THE IMPACT OF FOREIGN DIRECT INVESTMENT INFLOWS ON SUSTAINABLE DEVELOPMENT: EVIDENCE FROM AN EMERGING MIDDLE-INCOME ECONOMY

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A THESIS SUBMITTED IN FULFILMENT THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY

SCHOOL OF BUSINESS
WESTERN SYDNEY UNIVERSITY
APRIL 2020

DEDICATION

To my parents who have provided me all needed supports and facilities throughout my life and whose encouragement and inspiration have given me the strength to work hard for the things that I aspire to achieve.

STATEMENT OF AUTHENTIFICATION

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.

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(Signature)

ACKNOWLEDGEMENTS

First of all, I would like to extend my earnest admire, gratitude and thanks to my principal supervisor, Dr. Neil Perry, whose valuable guidance and proper mentorship have motivated me a lot all through my PhD study at Western Sydney University. His excellent supervision and inspiring and constructive feedback have motivated me to engage vigorously in my research, which eventually made me complete the thesis. His true mentorship and high level of inspiring quality, as a supervisor, reminds me of a quote from Brad Hanry, "*A good teacher can inspire hope, ignite the imagination and instil a love of learning*". He is a high-quality teacher, a great mentor and, overall, a nice person. I am greatly indebted to him.

I also express my profound gratitude and thanks to my co-supervisor, Dr. Mamta B Chowdhury. Her guidance and critical feedback helped me a lot to improve the quality of my research, especially the empirical analysis part of my thesis. I acknowledge all her guidance, contributions, time, and encouragement, which made my PhD journey exciting and interesting.

I am extremely grateful to Western Sydney University for providing me with a scholarship during the last year of my study. I like to take this opportunity to express my heartfelt gratitude to my Principal supervisor once again for his sincere support in renewing my scholarship when I needed it the most. In addition to that, the School of Business at Western Sydney University has provided me with numerous facilities and activities for widening my research skills and knowledge in various ways. The research networks, weekly seminars and conferences, resources, training, intellectual endeavours provided me with thought-provoking research ideas and strengthened my research skills.

I also highly benefitted from other academic members and teachers of the School of Business through formal and informal consultation and discussion. In this respect, I would like to express my sincere gratitude to Dr. Terry Sloan, Dr Maria Estela Varua, Dr. Girijasankar Mallik, and Dr. Anil Mishra. I am also indebted to the members of the Graduate Research School and Business Research of Western Sydney University for their magnificent and cordial support. I have been accompanied by a number of intelligent, smart, friendly research fellows in Western Sydney University during my PhD study. Their support and encouragement also made my PhD

journey smooth and interesting. Special thanks to Jufri Marsuki, Siddharth Jain, Ushi, Andy Nguyen and Anwara Happy for supporting me and sharing your experiences. I also express my heartfelt thanks to my friend Dr. Mohammad Salahuddin for his support and encouragement throughout my PhD journey.

I am highly indebted to the Government of the People's Republic of Bangladesh for giving me the opportunity to undertake PhD study at Western Sydney University. I am grateful to the Planning Division of the Ministry of Planning, in particular. I like to express my gratitude to my senior and colleagues at my work in the Government who have given me much inspiration, guidance, and support to endeavour my knowledge in the development and planning area.

I owe a deep sense of gratefulness to my husband, Md. Sayedur Rahman, for being caring, appreciative, sympathetic, and compassionate all through my PhD study. My daughter Nafisa Yashfee is my inspiration for all good deeds. I could not give enough time and care during her HSC period, but she continuously extended her support and helped me continue my study, even at a hard time. Finally, I would like to extend my heartfelt thanks to all other well-wishers who supported me throughout my PhD study.

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Meaning
2SLS	Two-Stage Least Square
3R	Reduce, Reuse and Recycle
3SLS	Three-Stage Least Square
ADF	Augmented Dickey-Fuller
AIC	Akaike's Information Criteria
APO	Asian Productivity Organisation
ARDL	Autoregressive Distributed Lag
ASEAN	Association of Southeast Asian Nations
BBS	Bangladesh Bureau of Statistics
BD	Bangladesh
BDT	Bangladesh Taka
BEPZA	Bangladesh Export Processing Zone Authority
BEZA	Bangladesh Economic Zones Authority
BIDA	Bangladesh Investment Development Authority
BITs	Bilateral Investment Treaties
BOI	Board of Investment
BOP	Balance of Payment
BRICS	Brazil, Russia, India, China, and South Africa
CBN	Cost of Basic Needs
CIP	Competitive Industrial Performance
CO2	Carbon dioxide
CRI	Climate Risk Index
CSR	Corporate Social Responsibility
CUSUM	Cumulative Sum
DOE	Department of Environment
DOLS	Dynamic Ordinary Least Squares
ECC	Environmental Clearance Certificate
ECR	Environment Conservation Rules

Abbreviation	Meaning
ECT	Error Correction Term
EIA	Environmental Impact Assessment
EKC	Environmental Kuznets Curve
EMP	Environmental Management Plan
EPI	Environmental Performance Index
EPZs	Export Processing Zones
ETPs	Effluent Treatment Plants
EU	European Union
FDI	Foreign Direct Investment
FMOLS	Fully Modified Ordinary Least Square
FSRP	Financial Sector Reform Programme
GAINS	Greenhouse Gas and Air Pollution Interactions and Synergies
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GHGs	Green House Gases
GLM	Generalised Linear Models
GMM	Generalised Method of Moments
GNI	Gross National Income
GOB	Government of Bangladesh
HCR	Headcount Rate
HDI	Human Development Index
HIES	Household Income and Expenditure Survey
ICTPs	International Conventions and Treaties
IIP	Industrial Investment Policy
IMF	International Monetary Fund
ISO	International Organisation for Standardisation
IVR	Instrumental Variable Regression
LC	Letter of Credit
LDCs	Least Developed Countries
LM	Lagrange Multiplier
M&A	Mergers and Acquisition
MDGs	Millennium Development Goals
MENA	Middle East and North African

