

**THE LONG RUN IMPACT OF TECHNICAL AND VOCATIONAL EDUCATION
AND TRAINING IN PAKISTAN: AN ARDL APPROACH**

By

Qaisar Khan

THESIS

Submitted to

KDI School of Public Policy and Management

in partial fulfillment of the requirements

for the degree of

MASTER OF DEVELOPMENT POLICY

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ABSTRACT

The Long Run Impact of Technical and Vocational Education and Training in Pakistan: An ARDL approach

By

Qaisar Khan

Human capital is considered as one of the most important determinants of economic growth in recent years due to rapid technological change, globalization and economic liberalization. These rapid changes have prompted the Government of Pakistan like other developing countries, to prioritize skills development as a key strategy for economic growth. This study explores the long run relationship between technical and vocational education and economic growth in Pakistan by using autoregressive distributed lag (ARDL) framework. The estimated coefficient shows that technical and vocational education has a positive and significant impact on economic growth in the long run and can play big role in boosting economy by creating skilled and demand driven individuals in labor market. I also suggested that the government should invest more on technical and vocational education to produce strong human base that can further strengthen labor market with productive workforce and can change the status of Millennium Development Goals (MDGs).

Keywords: Human Capital. TVET. Economic growth. Pakistan

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TO MY PARENTS

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"There is an immediate and urgent need for training our people in scientific and technical education in order to build up our future economic life . . . do not forget that we have to compete with the world which is moving very fast in this direction, therefore greater attention should be paid to technical and vocational education". M.A. Jinnah: The Founder of Pakistan, 1947

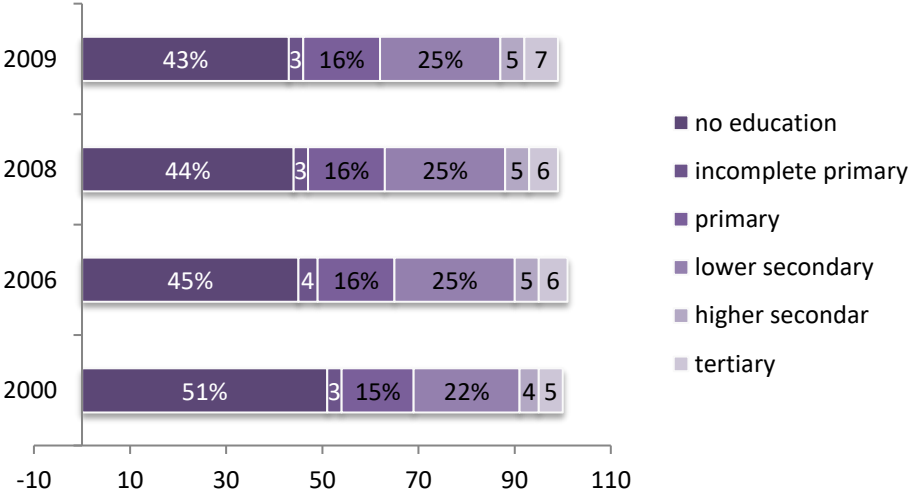
Chapter 1 Introduction

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), "Technical and Vocational Education and Training (TVET) is basically the skill-development of workforce in the industry and economically relevant education for people, while vocational education refers to lower-level of education and training for the preparation of skilled and semi-skilled workers in various trades".¹ TVET enhances human potential through market oriented skills and increases chances of employment in the labor market. It has both a positive externality and spillover effect in labor market i.e. the more the workforce with demand driven skills the higher the investment and job creations in the labor market. Therefore, it is deemed necessary to invest in skills of individuals to reduce unemployment, promote access to economic generating opportunities and contribute to economic growth. As with industrialization, economic development, capital and skills, there are also strong relationship between technology and skills. Fast moving changes in technology has created strong demand for higher skills in the labor market (World Bank 2002). New technologies are more skill and knowledge intensive, and therefore there is a high need for skilled and trained workforce in the labor market.

TVET can play an important role in a country like Pakistan, which is passing through high population growth, low enrollment, gender disparity and unemployment. The country is ranked

¹ UNESCO, Research Study on Technical and Vocational Education in Pakistan at Secondary Level (Pakistan, 2009), 10.

second in out of school children in the world, which means that parents prefer opportunity cost of the children and that both formal and technical education, are not informed by labor market demands. On the other hand labor force participation increases, as stated in the report, “In line with a growing labour force participation rate (from 50.4 percent in 1999-2000 to 52.5 percent in 2006-2007 and 53.4 percent in 2010-2011), the employment to population ratio has steadily increased over the last ten years (from 46.8 percent in 1999-2000 to 50.4 percent in 2010-2011), especially for women, (from 13.7 percent in 1999-2000 to 22.2 percent in 2010-2011) reflecting the Government’s efforts to create more employment opportunities for all”.² Furthermore, there has been seen a sharp decline in the labor force participation in Pakistan but still in comparison to other countries, there is still significant quantity of labor force without education. This also further strengthen argument for TVET sector development in order to provide skills to those individuals and change in the status from ‘labor force with no education’ to ‘ skilled labor force’ in the labor market. Below Figure 1-1shows the status of the labor force with different levels of education.



Source: World Bank (2013)

Figure 1-1 Labor force with different level of education

² Pakistan Employment Trends (2011).

Women participation in economic activities is yet another big challenge, which could be verified through various means but one of them is lack of access to vocational skills opportunities and market. This disparity creates major problems in mainstreaming gender equality in sustained economic growth, “In 2010-2011, the share of men with a wage and salaried job was at 41.2 percent, almost double that of females, at 21.6 percent, reflecting a situation in which the few wage and salaried jobs that are created tend to go to men rather than women”.³

Universalization of education system has received attention from all segments of society to invest in their children’s education. But on the other hand figuring out low enrollment reveals that quality of education is inadequate and parents prefer the opportunity costs of their children, rather than sending them to schools. The reasons are that neither the education policies are informed nor ground in reality, which in other words cannot provide quality education for future earnings. On the other hand, “with high fertility rate Pakistan will double the size of its young population by 2025”.⁴ This indicates that the labor force will rise faster in future and participation rate will increase that will demand more job creations in the labor market. One of the challenge as well as opportunity is the rise in youth workforce (15-24), which is growing even faster than the regional average, “youth workforce has grown even faster, at 4.3 percent a year, well above the regional average of 2.7 percent”.⁵ This means that in future there is a dire need of formulating strategies to utilize the growing workforce as well as making education system efficient enough to respond to these challenges.

