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Non-Linear Effect of Quality of Education on Social Development

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ABSTRACT

Objective: This study aims to test the role of the quality of education in improving the social development of HDR-listed countries. Moreover, the role of labor and capital is also included as controlling factors of the described model.

Research Gap: This study is instrumental in exploring the role of quality of education globally. Further, this study tests the determining as well as the moderating role of institutions in improving social development

Design/Methodology/Approach: For the analysis, secondary data is collected from the period 2008 to 2018, and the results are estimated using panel quantile regression. The study sample is classified as country groups based on human development.

The Main Findings: The estimated results indicate that the quality of education and social development have a U-shaped relationship. While capital and institutions are increasing but labor force is decreasing social development. The cross-product of the quality of education institutions is reducing social development.

Theoretical / Practical Implications of the Findings: These results have confirmed the implementation of targeted education reforms to enhance access and quality, cater to diverse learner needs, maximize education's positive impact on social progress, and ensure sustainability.

Originality/Value: The nonlinear role of education quality is assessed with the moderating role of institutions.

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1. Introduction

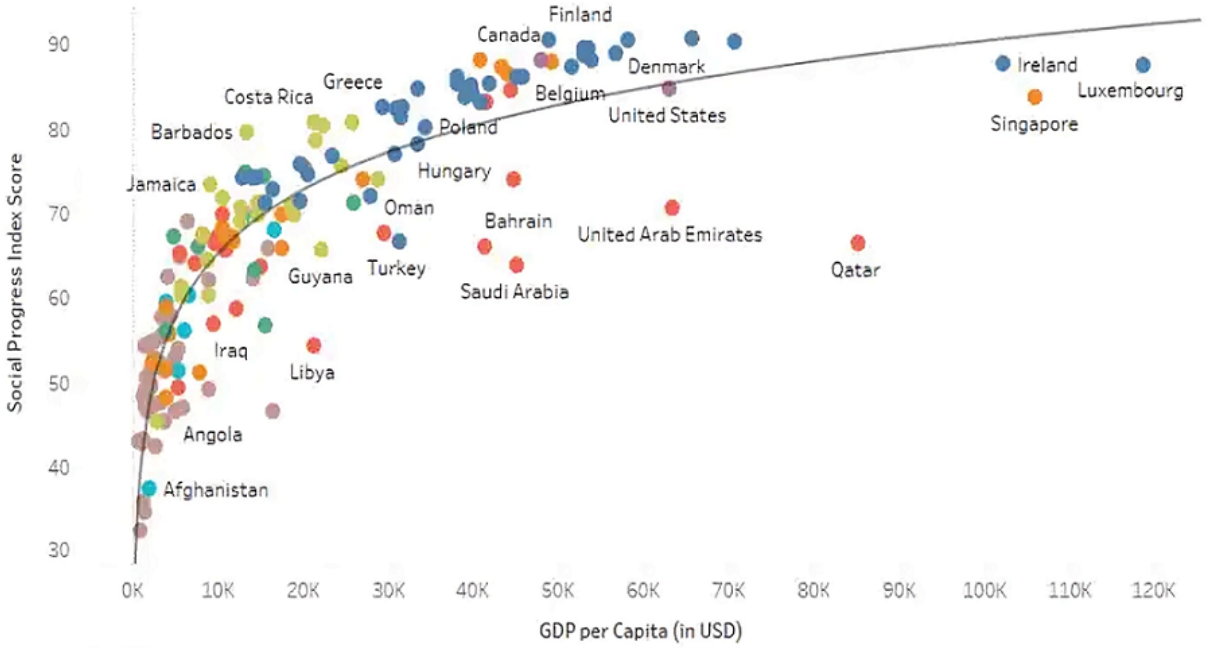
Optimum utilization of resources is essential for social progress vis à vis economic development (Ghannam, 2002; Turiel, 2002). Most people cannot afford decent living standards because of limited resources even if they desire a life full of satisfaction and prosperity (Mankiw, 2018). Social progress arrives here because social progress means improving every individual's well-being in society via economic development (Bilan et al., 2020). Whilst, only economically developed countries have a sound base for the socially developed atmosphere (Qerimi & Sergi, 2015). No doubt, income level matters (Iqbal et al., 2019), but social progress is a necessary

tool to understand the social development of an economy (Ali & Bibi, 2017). However, social progress is significantly connected to Sustainable Development Goals (SDGs)1. Specifically, the 4th, 11th, and 16th goals of SDGs are directly related to this study.