Abbreviation	Meaning
MOF	Ministry of Finance
MNCs	Multinational Companies
MNEs	Multinational Enterprises
MVA	Manufacturing Value Added
NARDL	Nonlinear Auto-Regressive Distributed Lag
NEMP	National Environmental Management Plan
NEP	National Environmental Policy
NGOs	Non-Governmental Organisations
NILU	Norwegian Institute for Air Research
NIP	New Industrial Policy
NO_x	Nitrogen-oxides
NSDS	National Sustainable Development Strategy
NTPA	Bangladesh Export Processing Authority
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
PaCT	Partnership for Cleaner Textiles
PP	Phillips-Perron
PPP	Public-Private-Partnership
R&D	Research and Development
REC	Renewable Energy Consumption
RMGs	Readymade Garments
SAF	Structural Adjustment Facility
SAP	Structural Adjustment Programme
SDGs	Sustainable Development Goals
SO_2	Sulphur dioxide
SREDA	Sustainable and Renewable Energy Development Authority
TO	Trade Openness
UCEM	Unrestricted Error Correction Model
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention On Climate Change
UNIDO	United Nations Industrial Development Organisation
USD	US Dollar

Abbreviation	Meaning
VAT	Value Added Tax
VECM	Vector Error Correction Model
VGF	Vulnerable Group Feeding
WB	World Bank
WBCSD	World Business Council on Sustainable Development
WCED	World Commission on Environment and Development
WSSD	World Summit of Sustainable Development
WDI	World Development Indicators
WEF	World Economic Forum
WHO	World Health Organisation
WSSD	United Nations Sustainable Summit
WTO	World Trade Organization
ZDCH	Zero Discharge of Hazardous Chemicals

ABSTRACT

Policymakers and global financial institutions promote foreign direct investment (FDI) as a driver of economic growth in developing countries; however, questions remain if FDI actually promotes sustainable development. It may encourage growth, but also hinder social and environmental development. In the study, I analyse whether FDI promotes or hinders sustainable development in developing countries, using Bangladesh as an example of an emerging middle-income country.

Literature in this field indicates that FDI inflows can have positive or negative impacts on sustainable development, depending on the absorptive capacity of the country, the regulatory system, and the sector where FDI is directed. I focus on the manufacturing sector in Bangladesh and contribute to the literature on FDI and economic growth, inequality, and sustainable development by analysing the impact of FDI on all three dimensions of sustainable development – the economic, the environmental, and the social.

In terms of the economic dimension, I investigate the effect of FDI inflows on economic growth, structural transformation, exports, domestic capital formation, and the productivity and efficiency of the industry, using both descriptive and empirical analysis. In the descriptive statistical analysis, manufacturing FDI inflows promote economic growth and exports. Manufacturing FDI inflows also contribute to the expansion of the domestic production base by creating backward linkages and increasing gross capital formation; however, Bangladesh has not been able to benefit from the productivity and efficiency spillover effects of FDI inflows. In the empirical analysis, I apply Johansen co-integration and the Vector Error Correction Model (VECM) to investigate the long-run relationship and short-run causality amongst manufacturing value-added, FDI inflows, gross fixed capital formation, and trade openness. The results exhibit a significant long-run co-integration amongst the variables. The results also reveal that FDI inflows exert a positive impact on manufacturing value-added in the long run. However, the causality of FDI inflows on manufacturing value-added could not be established. In contrast, domestic gross capital formation has a strong positive causal link with manufacturing valued-added in the short and long run.

The environmental dimension relates to the pollution haven, pollution halo and Environmental Kuznets Curve (EKC) hypothesis. In the descriptive statistical analysis, I reveal the presence of the pollution haven hypothesis in Bangladesh. In the econometric analysis, the pollution haven and EKC hypothesis for CO_2 emissions are investigated. The results of the Non-Linear Auto Regressive Distributed Lag (NARDL) test rejects the presence of the pollution haven hypothesis for CO_2 emissions and confirms the existence of the EKC relationship in Bangladesh. For renewable energy consumption, the pollution halo hypothesis is also rejected.

FDI could also impact positively or negatively on the social dimension of sustainable development, as measured through employment generation, poverty alleviation, working conditions and income inequality. In the descriptive statistical analysis, FDI inflows can be established as generating a positive contribution to employment and poverty alleviation. Empirically, I examine the Kuznets Hypothesis on income inequality and its relation to FDI inflows using the Two-Stage Least Square method. FDI inflows do not cause income inequality in Bangladesh; however, the Kuznets Hypothesis relationship is present.

In general, the impact of FDI inflows on economic and social sustainability is positive in Bangladesh, while the environmental dimension of sustainable development is hindered. Bangladesh should consider environmental issues seriously in the case for promoting FDI inflows in the country; otherwise, FDI inflows could cause irreversible damage to the environment and hinder sustainable development and social wellbeing. Based on the findings of the analysis, the thesis also offers policy suggestions to steer the FDI inflows towards sustainable development for developing countries.

CHAPTER 1: INTRODUCTION

1.1 Background and motivation

As a part of the globalisation process, the world economy has experienced a massive surge of foreign direct investment (FDI) inflows during the last three decades of the 21st century. Developing countries' share in world FDI inflows increased over the same period. The last three decades also witnessed some severe environmental and social challenges, such as global warming, climate change, droughts/floods and extreme poverty. The environmental and social challenges are more acute in developing countries, leading to a call for environmentally friendly and inclusive development, as exemplified by the United Nations Sustainable Development Goals (SDGs) (UNGA, 2015). World leaders are emphasising FDI in developing countries as a way of achieving the SDGs (UNCTAD, 2017). However, the impact of FDI inflows on sustainable development could be positive or negative, and the impacts could also be dramatically different in different countries. In the study, I explore whether FDI promotes or hinders sustainable development in an emerging middle-income developing country, taking Bangladesh's manufacturing sector as the case study.