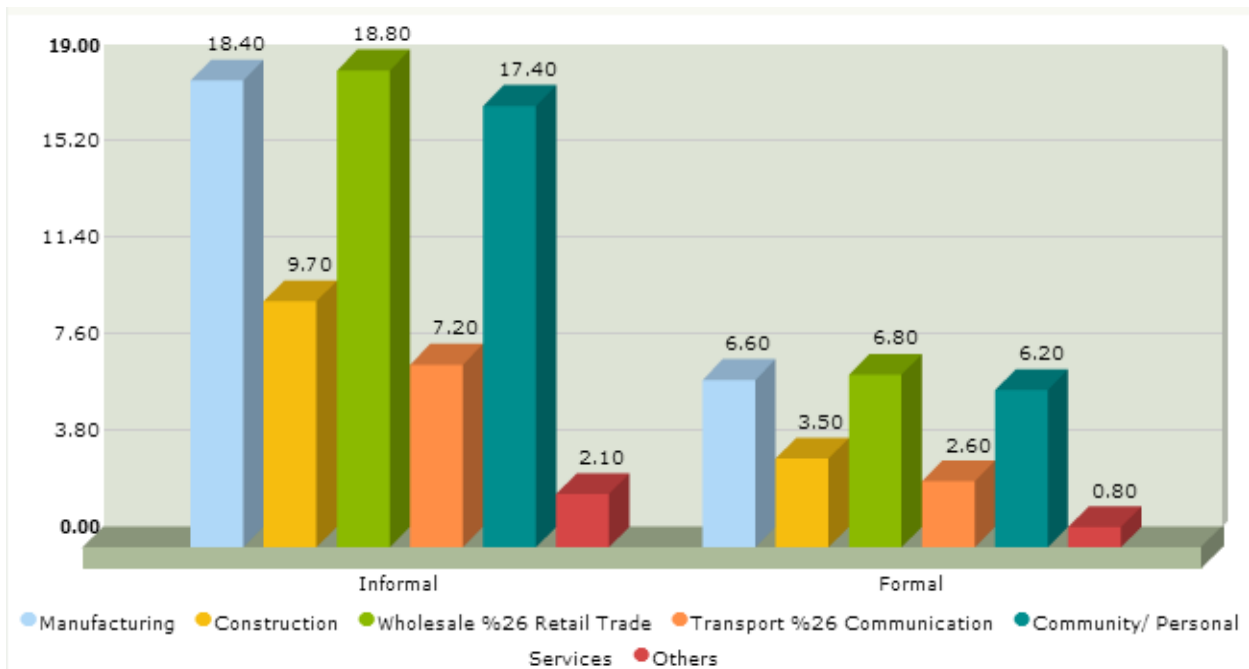
Similarly, low productivity is also caused by the presence of huge proportion of informal economy workers with majority of them working in agriculture sector, “73% of the country’s

³ Ibid., x

⁴ World Bank, Policy Paper Series, “Pakistan: Path to Rapid Growth and Job Creation”, (2013):2

⁵ Ibid.,

total workforce is informal economy workers, a growing percentage of which is women”.⁶ Majority of workers are working without a formal contracts and thus operates without the government regulations. The absence of government regulations, for instance, unregistered workers and employers contribute very little to the documented economy in the country. Skills in this sector usually transfer from one generation to another generation in a traditional way without the influence of government and market, which makes the productivity of the workers very lower.



Source: Pakistan Labor Force Survey-2012-2013

Figure 1-2 Labor Force by major industry

Historical Background

One of the main issues that persist with Technical and Vocational Education and Training (TVET) in Pakistan is the weak foundations that have been established in 1947 after independence (Munir 2002, Shah 2003, Akram and Khan 2007). From 1950 onward, a series of

⁶ National Skills Strategy, Pakistan (2009-2013), 22.

development took place in this sector by introducing various policies and setting up infrastructure of middle, secondary and higher level vocational education and training schools, colleges, universities, polytechnic institutes in both public and private sector. The various phases of development in TVET sector is presented in Table 1-1. In the context of Pakistan, technical education prepares technicians aimed to work in middle level supervisory staff, while vocational education is lower level education and training that prepares individuals in various trades.

Table 1-1 Phases of TVET Development in Pakistan

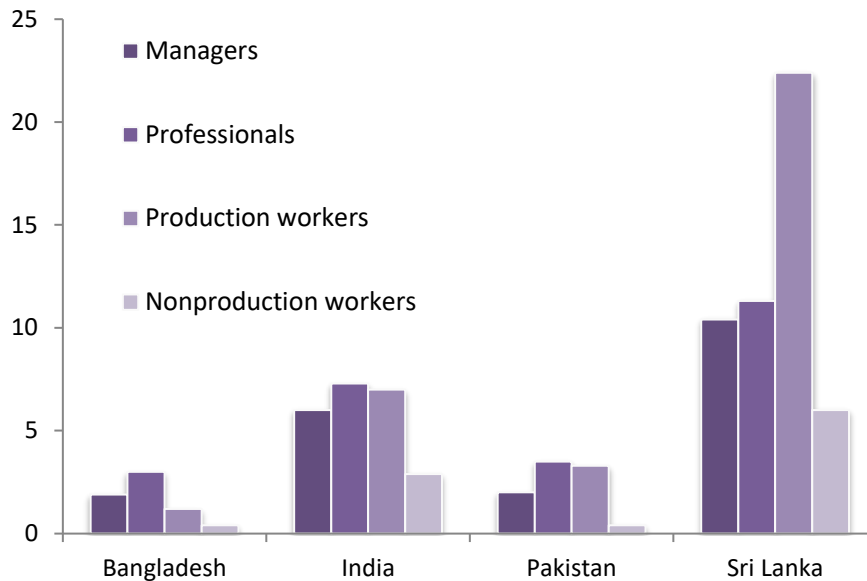
Phases	Period of Implementation	Level
1	1947-1958	Initial policy formulation stage
2	1959-1970	Expansion and development period
3	1971-1977	Experimentation period
4	1977-1988	Second expansion period
5	1989-1997	Quality improvement period
6	1997-2010	Good governance and self-reliance
7	2009-2016	TVET reforms and implementation

Source: Journal of Technical Education and Training (2012)

Today in the global workplace, countries are competing by investing in skill development, but unfortunately Pakistan is far behind in meeting the international TVET standards even in the region as shown in Figure 1-3.

The rapid advancement in technology, industrialization and globalization has attracted government attention to prioritize TVET and improve skills to strengthen labor market with adequate and informed labor force in the country. The establishment of National Vocational and Technical Education Commission (NAVTEC) is a testament of these initiatives from the government. NAVTEC is coordinating the ongoing TVET reform process with provincial Technical Education and Vocational Training Authorities (TEVTA), employers and institutes to

inform TVET system with labor market demands promote job creation and social inclusion.



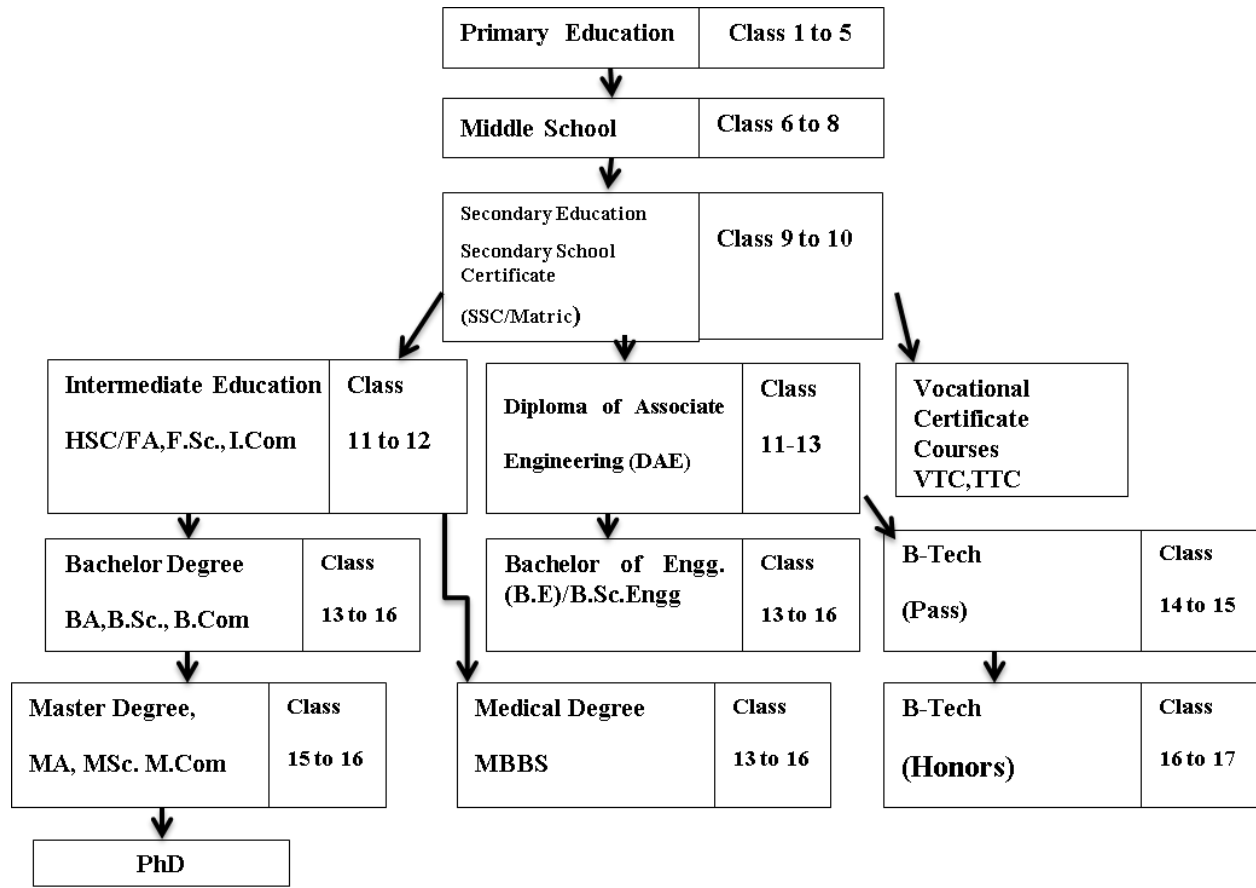
Source: Based on data from World Bank (2007)