The question is, which factors are responsible for determining social progress or which factors are essential to increase its pace? In this context, the quality of education is a master key (Hillman, 2023). A sound education system provides a sense-making and goal-setting strategy for all and sundry (Opstoel et al., 2020). Education improves awareness among the masses (Godonoga & Sporn, 2023). The mechanism of education in improving social progress is quite clear. It improves economic, political, and cultural development that paves the way for social well-being (Alam & Mohanty, 2023). Education advances human development, leading to social progress and overall sustainability (Kalim et al., 2023). The crux of social progress is spending on people to improve their lives, education is vital to attain sustainable challenges (Iqbal et al., 2023b). Studies have shown the role of education in income distribution, poverty, growth and business development (Hanif & Arshed, 2016; Arshed et al., 2018, Bukhari et al., 2021; Arshed et al., 2021).

Economic and social progress is a simultaneous process (Astakhova et al., 2016), as both go hand in hand. Figure 1 reflects the positive association between economic growth and social progress in the rest of the world. According to this, in the beginning, an expansion in economic growth leads to a rapid increase in social progress, but after a specific level, this rapidity becomes slow.

Figure 1: Social Progress and Economic Growth Trend



Source: https://www.socialprogress.org/social-progress-across-worlds-regions/

Many factors determine productivity (Arshed et al., 2021). For the development process, factors of production have an important role (Doughan, 2020). The labor force is the elementary factor of production and essential for economic development (Clark, 1999). In recent times, demographic variations altered the behavior of the labor force (Iqbal et al., 2021), but production still depends upon this factor (Wijaya et al., 2021). As the productivity of this factor increases, it leads to improvement in all the social aspects. With an increase in the employment level, social improvement increases (Bazzhina, 2015). Whereas, capital can formulate the overall structure of social progress (Susetyo et al., 2018) because higher capital accumulation is linked with higher social well-being (Khan et al., 2021).

This study dug out essential factors behind social development by considering social progress as an important

[1] https://sdgs.un.org/goals

mechanism. Therefore, the objective of the present study is to find out the non-linear impact of quality education on social development. It is further aimed to test the role of institutions as a determinant and cross-product with the quality of education. The role of labor and capital as control variables in social development is also tested.

As customary, the study is divided into several parts. The second part reviews the empirical and theoretical literature to identify the research gap to be fulfilled. The third section discusses data and methodology. The results and discussion are part of section four. Finally, section five concludes the major findings of the study, and policy implications are presented in the light of estimated results.

2. Literature Review

Many studies had highlighted social progress using different indicators. Simon Kuznets (1955) had contributed significantly to this pehnomena. Later, some studies considered income inequality as a standard tool for social progress. Kakwani (1980), Solt (2009; 2016), and Aboagye and Bolt (2021), had also discussed the relationship between income inequality and social progress. Furthermore, Thompson (1978), Atkinson (1987), Lipton and Ravallion (1995), Alcock (1997), Lister (2004), Apata et al. (2010), Churchill and Smyth (2020) and Fusco and Kerm (2022) linked poverty with social development.

As discussed earlier, the role of education is crucial for social progress/development. Desjardins (2015) advocated that education can transform society. Similarly, Mok (2015) believes education is important for global competitiveness and social consequences. Astakhova et al. (2016) have discussed that education is vital for social progress. But Posselt and Grodsky (2017) had a different view on education. They urged that higher education is responsible for increasing economic inequality. Bongaarts et al. (2017) discussed that education could change the trend of society. Opstoel et al. (2020) have pointed out that physical education is imperative for social progress. Further, Osuntuy and Lean (2023) and Biancardi et al. (2023) have confirmed the role of education in sustainable social setup.

As significance of education in social development cannot be neglected. In this context, the findings of Hillman (2023), Godonoga and Sporn (2023), and Alam and Mohanty (2023) have validated the same thing. Further, the literature has evidence of the impact of education on social progress through poverty and income inequality alleviation. However, considering poverty as social progress, some recent studies like Assari (2018), Arsani et al. (2020), Liu et al. (2021), and Bukhari et al. (2021) have found that education has an impact on poverty reduction. Alternatively, some studies have used income inequality to measure social progress. Recent studies by Coady and Dizioli (2017) and Tchamyou et al. (2019) have found that education reduces income inequality. However, Lee and Vu (2020) found negative and positive evidence with different education indicators on income inequality.