Since the beginning of the 1980s, globalisation has become one of the essential characteristics of the world economy. Along with the various economic and trade liberalisation policies and institutions, FDI inflows play a significant role in this globalisation process. Following the export-oriented growth argument (Krueger, 1978; Lucas, 1988) and the success of the East Asian tigers and South-East Asian countries, key leading policy institutions like the IMF and the World Bank have advocated opening up economies to foreign investment in the belief that production processes will be more efficient and competitive. As a result, global FDI inflows increased eightfold from 1991 to 2001 and threefold from 2001 to 2011, with periodic fluctuations (UNCTADSTAT, 2018). In total, world FDI inflows increased from USD154 billion in 1991 to USD 1357 billion in 2000 and reached to USD1891 billion in 2007. Since 2008 world FDI inflows have fluctuated around USD 1400 billion (UNCTADSTAT, 2018). FDI inflows were mostly concentrated in developed countries; however, the average share of world FDI in developing countries is increasing. In developing countries, the average world

share of FDI inflows was around 30 percent during the period from 1990 to 1999, 32 percent in the following decade to 2010 and 44 percent for the period 2011–2018. For example, Figure 1.1 describes the FDI inflows for the world, developed economies and developing economies from 1990–2018.

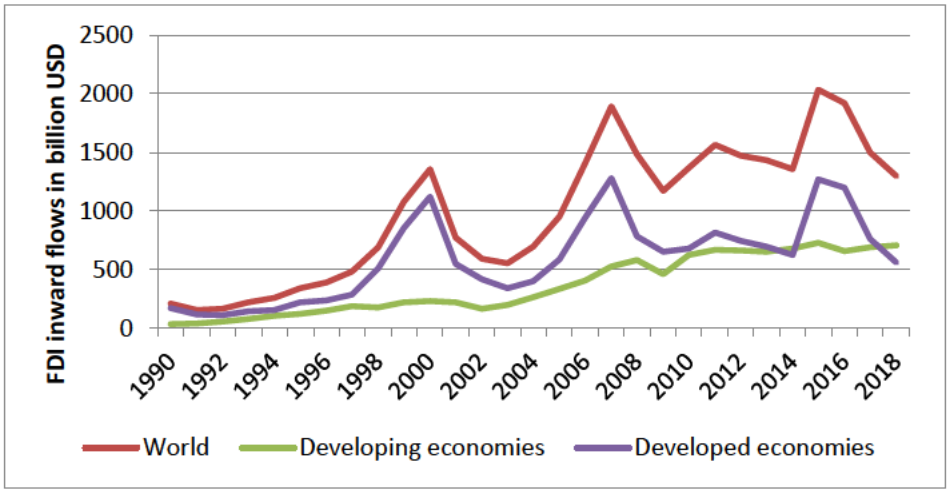

Figure 1.1: World FDI inward flows (1990-2018)

Source: UNCTAD statistics (UNCTADSTAT, 2018)

Since 1980, there has also been large-scale global environmental degradation including an increase in industrial pollution, loss of biodiversity and ecosystem services, rapid increase of CO_2 and other greenhouse gases emissions and natural resource depletion (UNEP, 2012). In addition, extreme poverty and hunger are persisting in the world economy. More than 12 percent of (or nearly one billion) people in the world are still living at or below USD1.96 a day (World Bank, 2015). World income inequality has also increased in both developed and developing countries, with the poorest half of the world's population controlling less than 10 percent of the wealth (WEF, 2015). Due to increasing environmental and social challenges in the world, development thinking has shifted towards environmentally-friendly and inclusive development, with sustainable development placed at the heart of all development strategies and policy decisions.

As a consequence, in September 2015 the United Nations announced the most recent global sustainable development program, Agenda 2030, where 17 Sustainable Development Goals (SDGs) and 169 associated targets were set to be reached by 2030. The SDGs are universal goals to meet the urgent environmental, social, and economic challenges of the world. Both developing and developed countries are accountable for reaching the targets of the SDGs. The SDGs cover a wide range of social, economic and environmental issues, which include poverty,

health, education, equality, water, sanitation, inclusive growth, decent working conditions, industrialisation, innovation, energy use, urbanisation, climate change, and social justice. The ambitious goals require considerable investment. UNCTAD (2014) estimated the investment needs and current level of investment in key SDGs over the period 2015–2030: the total investment needs in developing countries in key SDGs sectors are around USD 3.9 trillion. At the current investment level, the investment gap is around USD 2.5 trillion per year. To meet the gap, UNCTAD advocates mobilising FDI in developing countries and creating a favourable environment for channelling more FDI to the SDG related sectors, such as education, health, power, food, transport, industry and infrastructure.

However, FDI inflows may generate both negative and positive effects on the three dimensions of sustainable development – the economic, the environmental and the social. FDI supplies the capital to capital-scarce countries, which directly boosts the economic growth of the host country. FDI inflows also channel advanced technology and management skills from developed economies to developing economies, which increases the productivity and efficiency of the host country. Therefore, FDI inflows directly and indirectly positively contribute to the host-country economy. FDI inflows can also improve environmental conditions in a developing economy by introducing ecologically-friendly technology and better environmental management systems in the production process. Advanced technologies can require fewer inputs and energy and generate less waste in the production system. FDI inflows can also contribute to employment creation and, hence, social welfare in the host country. Employment generation provides income and therefore contributes to reducing poverty and improving living standards. The corporate social responsibility (CSR) activities by multinational enterprises (MNEs) can also positively impact the social dimensions of sustainable development.

In contrast, FDI inflows could create a negative impact on the three dimensions of sustainable development. The presence of foreign firms intensifies competition, which may force domestic firms to leave the industry. Therefore, FDI inflows may adversely impact on the domestic production base and sustainability of the host economy. In the case of the environment, instead of promoting environmentally-friendly technology, FDI inflows may shift dirty or polluting industries to the developing countries. As a result, environmental conditions in the host country worsen due to the activities related to FDI inflows. In terms of the social dimension of sustainable development, FDI inflows may increase inequalities by generating demand for specific skilled labour and not other types of labour.

Moreover, the nature and degree of the impact of FDI inflows also depend on the absorptive capacity and regulatory system of the host country. For instance, the transfer of advanced, efficient technology is critical and desirable to gain positive benefits from FDI inflows. However, if the host country does not have sufficient absorptive capacities, such as skilled human resources and infrastructure facilities, advanced technology-based FDI will not be taking place. Similarly, if the host country's regulatory system is weak, the natural and human resources of the host country could be exploited. Case studies of different economies are therefore needed to analyse the impacts of FDI inflows on sustainable development.

