It is observed that in the years of study data (1985-1990) there is a decreasing trend until 1999. However, after 2000 an increasing trend in such alternative and nuclear energy is experienced in the economy of Indonesia until the year of 2017.

In the last step, this section has covered the individual impact of alternative and nuclear energy on all six dependent variables of the study. The reason to analyze the individual impact of ANENG on 1-5 dependent variables. Findings are showing the evidence that for DV1, ANENG is putting a positive pressure in terms of 0.400 which is accepted as highly significant at 1 percent because t-value is above the threshold point of 1.96. It is expressed that when the individual impact of ANENG on Adolescent fertility rate (births per 1,000 women ages 15-19) is examined, it is positive which further suggest that there is an increasing adolescent fertility rate due to alternative and nuclear energy in Indonesia. However, when the influence on Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate) is examined it is adversely and significantly proved, meaning that higher ANENG means lower labor force participation in terms of female for Indonesian economy. The continuous adverse trend is experienced with the ANENG and Life expectancy at birth, female (years) where the coefficient value is -2.14 significant at 1 percent, hence saying that more ANENG means less life expectancy at birth, female. Addition to this Model 4 is accepting the fact that ANENG is also negatively impacting on School enrollment, primary and secondary (gross), gender parity index (GPI) for the Indonesia. Keeping the further investigation for the impact of ANENG on Vulnerable employment, male (% of male employment) (modeled ILO estimate), high-positive-significant impact is proved for the period of last 32 years.

Figure 2: Trends of alternative and nuclear energy in Indonesia from 1985 to 2018



5. CONCLUSION

Social development in Indonesia has been emerged in last many decades, however, its determination by the set of energy sources including the alternative and nuclear energy is not observed vastly. To overcome, this research study has explored the economy of Indonesia dealing with the social development and energy factors and how these two are interrelated to each other. The theme of social development has although different set of measures which may vary according to the regional and economic implications and situations. However, world development indicator has established a set of data indicators under the separate title of social development. For this reason, our study had been carried out to analyze the trends and patterns of social development in the domestic environment of Indonesia as explained by energy dynamics.

The overall study pattern is developed under different sections. Under first section, introduction and some background knowledge is developed to enhance the understanding of the readers. Under the 2nd section, some literature both past and present studies is provided covering the range of conceptual work by different researchers in social development and energy dynamics. Under the third section key variables are explained along with the literature sources with their operational measurement. Under section four, methods of the research are elaborated with the help of regression equations for both DVs and IVs. Whereas fifth section has conducted a detailed description and presentation of the results with the help of figures and tables etc. As per research results, both positive and negative influence on social development dynamics by energy factors is observed showing a mixed layout. However, for some of the social development factors like Adolescent fertility rate (births per 1,000 women ages 15-19), Life expectancy at birth, female (years), Vulnerable employment, female (% of female employment) (modeled ILO estimate), and School enrollment, primary and secondary (gross), gender parity index (GPI) needs to restructure while controlling their adverse results in the economy and society.

Expanding the discussion, this study has donated a good work in exploring in the role of alternative and nuclear energy sources in combine model and through individual regression equations additionally. When the effect of alternative and nuclear energy is analyzed with other energy dynamics for the social development it has expressed a Significant and positive impact on the Adolescent fertility rate (births per 1,000 women ages 15-19), and significant and negative impact on Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate), and Life expectancy at birth, female (years) in Indonesia. on the other hand, the impact of ANENG on vulnerable employment for the males and females is positive and significant from 1985-2017. Besides, under Table 5, the individual impact of ANENG on all five measures of social development is also explored and presented where for the Adolescent fertility rate (births per 1,000 women ages 15-19), and Vulnerable employment, male (% of male employment) (modeled ILO estimate), the impact from ANENG is positive and from Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate), Life expectancy at birth, female (years), and School enrollment, primary and secondary (gross), gender parity index (GPI), its influence is positive but statistically significant. Based on the all these results, this research is of a good work for the Cabinet of the Republic of Indonesia and social development department for establishing some good policies along with mega projects which can significantly boost the progress and prosperity in the country.

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