There is immense literature on social progress and institutional quality in the context of poverty and income inequality. By considering reducing poverty as a tool for social progress, some recent studies like; Rizk and Slimane (2018), Zhao (2020), Hassan et al. (2020) and Dossou et al. (2021) have talked about it. Similarly, Singh (2021) believes that poor institutional quality increases poverty, and Aracil et al. (2022) and Ouechtat (2022) have found that institutional quality through financial development reduces poverty. Some recent studies like; Ferrara and Nisticò (2019), Adams and Klobodu (2019) and Madni (2019) have found that institutional quality can reduce income inequality. However, Hartwell et al. (2019) have found that if the institutional quality is improved, income inequality can be reduced using the country's natural resources.

In determining social progress, labor force participation has an obvious role. Bazzhina (2015) and Arshed et al. (2018) discussed that labor activity could improve social well-being, while as per Faridi et al. (2016), employment is the major source of poverty alleviation. Thompson and Dahling (2019) believe that an increase in employment opportunities helps formulate such a policy mix which would be helpful in an increase in social progress via a reduction in poverty and income inequality. Osabohien et al. (2019) have found that increasing labor force earnings can increase social progress by escaping the poverty trap, and Fields (2019) and Aziz et al.

(2020) argued that poverty could be reduced by self-employment.

Another important and basic factor is capital formation, which plays a role in social development and is also responsible for reducing poverty and income inequality (Arshed et al., 2018). According to Isa et al. (2019), capital expenditure positively impacts poverty, while Leasiwal (2021) has found that capital expenditure is responsible for reducing poverty. On the other hand, according to Omodero (2019), public sector capital expenditure does not impact poverty reduction. Bengtsson and Waldenström (2018) findings indicate that capital expenditures can reduce income inequality. Artiningsih (2020) states that capital expenditure can increase social progress by increasing income levels. On the other hand, Purba (2019) and Liu et al. (2021) indicate that capital expenditures are increasing income inequality. Whereas, Ishak (2018) argued that capital expenditure has no significant impact on reducing income inequality.

The studies discussed above have used different indicators for measuring social progress (poverty and income inequality). There is a need to use comprehensive indicators, so this study fulfills the gap by using the social progress index in the analysis. Moreover, the above studies have tested the role of education in social progress, but its non-linear impact on social development has never been tested. Moreover, the present study also tests the role of institutional quality, labor force, and capital formation in social progress. Further, the analysis is distributed into overall estimated results and classified based on the development status of countries.

3. Research Methods

This section details the methods relevant to the study.

3.1 Variables and Sample

To catch on to those factors crucial for social progress, this study has focused on secondary data collected from the Social Progress Imperative (SPI), World Development Indicators (WDI), and World Economic Forum (WEF). The available data covers the time from 2008 to 2018. This period is selected based on data availability. Further, the sample of the study is the overall world. The analysis is done on an aggregate as well as a disaggregated basis. At the disaggregate level, four classifications of countries as per their development status listed in the human development report are analyzed (Iqbal et al., 2023a). Two models will be estimated to test the relationship between quality education and social progress. Model 1 is the baseline model, while the 2nd model contains the moderating effect of institutions on the quality of education to ensure sustainable social progress. Table 1 presents all the symbols and the definitions of those indicators taken in models. By using these variables, regression equations 1 and 2 are formulated.

3.2. Theoretical Framework

This study explores the relationship between the quality of education and social progress (Elman & Woodside, 2023). However, this study posited a U-shaped trajectory wherein initial concentration on education initially diminishes social progress. However, as education quality improves, it subsequently enhances social progress (Posselt & Grodsky, 2017; Biancardi et al., 2023). Institutional factors moderate this dynamic, suggesting that effective institutional frameworks mitigate the negative impacts of poor education quality and amplify the positive effects of high-quality education on social progress (Sanbonmatsu et al., 2023). Research propositions include a U-shaped relationship between education quality and social progress, alongside the moderation effect of institutions on this relationship. The model offers theoretical and practical implications, contributing to our understanding of the complex dynamics between education, institutions, and social progress, thereby guiding policymakers in designing interventions that promote sustainable development through improvements in education quality and institutional strengthening.