In the analysis, I have taken the Bangladesh manufacturing sector as a case study, as Bangladesh is an emerging middle-income developing economy. In 2018, Bangladesh shifted from a low-income economy to a lower-middle-income economy, and aspires to reach the level of an upper-middle-income country by 2021 (World Bank, 2019). Bangladesh also has a strong commitment towards achieving the targets of the SDGs and promoting FDI inflows through various incentives.

The Bangladesh economy has passed through a number of reforms and refinements. Immediately after independence in 1971, the Bangladesh government followed a socialist path of development, nationalising most of the large and medium-scale industries and financial institutions. As a result, more than 90 percent of industrial properties became government-controlled entities (Nath, 2012). The government adopted an inward-looking, very rigid, import-substituting industrialisation strategy. Foreign investment was restricted; only allowed in a limited number of areas and forms (Salim, 2003). However, due to the poor performance of state-owned enterprises, and conservative import-oriented trade policies, the performance of the manufacturing sector was not satisfactory (GoB, 2015a).

The Bangladesh economy experienced an intensification of ‘outward-oriented’ economic reforms from the late 1980s under the Structural Adjustment Program prescribed by the World Bank, which includes liberalisation of financial and trade sectors, accelerating privatisation, as well as fiscal and agricultural reform (Rahman, 1992). Bangladesh then opened up the economy for foreign investment. The Foreign Private Investment Act (1980) was formulated for the promotion and protection of foreign investors against nationalisation and expropriation. In 1989, Bangladesh set up a designated institution, the Board of Investment (BOI), to provide complementary support and speed up foreign investment in the country.

One of the fundamental development strategies of the government is to transform the economy from a low value-added agrarian economy to a high value-added industrial economy. Considering the low resource, technology and production base of the country, pressure for job creation for a growing labour force, and the increasing challenge of global competitiveness, Bangladesh attempted to attract foreign direct investment to promote an export-oriented manufacturing sector. The current Perspective Plan (2010-2021) and 7th Five-year Plan (2016-2020) of the government recognise that export-led manufacturing growth is the driver of job creation and sustainable development in the country[1]. The 7th Plan also suggests that FDI inflows need to be increased to at least 3 percent of GDP to achieve the targeted growth rate.

However, at least until the late 1980s, FDI inflows in Bangladesh were very low and limited to a few areas, mostly in the financial and banking sectors. FDI inflows in Bangladesh started to increase gradually from 1996, due to supportive complementary policies. The establishment of Export Processing Zones (EPZs) also stimulated FDI inflows. In 1996, net FDI inflow was USD 236 million and it had reached USD 1136 million in 2011, and USD 2151.56 million in 2017 (Bangladesh Bank, 2017). The FDI inflows are clustered in manufacturing, power, gas and petroleum, trade and commerce, telecommunications, engineering, food and agriculture sectors (Bangladesh Bank, 2017). The manufacturing sector has a major share (41 percent) of total FDI inflows in 2017, which are mainly concentrated in textiles and wearing, chemicals and pharmaceuticals, cement, fertiliser, and leather and footwear products. However, at 42 percent, textiles and wearing have a major share of total manufacturing FDI in 2017 (Bangladesh Bank, 2017).

Along with the increased FDI inflows, the growth and export of the manufacturing sector also increased, which contributed to economic growth (MOF, 2017). The average manufacturing growth reached 7.2 percent during 1990–1999 and climbed to 10.4 percent during 2012–2016. The manufactured export share in total exports was more than 95 percent in 2017 (MOF, 2017).

However, whether the FDI inflows drive the country towards sustainable development is a different issue. Sustainable development is multi-dimensional and environmental protection and social improvement must be considered, along with economic development. Further, the economic dimension of sustainable development includes productivity, efficiency and capital

[1]The long-term development goals of the government of Bangladesh are outlined in the perspective plan. Based on the development goals of the perspective plan, the government formulates medium-term (five- years) development plans and specifies the needed strategies and programs to achieve the targeted goals of the perspective plan (GOB, 2012; GOB 2015a).

formation along with the broader concept of economic growth. Environmental sustainability includes resource use, pollution, waste generation, and energy savings within the production process. The social aspects focus on inclusivity, justice and the equity of the development process. Therefore, a comprehensive analysis covering all three dimensions of sustainable development is required to assess the impact of FDI inflows on sustainable development of a country. The existing research conducted on FDI inflows and sustainable development is limited. Most of the existing literature discusses the three dimensions of sustainability in an isolated way and the results are also inconclusive. In this study, I investigate the impact of FDI inflows on all three dimensions of sustainable development in an integrated and systematic way.

1.2 Structure of the thesis

The thesis comprises eight chapters, including this introductory chapter, which describes the background and motivation of the study. Chapter 2 explains the definitions, concepts and various aspects of FDI inflows and sustainable development, which are used throughout the thesis. Chapter 3 discusses the relevant theoretical and empirical literature. Based on the three pillars of sustainable development, the discussion is broken into three main parts – FDI and its impact on the economy; FDI and its impact on the environmental condition; and FDI and its impact on social improvement. As sustainable development is an integrated and composite concept, special attention has also been paid to the effects on FDI and overall sustainable development. I also conduct empirical analysis in the thesis; therefore, the empirical literature related to FDI and sustainable development is reviewed. Based on the findings of the review of the literature, the research questions and methodology are developed.

In Chapter 4, I explore Research Question One, which focuses on the impact of manufacturing FDI inflows on economic performance in Bangladesh. The chapter starts with a background about the major economic reforms and performance of Bangladesh economy. The trend, structure and relevant rules and regulations of FDI inflows are also discussed. Through descriptive analysis, I examine the contribution of manufacturing FDI inflows to economic growth, structural transformation, productivity and the efficiency of the manufacturing sector of Bangladesh. The expansion of the domestic capital base is important for the economic sustainability of a country. The literature suggests that FDI inflows can contribute to the expansion of the domestic production base of the country by creating backward linkages in the industry. Manufacturing FDI inflows concentrate in the readymade garments and textiles industries; therefore, the backward linkages effect of FDI inflows on readymade garments and

textile industries in Bangladesh is also carried out. The structural transformation is one of the fundamental development strategies of the country. With this backdrop, the empirical analysis investigates the impact of FDI inflows on manufacturing value-added of the country.