Figure 1-3 Percent of workers trained by occupation

Education system in Pakistan is comprised of primary, middle, secondary, higher secondary and higher education (UNESCO 2009). The duration of primary education is of five years starts from class 1 to 5; followed by Middle from 6th to 8th class, secondary education from class 9th to 10th and higher secondary is from 11th & 12th class. After completing higher secondary education, students enter into higher education i.e. bachelor and master level.

Another stream of education is Technical and Vocational Education used for the development of skilled workforce and labor productivity. This is provided for three years after secondary education (10th class), while courses in vocational training is imparted for a duration of six, twelve and eighteen months after middle (8th) or secondary (10th) class (Figure 1-4). The National Education Policy (1998-2010) reflects upon the sustainable socioeconomic development not only through capital investment but also supply of informed and equipped

human resources. The policy document identified the gaps between labor market and skills due to greater increase in facilities for general education while inadequate investment and attention to vocational education and training.



Source: UNESCO

Figure 1-4 Education setup in Pakistan

The structure of TVET in Pakistan is functioning in a two-layered pattern, National Vocational and Technical Education Commission (NAVTEC) at the federal level while the Technical Education and Vocational Training Authorities (TEVTA) functions at the provincial levels. Provincial education departments managing vocational institutes while provincial labor departments are administering technical training centers, besides the programs are administered by a number of federal, provincial and private agencies.

Medium Term Development Framework (MTDF 2005-2010)

Pakistan has formulated Medium Term Development Framework (MTDF 2005-2010) to achieve national and international goals, “MTDF sets an annual target of 950,000 skilled workforces through public and private sector training institutes”.⁷ However, “there are currently 1,647 TVET institutes with 315,000 enrolled students in the country which is evident of the fact that major changes needed to achieve this target”.⁸ This is encouraging that 57% of TVET provider is the private sector, but still there is a need of better reforms to utilize this opportunity and further strengthen this sector.⁹ In order to address these challenges, Government of Pakistan is in the process of reforming TVET sector with access, equality and relevance at the forefront of reforms to produce skilled and demand driven individuals to convert the massive demographic bulge into an exceptional dividend for sustainable development.

Table 1-2 Province-wise Public and Private TVET institutes in Pakistan

Province/Region	Public	Private	Total
Punjab	417	381	698
Sindh	263	249	512
Khyber Pakhtunkhwa (KP)	47	129	176
Balochistan	34	54	88
Gilgit Baltistan (GB)	9	58	67
Federally Administered Tribal Areas (FATA)	24	33	57
Islamabad Capital Territory (ICT)	12	37	49
Total	806	841	1647

Source: National Vocational and Technical Training Commission (NAVTTTC) Pakistan.

TVET Reforms in Pakistan

In the present context, TVET can significantly contribute to major challenges including unemployment, poverty and inequality, and can improve the socio-economic conditions of the

⁷ National Skills Strategy (2009-2013), 3.

⁸ Ibid.,4

⁹ For details, see “Opening the Door to Better Jobs by Improving Education and Skills” Page-205

marginalized (Grierson and Young, 2002). The increasing pace of population growth, and labor force participation has made government of Pakistan realized the importance of revisiting TVET sector through reforms initiatives. Keeping in view the increase demand of skilled individuals in labor market, MTRF established a plan covering a period from 2005-2010 by putting in place effective strategies and instruments to meet labor market demand which is around one million annually. Following the plan, government of Pakistan established National Vocational and Technical Education Commission (NAVTEC) under the ministry of education as a country's apex body to regulate and coordinate TVET sector and provide policy direction.¹⁰ The main reason was to match the labor market demand and meet international standards in the TVET sector while promoting enrollment, which stand at 3% being the lowest even in the region. Similarly, the early TVET system in Pakistan was more focused on curriculum based education rather than practical or competency based system. These challenges are also pointed out in the recent National Education Policy (2009) by recognizing that skill development is essential and TVET sector need to be more strengthened to meet labor market demands to effectively utilize the working age population and achieve a sustainable growth.

In order to address these issues, NAVTEC provided a seminal policy titled “*Skilling Pakistan-National Skills Strategy (2009-2013)*” that set a direction for skill development to compete the domestic as well as global market. Following this policy Government also set a vision titled “*Skills for Employability and Skills for All*”. National Skills Strategy formulated with two main goals, (i) shift from curriculum and time bound training to competency based training, and shift from (ii) supply led training to demand driven training by increasing the role of private sector, with relevance, access and equity at the forefront of the strategy. For the

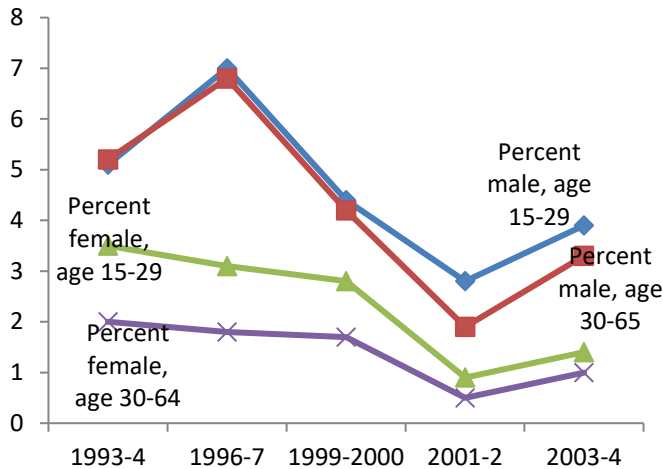
¹⁰ For details, see National Skills Strategy, Pakistan 2009-2013

implementation and achievement of desired goals and objectives, twenty reforms are proposed mainly to provide relevant skills for industrial and economic development, provide access to marginalized and particularly informal economy workers by putting in place effective instrument to ensure quality and promote research and development.