3.2 Empirical Specification

Panel Quintile Regression (PQR) proposed by Powel (2016) is incorporated to estimate these regression equations 1 and 2. The advantage of this technique in estimating the regression equation is the usage of median as a central tendency in robust estimates while fixed effect specification controls for unobserved heterogeneity (Iqbal et al., 2023; Iqbal & Kalim, 2023). Moreover, for the nonlinearity, the square term of quality of education

is included. The benefit of the square term is to test whether there exists an inverted U or U-shaped relationship (Chiang &Wainwright, 2005; Iqbal et al, 2023c). After that, a derivative method is incorporated to calculate the cut-off value from where a non-linear curve changes its slope (Takayama & Akira, 1985). The moderating effect is demonstrated using Dawson's (2014) methodology. It helps in analyzing the effect of interaction terms through curve shifting.

$$SPI = \beta_1 QES + \beta_2 QES^2 + \beta_3 INS + \beta_4 LAB + \beta_5 CAP + \xi \quad (1)$$

$$SPI = \beta_1 QES + \beta_2 QES^2 + \beta_3 INS + \beta_4 LAB + \beta_5 CAP + \beta_6 QES*INS + \xi \quad (2)$$

Table 1: Description of the Variables

Symbol	Definition	Source
SPI	Social progress index	SPI
QES	Quality of the education system	WEF
QES^2	Square of quality of the education system	WEF
INS	Institutions	WEF
LAB	Natural log of the labor force, total	WDI
CAP	Natural log of gross fixed capital formation (% of GDP)	WDI

Source: Authors' Compilation

This study has taken the social progress index (SPI), a dependent variable for social progress. This index measures human well-being (nutrition and medical care, water and sanitation, housing and safety). To determine social progress determinants, the study has selected quality of education, institutional quality, labor force, and capital formation. Equations 1, β1 to β5 represent the coefficients of education quality, its square, institutional quality, labor force, and capital formation. In regression equation 2, β6 is the coefficient of cross-product of quality of education and institutional quality. In these equations, ξ is the normally distributed error term.

The discussed determinants are also evidence-based and have been used in the literature. The role of education is aligned with; Mok (2015), Astakhova et al. (2016), Bongaarts et al. (2017) and Opstoel et al. (2020). The role of institutional quality in the literature is relapsed by; Rizk and Slimane (2018), Zhao (2020), Dossou et al. (2021), Ouechtat (2022). Similarly, the role of labor in social progress is also part of some studies like; Bazzhina (2015), Faridi et al. (2016), Osabohien et al. (2019) and Fields (2019). The role of capital formation is coined by studies like Ishak (2018), Isa et al. (2019), Artiningsih (2020) and Leasiwal (2021).

4. Results

For the descriptive analysis of the selected series of variables, this study has presented Table 2, in which the mean and median are for the average and the central values of these series. Minimum and maximum values are also reported. After that, standard deviation is used to test how much the values of these series differ from the mean value. The most important technique is the Jarque-Bera test, which determines the normality of data. This test shows that the selected series are not normally distributed (as the P-value of this test is significant, resulting in the rejection of the null hypothesis). The total number of observations is reported in the end.

Table 2: **Descriptive Statistics**

Statistic	SPI	QES	INS	LAB	CAP
Mean	69.776	3.882	4.137	16.346	23.536
Median	70.175	3.718	3.956	16.188	23.089
Maximum	92.270	6.189	6.163	21.054	29.414
Minimum	27.980	1.852	2.544	12.553	19.018
Std. Dev.	14.859	0.916	0.883	1.639	2.087
Jarque-Bera	36.228	30.992	58.885	10.931	28.346
P-Value	0.000	0.000	0.000	0.0042	0.000
Obs	1500	1387	1387	13197	8062

Source: Authors' Calculation

Figure 1 shows a curvilinear association between the quality of education and the social progress index for the sample covered in the study. Table 3 depicts regression results for the overall data representing the whole world,

which are statistically significant. The sign of the coefficients of quality of education, its square, institutional quality, labor force, and capital formation is the same in both regression equations. The coefficient of education is negative, while its square term positively impacts social progress. Education is initially deteriorating social progress, but it improves social progress after a specific level of maturity in the education sector.

The main reason is that initially, society was not inclined toward education, and due to a lack of awareness, the few educated, skilled workers earn surplus incomes leading to income inequality (Arshed et al., 2018). However, after a specific period, a further increase in the quality of education improves social progress (Arshed et al., 2019). It means that both negative and positive impacts coexist, as Lee and Vu (2020) and Arshed et al. (2018; 2019) discussed. These results of an increase in social progress are consistent with; Grodsky (2017), Rustagi et al. (2018), and Liu et al. (2021).