In Chapter 5, I investigate Research Question Two, which focuses on the impact of manufacturing FDI inflows on environmental sustainability in Bangladesh. At the outset, the chapter provides an overview of the key environmental challenges, policies, laws and implementation status in Bangladesh. The relationships between FDI inflows and environmental sustainability are generally viewed via three popular hypotheses – pollution haven, pollution halos, and the Environmental Kuznets Curve (EKC) hypotheses. Based on the available statistics and information, the chapter investigates whether the pollution haven or pollution halo hypothesis exists for manufacturing FDI inflows in Bangladesh. The chapter also discusses the types of water pollution created by the textiles and readymade garments industries in Bangladesh. The empirical analysis also investigates the existence of the pollution haven hypothesis, pollution halo hypothesis and the Environmental Kuznets Curve (EKC) hypothesis to discover the impact of FDI inflows on environmental sustainability in Bangladesh.

In Chapter 6, I explore Research Question Three, which focuses on the impact of manufacturing FDI inflows on social improvement in Bangladesh. The chapter discusses the social conditions of Bangladesh and examines the contribution of FDI inflows to the major social areas of sustainable development in Bangladesh, such as poverty, human development, and decent working conditions. As equity (or inclusiveness) is crucial to ensure the social justice of any development, the study conducts an empirical analysis to examine the impact of FDI inflows on income distribution in Bangladesh.

Chapter 7 unites the findings of Chapters 3, 4 and 5 to assess the overall impact of manufacturing FDI on sustainable development in Bangladesh. The chapter also discusses the prospects and challenges of FDI inflows towards achieving sustainable development goals in Bangladesh. Sustainable development requires appropriate policy interventions. Based on the findings of the analysis, I suggest policy interventions to steer the FDI inflows towards the sustainable development of the country. Chapter 8 concludes the thesis, discusses the limitations of the study and the directions for future research.

CHAPTER 2: SUSTAINABLE DEVELOPMENT AND FOREIGN DIRECT INVESTMENT

2.1 Introduction

The study explores the impacts of FDI inflows on sustainable development in developing countries. The topic comprises two core issues – sustainable development and FDI inflows. In this chapter, I describe the concepts and different aspects of sustainable development and FDI inflows. The concept of sustainable development evolved through a series of international agreements and meetings (Stockholm Conference 1972 – Agenda 2030). The sustainable development concept is also closely linked with the concept of sustainability. The concepts of sustainability and sustainable development both require a balance between economic, environmental and social dimensions of development. FDI inflows can impact on three dimensions of sustainable development through its direct and indirect effects. However, the impacts of FDI inflows vary on the type of the FDI inflows, absorptive strength and institutional context of the host country and the corporate social responsibility (CSR) of MNEs. Therefore, the various forms, types and nature of FDI inflows, the determining factors of FDI inflows are briefly discussed. The nexus between FDI inflows and sustainability are also discussed in the chapter.

2.2 Sustainable development (SD)

The concept of sustainable development is a complex issue, which has passed through different phases. In its early phase, sustainable development mainly focused on the environmental aspects of economic development. Later, along with economic and environmental issues, social aspects also had priority in the concept of sustainable development. However, the three dimensions of sustainable development – the economic, environmental and social dimensions are interrelated, and intergenerational equity lies at the heart of the concept of sustainable development.

The concept of sustainable development emerged through a series of global conferences, conventions and treaties between 1972 and 1992. At the global scale, the UN Conference of Human Environment was held in Stockholm in 1972, and addressed the need for sustainable development for the first time. The Conference generated recommendations and called for undertaking initiatives at all levels to protect and improve the environment for the prosperity of the people and the planet. The Stockholm conference called for the founding of the United Nations Environmental Program (UNEP). UNEP is the key organisation which establishes world environmental protection agendas to coherently promote environmental sustainability initiatives. In 1980, the World Conservation Strategy introduced a guideline on sustainable development and identified key issues for environmental protection. The guideline generated policies to promote sustainable development. The United Nations also initiated an independent commission to prevent the deterioration of human and natural resources. In 1983, the UN convened the World Commission on Environment and Development (WCED), better known as the Brundtland Commission, which comprised representatives from developing and developed countries.

In 1987, the WCED published *Our Common Future* or *The Brundtland Report*[2]. *The Brundtland Report* provides the most cited and popular definition of the concept of sustainable development:

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:*
>
> - *the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and*
> - *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs"* (WCED, 1987, p. 41).

The Commission recognised the environmental impact of economic activities and paid attention to gender equality, poverty and wealth distribution in formulating development strategies. *The Brundtland Report* also focused on food security, biodiversity, energy use, industry, population growth and human settlements. The report embraced the idea of inter-generational equity of sustainable development by mentioning the needs for the present and future.

[2] *Our Common Future* has become known as the *Brundtland Report* in recognition of former Norwegian Prime Minister Gro Harlem Brundtland's role as Chair of the World Commission on Environment and Development (WCED).

After twenty years of Stockholm Conferences, the Rio Earth Summit was convened in 1992. The summit provided three frameworks to guide future development activities – Agenda 21, the Rio Declaration, and the Statement of Forest Principles. Subsequently, many world summits and conferences were held on a regular basis, including the Earth Summit (1995), the World Summit of Sustainable Development (WSSD) (2002) and the Sustainable Development Conference of the United Nations (2012). The 2012 Sustainable Conference is also known as Earth Summit (2012) or Rio plus 20 Summit. The United Nations also organised the Sustainable Summit, in 2015.

The conferences and summits reviewed the implementation progress of the previous action plans. The WSSD recognised that globalisation provides opportunities, as well as adding new types of challenges, for sustainable development efforts. The WSSD emphasised the role of the private sector to promote equitable societies and communities. The Earth Summit called for environmentally-friendly economic development and a reduction in worldwide poverty levels. The Earth Summit 2012 prepared a non-obligatory document *The Future We Want*, which largely reaffirms the earlier action plans and provides the basis for formulating the Sustainable Development Goals (SDGs).