TVET and Economic Growth

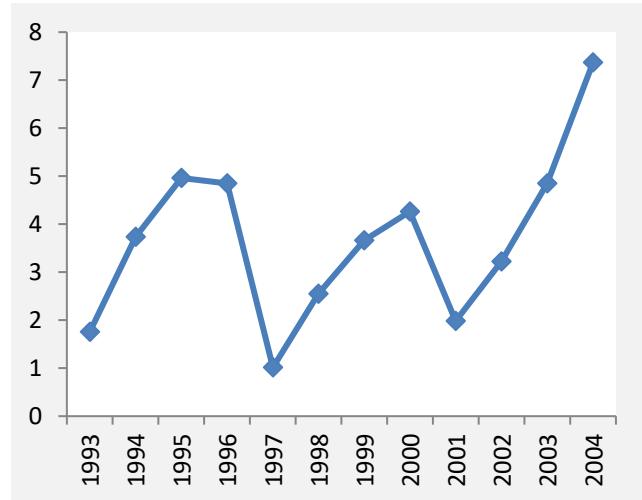
Based on Pakistan's Labor Force Surveys (LFSs) there seems interesting development in the TVET with the annual growth in gross domestic product in Pakistan. LFSs gather information on vocational education and training, but based on only two questions. These questions include whether (i) respondent has ever completed technical or vocational training, and (ii) type of training. LFSs do not ask questions about the duration or whether the training was formal, informal. Below figure shows a trend in the training of male and female by age groups during 1993-94 till 2003-4. The persons who received vocational training rose slightly in 1993-94 and 1996-97, then fell down in 2001-2 and rose again in 2003-4 (Figure 1-5).

This trend in the training of workforce appears to present an interesting change in the growth. For instance, when the economic growth slowed down, it has subsequently impacted training and rose with the rise in economic growth. From the figures, TVET and economic growth reinforces each other.



Source: World Bank (2007)

Figure 1-5 Percent of population who received vocational or technical training by gender and age



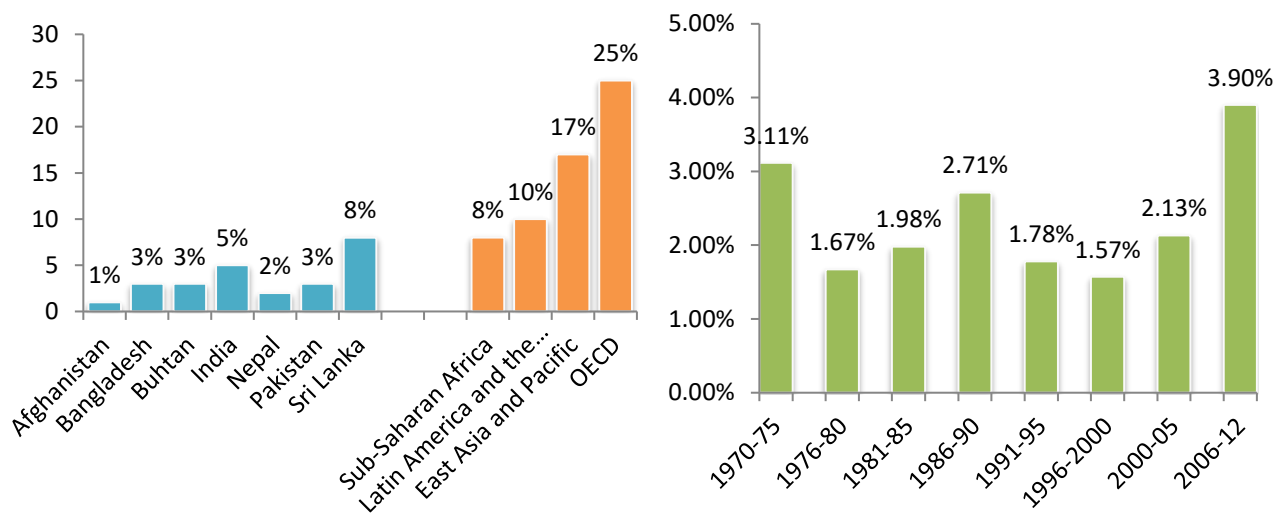
Source: World Bank Indicators

Figure 1-6 Annual GDP Growth in Pakistan, 1994-2004

This correlation between economic growth and TVET shows that demand for skilled workers increases when the economy is growing. The figure also shows gender gap in technical and vocational training, which subsequently affect wages as well as limited role of women in labor market. From the discussion it is evident that skill and economic growth has forward and backward linkages creating positive externalities, enhances productivity which has significant effect on economic growth. This study contributes to address the question of whether TVET impacts economic growth. If yes, what are the short run and long run dynamics of its impact? Furthermore, the study will also assess the role of Gross Fixed Capital Formation (GFCF), Openness as well as higher and secondary education and labor force participation and will find answers to contribute to effective and informed policy formulation in the country.

Lower enrollment in TVET institutes indicates that there is neither demand from the parents nor the sector is strengthened and equipped enough to match labor market demands. These demand factors shows that TVET institutes are unable to produce skilled individuals in

line with labor market demands. Similarly, lack of capacities of the TVET institutes is also one of the factors that cannot supply both the quantity and quality of graduates. The current curriculum is outdated and time-bound due to lack of participation from employers, and therefore graduates are unable to receive job opportunities because of mismatch between skills and market. Enrolment in vocational education and training as a share of secondary enrolment is shown in below Figure 1-7.



Source: Participation in TVET by region World Bank (2013)

Source: Participation in TVET, % of secondary in Pakistan

Figure 1-7 Percent of enrolment in vocational education and training as a share of secondary enrolment in Region and Pakistan

Chapter 2 Literature Review

The study has used a wider range of literature review of the government data, international organizations, researchers and TVET reform support program. The effective use of vocational education is often said to be one of the factors behind the economic success of the “Asian Tigers” in Southeast Asia (Burnett & Jayaram, 2012). Similarly, the South Korean experience in promoting TVET sector is a living example which has produced some very tangible outcomes over time. During the Korea’s industrialization period from 1960-1980, vocational education played major role in supplying industrial manpower through an increase of graduates from 24.4% in 1965 to 50% in 1980.¹¹

The existing dearth of understanding regarding the creation and supply of skilled individuals is the limited number of TVET institutes and their capacities. The current enrollment and quantity of TVET institutes is quite limited to achieve annual target of graduates for labor market (National Skills Strategy, 2009-2013). On the other hand, the already graduated students from TVET institutes have very limited chances for jobs because of the poor quality of TVET system in the country. The existing TVET is using a supply driven approach which lacks the inputs from employers, and this results in unemployment in the country. On the demand side, there are also various factors that contribute to both the quantity and quality of TVET system in the country. This includes; (i) lack of incentives for parents to invest in their children’s skills due to lack of relevant jobs in the market, (ii) lack of attention from the government which results in lack of interests from the parents, and (iii) lack of social status due to poor policies from the government. As per survey in Pakistan, respondents rated TVET 35% as prioritized education for

¹¹ For details, see Lee, Ju-Ho, “The Development of Vocational High Schools in Korea during the Industrialization Period”, April, 2014

their children (Reliance Services, 2012). As a result of these demand factors there is demand and supply mismatch, “due to low levels of educational attainment and lack of technical and vocational education, Pakistan’s labor market is dominated by less educated and unskilled manpower”.¹² This means that education system is producing graduates without skills that lead to unemployment and poverty. TVET has a significant effect on income equalities and other social fabrics of life as mentioned in the international report on TVET, “We have concluded that Technical and Vocational Education (TVE), as an integral component of lifelong learning, has a crucial role to play in this new era as an effective tool to realize the objectives of a culture of peace, environmentally sound sustainable development, social cohesion, and international citizenship”.¹³

The other important aspect is the low productivity jobs in the labor market which is associated with lower skills that could not catch up with increasing labor market demands. According to World Bank, “despite a high rate of employment growth, labor market outcomes have been disappointing: most jobs have been created in low productivity sectors/activities, and even if they provide a minimum level of income to often avoid poverty, they remain low quality jobs providing little or no protection to workers against shocks”.¹⁴ Several reasons could be counted on including the lack of market information as well as coordination and linkages between TVET management and employers. Due to lack of government attention and interest from employers and TVET management, the market oriented trainings and skill delivery has become a big challenge in the current context, “The challenge in Pakistan is to improve the TVET system and to introduce well designed On the Job Training (OJT) and Active Labor