According to these results, institutional quality has improved social progress. Improving law and order, individual rights, and high-quality government regulation along with services would improve social progress. These results are also consistent with studies like; Fehder et al. (2019), Zhao (2020), Dossou et al. (2021), and Ouechtat (2022). The labor force is reducing social development, partially, because the abundance of the labor force creates a problem of unemployment, poverty, and inflation. So, the upsurge in labor force is harmful. Several studies like Faridi et al. (2016), Thompson and Dahling (2019), Osabohien et al. (2019) and Fields (2019) are of the view that only the employed labor force is beneficial for social progress otherwise, it would be harmful. A capital increase would create new opportunities and boost the industrial and corporate sectors of the economy, and developing countries need to break the vicious circle of poverty. These results are aligned with Leasiwal (2021) and Bengtsson and Waldenström (2018).

Equation 1 does not have any cross-product, but equation 2 has a cross-product of institutional quality and the quality of education. However, its coefficient is negative, which means that institutional quality and the quality of education reduce social progress. But the noticeable thing is, that the cut of the value of the educational quality is now reduced in equation two. It means strong institutional quality and the quality of education can help achieve the desired quality of education as soon as possible where education is increasing social progress.

Table 3: Quantile Regression Results for SPI

	Model 1		Model 2	
Variables	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**
QES	-4.000	0.004	-6.643	0.000
QES^2	0.573	0.003	1.521	0.000
INS	7.623	0.000	12.710	0.000
LAB	-2.509	0.000	-2.703	0.000
CAP	2.098	0.000	2.098	0.000
QES*INS			-1.205	0.000
Cut-Value	3.490		2.184	

Source: Authors' Calculation

Further, the models have been estimated for different development-wise categorized country groups. These results are slightly different from the overall sample results. The non-linear existence is only proved in the very high development group and is also statistically significant. However, these results represent the inverted U-shaped relationship between the quality of education and social progress, which means social progress will start to decline after a specific level of education. Further institutions in all the development groups are responsible for increasing social progress.

The labor force is increasing social progress only in very high development groups, but the scenario is inverse in other groups. Capital has increased social progress in very high and low-developed country groups, but it is decreasing in medium-developed groups. Institutions and quality of education jointly (as cross-product) are increasing social progress only in very highly developed group, but the scenario is inverse in other groups.

Table 4: Development Wise Quintile Regression Results

	Very High HDI		High HDI		Medium HDI		Low HDI	
Variables	**Coeff.**	**P-value**	**Coeff.**	**P-value**	**Coeff.**	**P-Value**	**Coeff.**	**P-Value**
QES	8.787	0.000	-3.219	0.218	13.196	0.222	14.548	0.000
QES^2	-1.072	0.000	0.671	0.264	-2.139	0.130	2.057	0.011
INS	1.156	0.033	5.996	0.008	28.552	0.000	33.670	0.000
LAB	0.352	0.000	-0.928	0.000	-2.889	0.000	-0.383	0.086
CAP	0.349	0.000	-.0103	0.419	-0.974	0.058	1.878	0.000
QES*INS	0.421	0.000	-1.000	0.199	-3.165	0.039	-8.420	0.000

Source: Authors' Calculation

Figures 2 and 3 are presented to test the quadratic behavior of the estimated results (see Dawson, 2014). Figure 1 plots simple quadratic effects, and Figure 2 plots quadratic effects moderated by one variable. Figures 1 and 2 show U shaped relationship between social progress and quality of education, as discussed above. In Figure 3, the quadratic curve shifted above, which shows a higher level of social progress because of the interaction of institutions and quality of education. So, the interaction between quality of education and institutional quality can improve social progress.