The Earth Summit 2012 or Rio+20 document recognises the three dimensions of sustainable development, and defines sustainable development as:

> *Sustainable development aims to ensure the promotion of an economically, socially and environmentally sustainable future for the planet and for present and future generations* (UN, 2013, p. 3).

The summit emphasised the integration of the three aspects of sustainable development, especially adopting a holistic approach for the advancement of sustainable development.

In September 2015, country leaders and world-leading organisations and communities announced 17 Sustainable Development Goals (SDGs) at the United Nations General Assembly. The goals and associated targets are planned to be achieved by 2030. The SDGs are very ambitious and require major effort and financial investment to ensure their implementation. The goals are broad and interrelated. Each goal has separate targets to achieve, and each target sets one to three indicators to measure the progress towards achieving the targets. In total, there are 169 targets and 232 indicators associated with the SDGs. Table 2.1 presents the SDGs.

Table 2.1: The Sustainable Development Goals (SDGs) of Agenda 2030 declared by the UN

SDG 1		End poverty in all its forms everywhere.
SDG 2		End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
SDG 3		Ensure healthy lives and promote well-being for all at all ages.
SDG 4		Ensure inclusive and equitable quality education and promote life-long learning opportunities for all.
SDG 5		Achieve gender equality and empower all women and girls.
SDG 6		Ensure availability and sustainable management of water and sanitation for all.
SDG 7		Ensure access to affordable, reliable, sustainable, and modern energy for all.
SDG 8		Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
SDG 9		Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
SDG 10		Reduce inequality within and among countries.
SDG 11		Make cities and human settlements inclusive, safe, resilient and sustainable.

SDG 12		Ensure sustainable consumption and production patterns.
SDG 13		Take urgent action to combat climate change and its impacts (in line with the United Nations Framework Convention on Climate Change)
SDG 14		Conserve and sustainably use the oceans, seas and marine resources for sustainable development
SDG 15		Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
SDG 16		Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
SDG 17		Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Source: Sustainable Development Goals, (UNGA, 2015)

The SDGs are interrelated; each goal contains a certain degree of economic, environmental and social aspects of sustainable development. However, based on the core elements and associated targets and indicators, the goals can be represented to show the three dimensions of sustainable development, as shown in Figure 2.1.

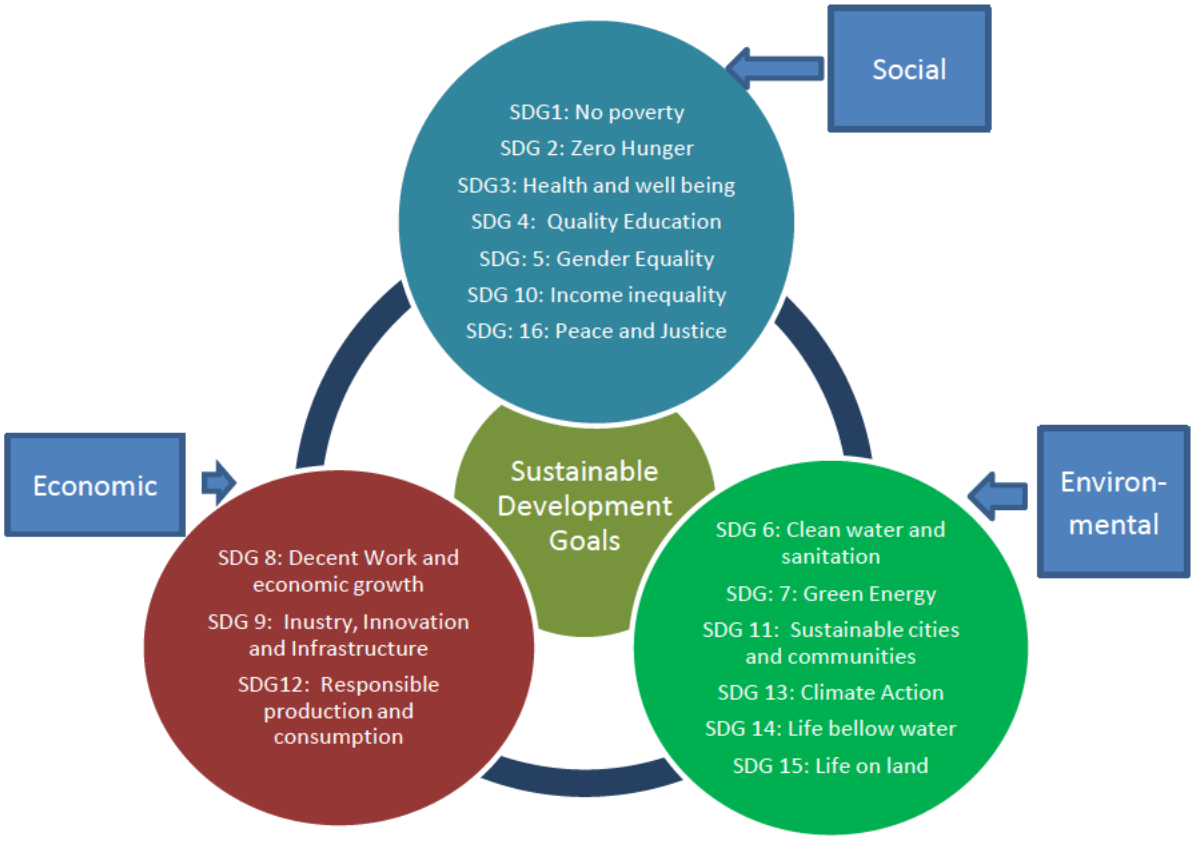

Figure 2.1: Three Dimensions of Sustainable Development Goals

Source: Author's representation of Sustainable Development Goals, (UNGA, 2015)

In Figure 2.1, SDGs 1 to 16 are placed into the three dimensions of sustainable development. SDG 17, the global partnership, is a cross-cutting issue for all three dimensions. To achieve the targets of the SDGs, the Agenda 2030 emphasises the strong global partnerships between developed and developing countries, different agencies, organisations, communities and business entities. These partnerships are also vital to address the humanitarian and natural crises of the world. Agenda 2030 calls for fostering innovation and technological advancement through trade and investment. The inner spirit of the SDGs is to decouple economic activities, production and consumption patterns from environmental destruction, and to ensure justice and prosperity for all.