12 Nasir and Nazli, “Pakistan Institute of Development Economics: Education and Earnings in Pakistan” (2000),5.

13 UNESCO, “Final Report: Second International Conference on TVET”, (1999), 61.

14 Robalino, David and Cho, Younngyong, “Labor Market Policies under a Youth Bulge” (Pakistan: World Bank, 2013), 2

Market Programs (ALMPs)".¹⁵ Skills training play an important role in raising income particularly for those with low level of education (Nazli, 2004). Using mincerian model of earnings at different levels of education and experience, "there is a significant impact of training on earnings for individuals at primary and below, and earnings rise even with limited number of experience".¹⁶ This means that TVET can play an important role in creating productive employments, better earnings, choices, and can significantly contribute in eradicating poverty. Moreover, there are also high disparities existing between rural and urban, men and women in the country, which means that employment, and education opportunities are not provided equally to these segments. According to the recent established report from World Economic Forum on Gender Parity, Pakistan is ranked the second in high gender disparity. One of the reasons is lack of access to marginalized and underserved segments of the society particularly women to education and income generating activities. The ongoing reform process of TVET in Pakistan seeks to emphasize on access to disadvantaged and particularly women (National Skills Strategy, 2009-2013). Furthermore, revisiting education curriculum and particularly TVET curriculum could make a long-lasting difference in labor market by matching skills and labor demand. Therefore, keeping in view the rapid development, it is crucial to reduce the gaps between TVET and employers by informing vocational education with labor market demands (Tabbron and Yang, 1998).¹⁷ Weil (2009) argued that education and skills create positive externalities in the market, by further arguing that skilled and educated individual in agriculture sector would be the

¹⁵ Ibid.,3.

¹⁶ Nazli, "The Effect of Education, Experience and Occupation on Earnings: Evidence from Pakistan", (2004), 16.

¹⁷ See for details, "The interaction between Technical and Vocational Education and Training (TVET) and Economic Development in Advanced Countries". International Journal of Business and Social Science, 162-169.

first to use new technologies rolling over the effect on low educated people to adopt it, hence giving strength to human capital in a country.¹⁸

The other potential cause of lower productivity and economic growth is the informal economy workers that constitute 73% of the whole labor force. Women in this sector is particularly more vulnerable, “women who were able to secure a salaried job, their monthly earnings on average were three-fifths that for men”.¹⁹ Similarly, women cannot move from one place to another due to cultural and access constraints, and therefore cannot find better job opportunities. The mobility of women is low and makes it difficult for them to find alternatives (Standing, 1999). Result shows 38.8 % share of the informal economy to Gross National Product (GNP) (Idris, 2008). Majority of these workers, in particular, the agriculture workers are working through old and outdated conventional methods which transfer from generations to generations. Lack of interest from employers and adequate regulations from the government makes these workers working without contracts, usually working for long hours, and lower wages that create bonded labors and child labors in this sector. Due to low income, skills and access to opportunities, there is a high income inequality in this sector and government is not prioritizing the needs through informed policies and plan of actions to regulate these workers (Charmes , 2000). Lower contribution from the employers is the other reason that cannot create demand for competitions, skills development and more productive employment. As per International Labor Organization (ILO), Lack of access to skills and income generating opportunities make the workers unable to support the healthcare and education expenses, which leads to worst form of child and bonded labors. TVET can play an active role in addressing concerns related to the context, such as unfavorable socio-economic conditions including under-

¹⁸ For details, see Economic Growth, Second Edition, Page- 161-170

¹⁹ ILO, “Pakistan Labor Market Update”, (2013), 3.

employment and unemployment – in particular of young people and women – poverty and deprivation, urban-rural disparities, food insecurity and limited access to health and education services (Shanghai Consensus, 2012). This means that TVET can be used an important instrument in developing countries and particularly in Pakistan to eradicate poverty, promote gender equality, reduce unemployment and change the status of Millennium Development Goals (MDGs).

Empirical Evidence

According to Anders Nilson, “Vocational education and training plays significant role in boosting up economic growth and promoting social inclusion”.²⁰ There are two reasons for this, first is vocational education equip individuals with necessary skills in line with the labor market demands to receive productive employment, and secondly to promote access to labour market. Education, vocational training and skill development plays major role in human capital and found effective instrument for individuals’ life time earnings (Becker 1975 and Mincer 1974). Booth and Snower (1996), states that professional training and skill development fosters human productivity and increase their earnings that help in expansion of the economy.

Intuitively, Education has a strong link with economic growth, but some studies concluded and presented negative and insignificant results. For instance, Pritchett (2013) finds negative correlation between higher education enrollments and economic growth. He further argued the reasons that educated workers move to unproductive jobs, or there could be limited labor market demand, and thirdly education system cannot create skilled individuals in line with labor market demand.²¹ This could be also justified from the fact that a significant portion of

²⁰ For details, see *International Journal of Training and Development* 14:4, ISSN 1360-3736

²¹ For details, see “Schooling is Not Education” A report of the center for Global Development Study Group on Measuring Learning Outcomes.

government funds are allocated to the higher education causing subsidy to the upper class to benefit from higher education. This is resulting high private return to higher education²² benefiting only those who can afford to progress to higher education. Most of the highly educated graduates go abroad either for jobs or higher education that consequently causes a big brain drain and public loss (Nasir and Nazli 2002). These factors subsequently contribute to lower progression of students from primary to secondary and higher education because of unequal distribution of education resources while putting no incentives for poor to invest in their children's education. In the context of Pakistan, studies conducted on education present mixed results. Khan (2005) stated that there is a positive and significant linkage with of economic growth and average years of schooling, gross secondary enrolment, literacy rate and life expectancy. On the other hand, Iqbal and Zahid (1998) find insignificant or negative linkage with high school enrollment and economic growth.

According to Kazmi (2007), vocational training and skill development are the instruments that foster labor productivity. The study suggested that public expenditure on vocational education need to be increased and invested in human capital. According to Solow (1957), Human Resource Development (HRD) contributes to better skills, earnings, and has good impact on reducing unemployment and accelerating economic growth. ILO report on information technology (2001), states that technological advancement cannot achieve its intended benefits without creating educated and demand driven skilled workforce. In order to achieve a knowledge-based economy it is essential to invest in human capital particularly in education and skill development to flourish pathways for sustainable economic growth. According to Khilji, *et al.* (2012), increase in labour force participation helps in increasing GDP

²² For details, see Pascharopoulos (1994), "Returns to Education".

growth and vocational training. He concluded that labour force participation creates positive externalities in improving skills for decent jobs in the labour market. Shah *et al.* (2011) based on a study of personnel in vocational training program, concluded that the TVET curriculum in Pakistan lack linkages with employers that results in limited placements of graduates in the labour market. According to Kazmi (2007), investment in technical and vocational education by establishing specialized institutes plays a major role in sustaining the economic growth. Tripathi (2003) stated that skills development and training play major role in strengthening and equipping individuals, organizations and contribute to economic growth.

There are also studies available that link skill development with increase in remittances and economic growth. For instance (Welch 1979, Card and Lemieux 2001 and Borjas 2003), in the context of migrants, states that local labour market provides limited or no recognition to the skills and qualifications required overseas and this is unlikely that workers with similar education are perfect substitutes in labor market.²³ TVET can play an important role in alleviating poverty, and promoting economic growth and human development with long term benefits for individuals, their families and local communities (Maclean and Wilson 2009, Chapter 1; NORRAG 2003). According to (UNESCO-UIS 2006), it is expected based on estimation that 80% application in the world of work center around technical and vocational skills.