Figure 2: SPI and Education Scatter Plot

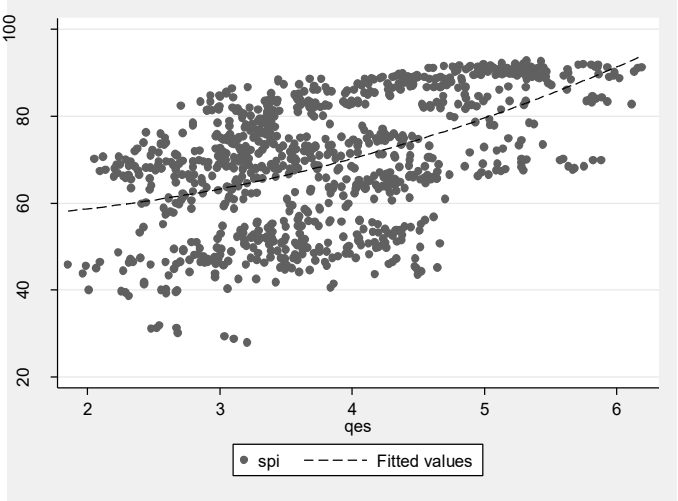


Figure 3 – Model 1 Non-Linear Impact

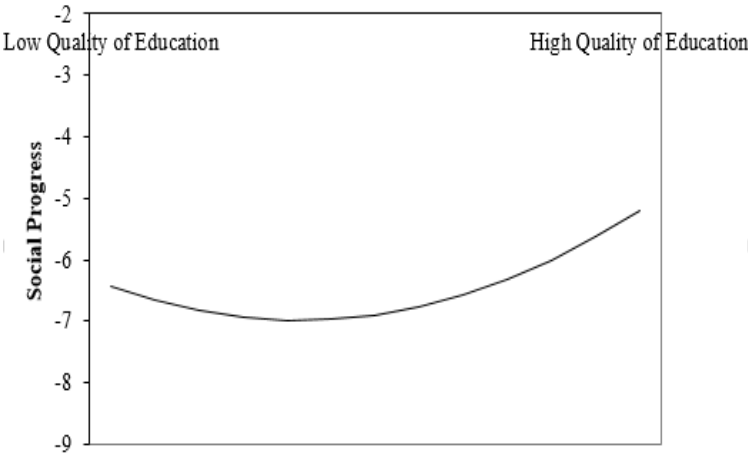
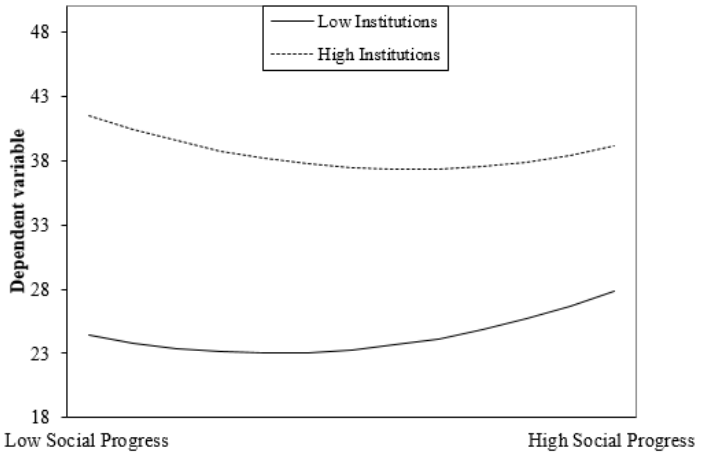


Figure 4 – Moderating Role of Institutions



5. Policy Implications

The main objective of this study was to test the role of quality of education in attaining social progress. In this context, this study has confirmed the U-shaped relationship between these two when estimations are made for the overall world. This means that progress in the quality of education initially is responsible for reducing social development, but after a specific level, further increase in the quality of education increases social development. It is because initial educational growth would restore awareness and a sense of consciousness. In this way, a

societal transformation would emerge, leading to mass conflicts. So, initially quality of education would reduce social progress. But when the quality of education builds its place, society will grow.

The role of institutions is also crucial for social well-being, and the estimated results confirm the same. The more betterment in institutional quality more social progress will be. Capital formation is also showing similar results. Thus, there is a need for strong institutions and more capital formation to attain social progress. However, the labor force harms social progress. Because excess labor supply would increase unemployment. The cross-product of institutions and quality of education is reducing social progress. But the noticeable thing is, that this interaction term has reduced the cut-off value, which means that social well-being could be achieved more quickly.

The importance of quality education is quite clear. There is a need to enhance the quality of education by updating education content. It will lead to attaining social progress/social development. Governments of developing countries should also enrich their culture to minimize the conflict among the people at the early stage of education spread. So, social progress would start to emerge when quality education sustains its growth. Similarly, governments should also strengthen their institutions including law institutions.

Factors of production are the key factors of growth. The two key factors, labor and capital are crucial for social progress, as the estimated results confirmed that capital formation is essential for social progress. So, access to capital should be easy for investors and entrepreneurs. Moreover, there should be a focus on skilled manpower. According to the estimated results, labor force is reducing the social progress level. To tackle this, the government may especially focus on human capital and skilled labor formation.

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