The concept of sustainable development also generates considerable debate between the various groups of economists. The concept of sustainable development evolves from sustainability theory. In sustainability theories, there are two opposing prototypes: 'weak' sustainability and 'strong' sustainability. Both weak and strong sustainability theory are developed based on the capital stock approach of intergenerational equity concepts. Non-declining capital stock, or

maintaining constant per capita consumption of capital stock over the period, is the necessary condition of both weak and strong sustainability theory (Hartwick, 1977; Solow, 1974; Solow, 1986; Costanza 1991b; O'Connor, 2000). The fundamental difference between the concepts of weak and strong sustainability is the degree of elasticity of substitution between natural and physical capital. The weak sustainability supporters allow perfect substitution among the physical capital stock and natural capital stock; in comparison, the supporters of strong sustainability do not believe in perfect substitutability among different capital stocks (Hartwick, 1977; Solow, 1974; Solow, 1986). The supporters of strong sustainability argue that natural capital stock cannot be substituted by physical capital stock, and it should be kept unchanged (Costanza, 1991b; Daly, 1991; O'Connor, 2000). However, both the paradigms endorse the need for the rational distribution of resources and facilities, between the present and future generations; that is, establishing intergenerational equity.

Weak sustainability assumes a perfect elasticity of substitution among physical and natural capital stock. The neoclassical growth models consider capital accumulation to be the engine of economic growth. By including the non-renewable resources as an input of production, the neoclassical growth models provide the framework of sustainability (Hartwick, 1977; Solow, 1974; Solow, 1986). Solow (1974), in a seminal paper, explains the concept of intergenerational equity, with the Rawlsian ethical framework. To maintain intergenerational equity the per capita consumption needs to be constant over time. Solow (1974) allows a given degree of substitutability between physical capital and natural capital. He claims that the accumulation of human capital (such as education, skills, knowledge) could replace the loss of natural resources generated from economic activities: as a result, per capita consumption will remain constant over time.

Hartwick (1977) provides sufficient conditions for constant per capita consumption. He notes that all the rents earned from the exhaustible resources need to be reinvested to get a constant consumption path, or to offset the declining stock of the non-renewable resources. The reinvestment conditions of sustainability, also known as Hartwick's rule suggests that investing all net returns (rents) from the use of exhaustible resources in reproducible capital implies intergenerational equity (Hartwick 1977, pp. 973-4).

As per Hartwick's rule for sustainability, a mechanism needs to be established for ensuring the reinvestment of the rents received from exhaustible resources to increase the level of physical capital. Pearce and Atkinson (1993) and Hamilton (1994) contributed to the Hartwick rule by introducing the methodology for measuring net investment of natural and man-made capital and introduce the model of Genuine Savings. Genuine Savings estimates the monetary value of the change of natural and man-made capital.

Weak sustainability allows some degree of natural destruction and acknowledges that the loss of natural resources can be compensated by the gain of physical capital. In contrast, strong sustainability emphasises the maintenance of ecological systems or critical life-supporting elements, in at best their original form, to achieve sustainability (Faucheux and O'Connor, 1999).

The weak and strong sustainability approaches have little to say on the social dimensions of sustainability. Both approaches consider that societies and their needs are homogeneous but achieving sustainable development is not possible without the establishment of coherence between and within societies. Therefore, in addition to natural and physical capital, contemporary economists include the maintenance of social capital as a crucial factor for sustainability (Dasgupta and Serageldin, 1999).

Social capital preserves and maintains social networks and relationships, and plays a complementary role with physical and natural capital stock. Serageldin (1996) notes that social capital works like 'sticky tape as it connects different communities of society. Dasgupta and Serageldin (1999) observe that social capital requires maintaining the operation of a coherent social system. They also note that without the coherence between societies, the whole system would breakdown, and there would be little relevance for the concept of welfare.

Within the social capital stock of sustainability, economist such as Sen (1989) and Anand and Sen (1994) focus on reducing the prevailing inequality and deprivation of the poor communities and suggest the need to improve human capital stock to achieve sustainability. They argued that both weak and strong sustainability overlook the deprivation of the less privileged people of today. Ignoring the deprivation of today's generation implies that the prevention of the future generation's deprived people is not possible. Therefore, they focus on the development of the individual's capability or enhancement of the substantive freedom of choice (such as the ability to choose the options of living), particularly for deprived people. They suggest that sustainable

human development is the key to sustainability more generally. The improvement in the human development of the poor or deprived communities, such as through improved health, education and nutrition, enhances the capability of the present gneration and it also enhances the capability or substantive freedom of the future generations. For example, Anand and Sen (2000, p 2000) noted that: "Human development directly enhances the capability of people to lead worthwhile lives, so there are immediate gains in what is ultimately important, while safeguarding similar opportunities in the future."

The question regarding how sustainability can be measured also generates debate among scholars. The 'genuine savings' approach proposed by Hamilton and Hartwick measures all the changes of capital stock, both physical and natural in monetary terms (Hamilton, 1994; Hartwick, 1977). However, it is not possible to calculate the losses of many natural resources in monetary terms. In addition, the different dimensions and elements of sustainable development also have spatial characteristics. The incidence and the scale of impacts differ between countries and regions, and the needs and priorities are also varied by region. For example, the global food demand might be fulfilled by global food production but it cannot meet the food scarcities of many poor countries (Dasgupta *et al*., 2000a). Therefore, sustainable development planning should consider the global, as well as local, constraints and needs.

Whatever the definition of sustainability, good institutional mechanism or governance is crucial for sustainable development. As per the proponents of weak sustainability, all rent gained from the exhaustible resources needs to be reinvested to replace the loss of the stock of natural capital. Without strong governance, the redistribution of rent is not possible. The maintaining of a constant level of critical natural capital stock, which is crucial for strong sustainability also requires proper regulations and governance. Therefore, as future generations do not yet exist, without strong governance, sustainability is impossible to ensure.