Significance

This study attempts to inform academia and policy makers to put in place effective TVET strategies for job creation in line with labor market demands. Currently, the formal and vocational education streams fail to provide job opportunities to individuals that contribute to

²³ For details, please see Quarterly Journal of Economics, CXVI, 705-746.

unemployment, poverty, unrest and exclusion in the society. On the other hand, without receiving the actual benefits of education, children and youth are used as *consumer goods* rather than *investment goods* in the society. This leads to worst conditions of employment at workplaces in the shape of bonded and child labor in the country. Pakistan have ratified ILO conventions on decent work and formulated policies for provision of free and compulsory education but the ground realities reveal that neither these policies are informed nor backed by evidences. In the case of TVET institutes, neither teachers nor the curriculum is adequate enough to produce skilled and demand driven individuals for social change and sustainable development.

The study will shed lights on other factors for instance, formal education, economic openness and labor force participation to compare its relevance in the presence of vocational education and training. This will provide relevant arguments to provide empirical grounds for promoting TVET in the country. Based on the literature and major challenge of informal workers in the country, the study is contributing to the wider spread debate on the importance of TVET to raise the skills of the population to be able to find employment and increase their earnings and ultimately improve their living conditions. In short, the study is a contribution to the efforts of the government of Pakistan in creating jobs, reducing unemployment, promoting cohesion and inclusion, and changing the status of national medium term frameworks and Millennium Development Goals (MDGs).

Chapter 3 Methodology and Data Sources

Theoretical Framework

Solow (1956) presented a growth model that explains long run economic growth by assuming that economy grows with the expansion of stock of capital, labor and increase in productivity which is also referred as technological progress. This model is based on Cobb-Douglas production function:

$$Y = A K^\beta L^{1-\beta} \quad (1)$$

Where Y represents the economic growth, A is the technological progress; K is stock of physical capital and L is stock of Labor.

This model was further extended by Mankiw and Weil (1992) by incorporating human capital as an input factor by assuming that economic growth occurs with increase in stock of labor capital, physical capital and human capital. This equation could be further explained as:

$$Y = A K^\beta H^\theta L^{1-\beta-\theta} \quad (2)$$

In this equation, H represents the stock of human capital. Human capital is defined as investment in labor force to make them productive and efficient to contribute more effectively to economic growth. Generally, Human capital can be further explained in terms of Education, Health, Experience and On the Job Training (OJT). However due to constraints in the availability of data, human capital is expressed in terms of Education and Health. Where education is used as an instrument to improve productivity by increasing knowledge and skills, and health is used to increase the efficiency of the labor force.

This study aims to develop empirical findings on Technical and Vocation Education and Training (TVET) on economic growth. Therefor output growth is a function of vocational secondary enrollment (VOCENR), gross fixed capital formation (GFCF) and openness (OPEN), higher education enrollment (HEDUENR), Secondary school enrolment (SENR), and Labor Force Participation (LFP) i.e.

$$Y = f(VOC, GFCF, OPEN, HEDU, SEDU, LFP \dots \dots)$$

Using Cobb-Douglas production function the above functional form can be written in explicit form as:

$$Y_t = A_t(VOCENR)_t^{\psi_1}(GFCF)_t^{\psi_2}(OPEN)_t^{\psi_3}(HEDUCENR)_t^{\psi_4}(SENR)_t^{\psi_5}(LFP)_t^{\psi_6} \quad (3)$$

Where Y is GDP per capita at time ' t '; A is the total factor productivity at time ' t '. Other explanatory variables are explained below. Equation (3) can also be written as;

$$\ln Y_t = \psi_0 + \psi_1 \ln(VOCENR)_t + \psi_2 \ln(GFCF)_t + \psi_3 \ln(OPEN)_t + \psi_4 \ln(HEDUC)_t + \psi_5 \ln(SENR)_t + \psi_6 \ln(LFP)_t + \varepsilon_t \quad (4)$$

Where:

$VOCENR$ = Vocational Enrolment at time ' t ' (a proxy is used for human capital);

GFC = Gross Fixed Capital Formation at time ' t ' (a proxy is used for capital);

$OPEN$ = Openness at time ' t ' (a measure of Innovation and Technology transfer);

$HEDUCENR$ = Higher Education Enrolment at time ' t ' (a proxy is used for human capital);

$SENR$ = Secondary School Enrolment at time ' t ' (a proxy is used for human capital);

LFP = Labor Force Participation at time ' t ' (a proxy used for labour);

ψ_i = Coefficients are to be estimated; and

ε_t = Error term assumed to be white noise.

Due to constraints on the availability of data, for the independent variables, proxy variables such as gross fixed capital formation as a proxy for physical capital followed by Khilji et.al (2012) and Afzal et.al (2010), openness of the economy as a proxy for technology transfer followed by Sachs and Warner (1995) that “*open economies grew faster than closed economies with a rate of 2.5% and the difference is even observed large in developing countries*”²⁴, and vocational enrollment as well as higher education enrollment and secondary enrolment as a proxy for change in human capital followed by Khilji et.al (2012). Labor force participation is taken as proxy for labor in the equation.

Empirical Model

This study puts in place a recently new framework Autoregressive Distributed Lag (ARDL)²⁵ model which is based on cointegration techniques introduced by Pesaran & Shin (1999), and Pesaran et.al (2001). The comparative advantage ARDL have over other empirical models is that, it explores long term relationship in levels between the variable of interest. Similarly it has advantage over the previous methods introduced by Engel & Granger (1987), Phillips & Oularis (1990), Johansen (1995), Park (1990), Shin (1994), and Stock & Watson (1988) which were based on ways where variables are integrated of order one i.e. $I(1)$. However, this new technique can be used for testing the cointegration between variables regardless of their order of integration i.e. either $I(0)$, $I(1)$ or both, but not $I(2)$ because in this case the ARDL model produces spurious results (Ouattara, 2004). Furthermore, this technique can be applied in cases where the numbers of observations are limited i.e. between 30-80 observations.

²⁴ Cited by Mohammad (2010), p-422

²⁵ All empirical analysis are done using Stata 13, in this study

Given equation (4) we assume that a long-run relationship exists among GDP per capita, VOCENR, GFC, OPEN, HEDUCENR, SENR and LFP. Since we don't know about the direction of long-run relationship among the variables therefore following unrestricted error correction model is regressed for checking the long-run relationship;

$$\begin{aligned} \Delta \ln Y_t = & \alpha + \sum_{i=1}^n \beta_i \Delta \ln(Y)_{t-i} + \sum_{i=0}^n \gamma_i \Delta \ln(\text{VOCENR})_{t-i} + \sum_{i=0}^n \delta_i \Delta \ln(\text{GFCF})_{t-i} + \\ & \sum_{i=0}^n \eta_i \Delta \ln(\text{OPEN})_{t-i} + \sum_{i=0}^n \theta_i \Delta \ln(\text{HEDUCENR})_{t-i} + \sum_{i=0}^n \lambda_i \Delta \ln(\text{SENR})_{t-i} + \\ & \sum_{i=0}^n \pi_i \Delta \ln(\text{LFP})_{t-i} + \psi_1 \ln(\text{VOCENR})_{t-1} + \psi_2 \ln(\text{GFCF})_{t-1} + \psi_3 \ln(\text{OPEN})_{t-1} + \\ & \psi_4 \ln(\text{HEDUCENR})_{t-1} + \psi_5 \ln(\text{SENR})_{t-1} + \psi_6 \ln(\text{LFP})_{t-1} + v_t \end{aligned} \quad (5)$$

Δ represents first difference, i number of lags which are selected using Akaike Information Criterion (AIC) before the estimation of the model and v_t is the error term. The data set used for this model is time series and comprised of 43 observations, therefore the maximum lag length is taken as 4, following Pesaran and Shin (1999). F-test is used for validating the long run relationship ($H_0: \psi_1 = \psi_2 = \psi_3 = \psi_4 = \psi_5 = \psi_6 = 0$). Null hypothesis is tested based on critical values $I(0)$ and $I(1)$ representing lower bound and upper bound respectively following Pesaran (2001). If F-statistics is greater than $I(1)$, null hypothesis is rejected which means that there exists long run relationship among variables.

After establishing the long run relationship using equation (5), long run model can be estimated as;

$$\begin{aligned} \ln Y_t = & \Omega_0 + \sum_{i=1}^n \Omega_1 \ln(Y)_{t-i} + \sum_{i=0}^n \Omega_2 \ln(\text{VOCENR})_{t-i} + \sum_{i=0}^n \Omega_3 \ln(\text{GFCF})_{t-i} + \\ & \sum_{i=0}^n \Omega_4 \ln(\text{OPEN})_{t-i} + \sum_{i=0}^n \Omega_5 \ln(\text{HEDUCENR})_{t-i} + \sum_{i=0}^n \Omega_6 \ln(\text{SENR})_{t-i} + \\ & \sum_{i=0}^n \Omega_7 \ln(\text{LFP})_{t-i} + v_t \end{aligned} \quad (6)$$

Once the long run model is estimated, the short run dynamics can be established by estimating the error correction model;

$$\begin{aligned} \ln Y_t = & \rho_0 + \sum_{i=1}^n \Gamma_i \Delta \ln(Y)_{t-i} + \sum_{i=0}^n \Theta_i \Delta \ln(VOCENR)_{t-i} + \sum_{i=0}^n \Lambda_i \Delta \ln(GFCF)_{t-i} + \\ & \sum_{i=0}^n \Pi_i \Delta \ln(OPEN)_{t-i} + \sum_{i=0}^n \Upsilon_i \Delta \ln(HEDUCENR)_{t-i} + \sum_{i=0}^n \Phi_i \Delta \ln(SEN R)_{t-i} + \\ & \sum_{i=0}^n \Psi_i \Delta \ln(LFP)_{t-i} + \lambda ECM_{t-1} + v_t \end{aligned} \quad (7)$$

$\Gamma_i, \Theta_i, \Lambda_i, \Pi_i, \Upsilon_i, \Phi_i$ and Ψ_i represents coefficients of short-run parameters and λ is the speed of adjustment that shows how much of the adjustment to equilibrium takes place each period.

Empirical Results

Before testing the long run relationship among variables, unit root test is conducted for each variable to check the order of integration. Although for the ARDL approach it is not required, however it has been done in order to see if ARDL approach is applicable. Augmented Dickey Fuller (ADF) test is conducted to check the order of integration, and its results are presented in Table 3-1. From the table it is evident that except higher education enrolment which is stationary at first difference, all the other variables are stationary at level.

Table 3-1 Augmented Dicky-Fuller Test for Unit Root

Variables	Level	First Difference	Criteria	Conclusion
<i>LPERCAPITA</i>	-0.959**	-	Trend & Intercept	I(0)
<i>LVOCEDU</i>	-1.905 **	-	Trend & Intercept	I(0)
<i>LGFCF</i>	-0.217**	-	Trend	I(0)
<i>LOPEN</i>	-2.524 **	-	Trend & intercept	I(0)

<i>LHEDUC</i>	0.295	-3.393**	Trend	I(1)
<i>LSECEDU</i>	-1.877**	-	Trend & intercept	I(0)
<i>LLFP</i>	-1.417**	-	Trend & Intercept	I(0)

** , * represents level of significance at 1%, 5% respectively

The first step in the ARDL approach is testing the existence of long run relationship. Therefore equation () is estimated and according to Pesaran and Shin (1999) maximum of four orders of lags are used. Similarly F-statistics along with critical values is computed to see if there exists long run relationship between variables of interest by Pesaran et. al (2001) shown in Table 3-2. The computed F-statistics 6.86 is higher than upper bound critical values at 1%, 5% and 10% level of significance using unrestricted intercept, resulting in long run relationship among variables.

Table 3-2 Testing the existence of long run relationship

F-Statistics	Significance level	Critical value (unrestricted intercept)	
		I(0)	I(1)
6.86	1%	3.15	4.43
	5%	2.12	3.23
	10%	2.45	3.61

Source: Pesaran/Shin/Smith (2001) Bounds Test

Since the long run relationship among the variables is already established as evidenced from the above table, the coefficients of long run relationship are estimated and presented in Table 3-3.

Table 3-3 Long Run Relationship

Dependent Variable: *lpercapita*

ARDL (2 4 3 1 3 0 1) is selected based on AIC criteria

Variables	Coefficients	Std.Error	t-statistics	p-value
Ln (VOCEDU)t-4	.237*	.113	2.00	0.061
Ln (GFCF)t-3	-.258	.322	-0.80	0.433
Ln (OPENNESS)t-1	.422***	.142	2.98	0.008

Ln (HEDUC)t-3	-.158	.119	-1.32	0.205
Ln (SECEDUC)t	.444*	.235	1.87	0.078
Ln (LFP)t-1	-.052	.455	-0.11	0.915
R-squared	0.829	Adjusted R-squared	0.639	
No. of observations	39			

***, * represents level of significance at 1%, 10% respectively

The estimated coefficients show that vocational enrolment has positive and significant impact on economic growth in the long run. It is significant at 5% significance level. It shows that today's enrollment in technical and vocational school leads to 24% increase in economic growth four years later.

Gross fixed capital formation is insignificant and shows negative sign. Possible arguments for this result could be the political instability as well as continued energy crisis and conflicts in the country that created distrust as well as lack of confidence among investors. There is a high fluctuation seen in investment over a period of 42 years, normally the rise in investment is shown during 1970s, and 2000-2008 where huge investment is taken place. During 2000-2008 major rises is observed during the Musharraf regime who introduced supply side economy and attracted investors, that give rise to the promotion of ICT as well as demanded skilled individual in the labor market, and same is reflected in the Medium Term Development Framework (MTDF-2005-2010) as explained above. Other arguments are that the investment that taking place in the service sector which has usually lower production than real sector. Approximately 80% contributor is service sector and agriculture which means there is a very limited contribution to economic growth due to lower productivity and major investment is taking place in these two sectors.

Similarly openness gives positive significant sign, implies that 1% expansion in the economy will have 42% increases in the output in the long run. This will promote integration as well as knowledge sharing and technology transfer to promote knowledge based economy in the country.

Higher education is insignificant and with negative sign which could be explained by taking into account multiple reasons, for instance, we may fail to find evidence because of measurement errors, insufficient data set or possible autocorrelation in the series. However there are some ground evidences that could justify the insignificant behavior of this variable. One of the possible reasons could be the skills mismatch between education system and labor market. Recalling Pritchett (2013) arguments based on negative correlation between higher education enrollment and economic growth that educated workers move to unproductive jobs, or there could be limited labor market demand, and thirdly education system cannot create skilled individuals in line with labor market demand.

Secondary education is significant and shows positive sign. The result shows that 1% increase in secondary enrollment increases the output growth by 44% in the long run. This result is aligned with the studies being carried out by Abbas (2001), and Khattak and Khan (2012) that secondary education has a positive and significant effect on economic growth in Pakistan.

Labor force participation negatively effects economic growth in the long run. As discussed in above sections in detail, there is a skill mismatch between education and labor market in Pakistan and majority of the labor force is associated with informal sector. Due to skills mismatch, and lower job opportunities especially limited access to productive jobs in the labor market makes it more disincentive for the people to invest in education or learn skills. This

results in the influx of labor force with no education that works mainly in the informal sector and ultimately contributing little to the economic growth in Pakistan.

Short run dynamics using error correction model (ECM) is presented in Table 3-4. In the short run the sign of vocational enrolment is negative and higher education shows positive and significant impact. Similarly openness of the economy is insignificant in the short run. However this happens when short run relationship is estimated based on long run model, control variables become insignificant at conventional level of significance which is aligned with the modern growth theories. Most importantly, the coefficient of error correction term (ECM)t-1 is significant at 1% which guarantees that long run equilibrium can be attained. The magnitude of (ECM)t-1 shows that 64% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

Table 3-4 Short Run Relationship (Error Correction Model)

Dependent Variable: *lpercapita*
ARDL (2 4 3 1 3 0 1) is selected based on AIC criteria

Variables	Coefficients	Std.Error	t-statistics	p-value
$\Delta \text{Ln (PERCAPITA)}_{t-1}$	.451**	.170	2.69	.015
$\Delta \text{Ln (VOCEDU)}_{t-3}$	-.173***	.059	-3.17	0.005
$\Delta \text{Ln (GFCF)}_{t-2}$	.175	.152	1.11	0.280
$\Delta \text{Ln (OPENNESS)}_t$	.028	.063	0.25	0.804
$\Delta \text{Ln (HEDUC)}_{t-2}$	.351***	.104	3.63	0.002
$\Delta \text{Ln (LFP)}_t$	-.705	.458	-1.54	0.141
Constant	1.722**	.667	2.58	0.019
ECM t-1	-.645***	.126	-5.15	0.000
R-squared	0.829	Adjusted R-squared	0.639	
No. of observations	39			

***, ** represents level of significance at 1%, 5% respectively.

Value of adjusted R-squared (64%) shows that the model is well fitted and explains 64% of the variation in GDP per capita by explanatory variables mentioned herein the table above. The model also possesses diagnostic tests for multicollinearity, serial correlation and

Autoregressive Conditional Heteroscedasticity (ARCH) test. Similarly the model is also backed by Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) test for checking the structural stability. CUSUM and SUSUMSQ test statistics are within the 5% significance level which shows that the model is stable and correctly specified (see Figure 3-1 and Figure 3-2)

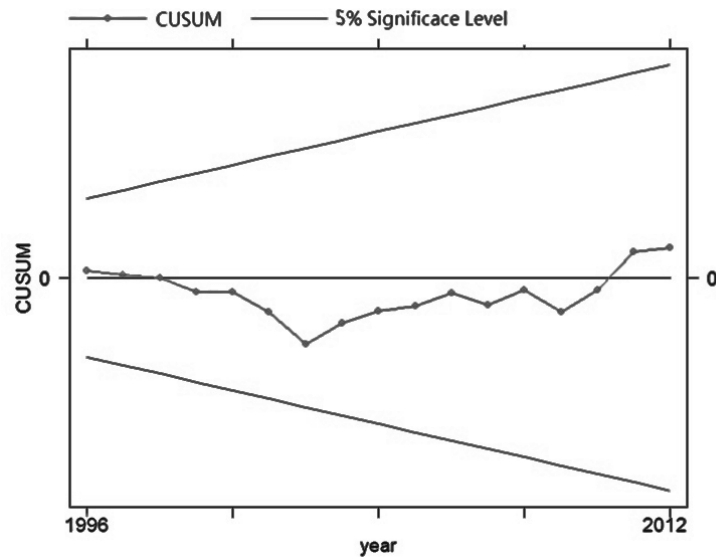


Figure 3-1 Cumulative Sum of Recursive Residual (CUSUM)

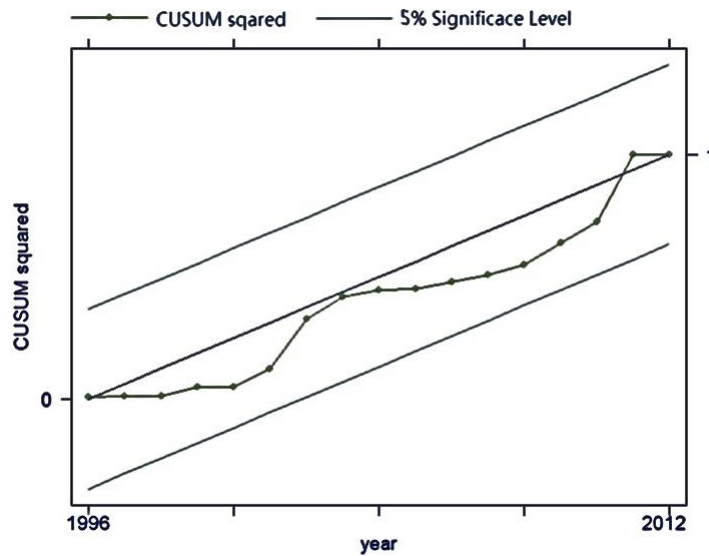


Figure 3-2 Cumulative Sum of Square of Recursive Residual (CUSUMSQ)

Chapter 4 Conclusion

The present study relates Technical and Vocational Education and Training (TVET) with economic growth after going through historical background and literature review. Major efforts and contribution being made in TVET sector has been critically reviewed and analyzed. From the empirical analysis, it is evident that TVET can play role in boosting economy by creating skilled and demand driven individuals in labor market. If we take into consideration the indirect effect or externalities associated with this sector, it can strengthen labor market with productive workforce, increase in earnings, and contribute significantly to the government's effort in eradicating extreme poverty and can change the status of Millennium Development Goals. Similarly, it can be used as an effective instrument in the informal sector that constitutes about 73% of total workforce in the country by increasing their skills and make them productive to increase their earnings, reduce inequality and provide access basic necessities of life. Women workforce that constitutes about 60% of the total workforce in the informal sector can be empowered by providing them skills for income generation and make them to play their effective role in ensuring inclusive growth.

Similarly openness in the economy is found positive and significant in the long run. This means that TVET or other streams of education cannot go alone to mark difference. This should be complimented with good economic policies, integration and partnership with the global world particularly in technology transfer. This will create even more demand for skills and will contribute in strengthening and equipping labor market to achieve a sustainable development.

Higher education enrolment is found significant in the short run while insignificant in the long run. There is a dare need to review education policies with focus on ensuring efficiency and

equity to provide access to all segments of society and particularly the disadvantaged. Similarly the voices of private sector is crucial to tailor the curriculum in line with labor market demands to make sure that returnees from education system have achieved the desired benefits. There is dare need to put in place strong accountability system through robust monitoring and evaluation to ensure that public spending is effectively utilized and desired benefits are achieved.

There is a need of consistent policies with active involvement from the private sector in order to make them sure that their voices are heard and brought at the forefront of policy making. By doing this, this will ensure their ownership and attract their trust to invest in the country and play their role in achieving a sustainable economic growth.

The government of Pakistan should realize and prioritize the population growth and influx of labor force in the labor market to transform this bulge into social and exceptional dividend. Sound economic and labor market policies should be put in place to utilize the labor force by providing them jobs and creating further incentives for education in the country.

Furthermore, reforms in the TVET sector are crucial as curriculum cannot go along the new market demands. There is a need to prioritize the agenda of *Skilling Pakistan*, and government should mobilize its resources for the implementation of National Skills Strategy (2009-2013) through active involvement of TVET institutes, students and employers. Major international donors are supporting these reforms, and they hold long lasting experience in monitoring, evaluation and research. The government should utilize their expertise and establish informed systems to ensure evidence based implementation of National Skills Strategy as well as contribute to long term policy development in TVET sector.

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