Global leaders and policymakers such as UNCTAD, World Bank, IMF are encouraging FDI as a channel for promoting sustainable development in developing countries; however, there is no direct theory which can explain the impact of FDI on sustainability or sustainable development. Both the weak and strong sustainability theories are based on the conditions of non-declining capital stock over the period. FDI supplies physical capital to the capital-scarce country. FDI inflows can increase the stock of human capital through training, research and innovation, and thus contribute to achieving the necessary conditions of weak sustainability. FDI can even help to retain or protect natural resources stock by introducing and promoting energy savings and

waste reduction technology to the host country. Therefore, FDI inflows could be a potential channel for achieving the necessary conditions of the weak or even strong sustainability.

However, the impact of FDI on sustainable development depends on the institutional arrangement, absorptive strength of the host economy, type of FDI and the sector where FDI is directed. For instance, if FDI inflows are the 'natural resource seeking' type, it will deplete the natural capital stock and strong sustainability cannot be achieved. Again, if the institution and governance are corrupt or inept and rent from the exhaustible resources is not reinvested entirely for the improvement of physical capital, then even weak sustainability cannot be achieved. In contrast, FDI inflows can impact on weak sustainability if it contributes to the productive base of the host country.

Dasgupta (2007) measures sustainable development by the movements of the social and economic productive base of the country. Institutions and capital assets (both physical and natural) are included in the concept of the economic productive base. The social-productive base considers wealth distribution. The presence and activities of FDI inflows may increase demand for the outputs of other sectors. Therefore, the domestic investment will be stimulated or the production base of the host country will expand, and thus FDI contributes to weak sustainability.

On the other hand, the presence and activities of FDI inflows may increase competition between firms. Increased competition may force domestic firms to exit the industry, and thus FDI contributes to a decline of the productive base of the host country. In this scenario, FDI would not meet the necessary conditions for weak sustainability.

2.3 Foreign Direct Investment (FDI)

In general, Foreign Direct Investment (FDI) inflows can be defined as a long term investment or establishment of a business or production plant by a private company or business entity, from one country to another country. An investor should have a degree of control over their business to qualify as FDI. According to the Balance of Payment Manual of the International Monetary Fund, at least 10 percent of equity ownership is needed to have effective control over the management of the business (IMF, 1993). Keeping consistency with the definition of the IMF, the third edition of the OECD Benchmark Definition provides the formal definition of FDI:

> *"Foreign direct investment reflects the objective of obtaining a lasting interest by a resident entity in one economy ('direct investor') in an entity resident in an economy other than that of the investor (''direct investment enterprise''). The lasting interest implies the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence on the management of the enterprise"* (OECD, 1996, p. 7).

The benchmark definition of the OECD recommends that foreign investors must own 10 percent or more of the ordinary shares or voting power of an incorporated enterprise or the equivalent of an unincorporated enterprise to have a significant degree of influence on the management of the enterprise. Incorporated enterprises are subsidiaries or associate companies and an unincorporated enterprises are branches of a company.

FDI flows usually comprise three basic components: equity financing, reinvestment of earnings and debt transaction within the company. Equity financing relates to the share ownership. Through equity financing, a company raises capital by selling the company's stock, and in return, the company gives a certain percentage of ownership to the investor. Reinvested earnings refers to the undistributed profits earned by overseas subsidiaries; the subsidiaries keep and reinvest profits. Debt transactions within the company refers to the borrowing and lending arrangement between parents and its affiliates (OECD, 1996).

FDI can be classified into different categories and types based on the nature, motive and production process of the investments. Foreign Direct Investment can be an inflow or outflow. FDI inflows occur when a non-resident or overseas company invests in the reporting country. FDI outflows occur when residents or a company of the reporting country invest in an external economy. FDI is usually channelled or directed through multinational enterprises (MNEs) with multinational companies naturally establishing their plants and operations in more than one country (Caves, 1996).

FDI inflows can take place as 'greenfield investment' or 'merger and acquisition investment'. In the case of greenfield investment, MNEs establish new plants or businesses in the host country. In the case of mergers and acquisition or 'brownfield investment', MNEs purchase existing business or plants from local investors.

Depending on the motive of the investors, Dunning and Lundan (2008) classify FDI inflows into four groups: resource-seeking; market-seeking, efficiency-seeking; and strategic-asset-seeking FDI. Resource-seeking FDI inflows aim to get access to and extract the natural resources (such as minerals, abundant workforce, or land) of the host country. Resource-seeking

FDI usually takes place when the host countries have a lack of required capital and technical expertise to extract, utilise and market the natural and mineral resources. Market seeking FDI seeks access to the host country's market. . Establishment of a plant in the host country provides an opportunity to market the products directly to the consumers and thus, investors are able to reduce the transportation, tariff and trade-related costs of marketing the product from the home country. Efficiency-seeking FDI intends to locate in a country with skilled human resources, and technological and physical infrastructure with the aim of reducing their production costs through enhancing productivity. The motive of the strategic-asset-seeking FDI is to increase the global competitiveness and physical assets of the company. By acquiring the strategic assets of foreign enterprises (such as brands and networks), a company can promote and strengthen their global competitiveness.

Based on the concept of a supply chain of production, FDI inflows are also classified as 'horizontal FDI' or 'vertical FDI'(Görg and Greenaway, 2004). In the case of horizontal FDI inflows, foreign-owned firms produce the same product and apply a similar type of production technique as practiced in the host country. Horizontal FDI is common in the manufacturing sector. Vertical FDI fragments its production cycle and establishes plants in different locations, based on comparative advantages, with different countries having distinct cost advantages (Beugelsdijk *et al.*, 2008). For example, some raw materials could be non-tradeable, or transportation costs might be very high. In this case, the firm shifts part of the production process to another country. The geographic specialisation offers cost advantages in different countries and for different products.

The literature emphasises the indirect or spillover effects of FDI inflows for assessing the impact of FDI inflows on economic development (Aitken and Harrison, 1999 ; Blomström *et al.*, 2001; Smarzynska Javorcik, 2004). The spillover effects generally refer to the positive external benefits created by the presence of foreign firms and their activities. Positive externalities generate through knowledge transmission. MNEs usually have some ownership-specific advantages of access to advanced technologies, patents and management and marketing skills (Blomström *et al*., 2001; Smarzynska Javorcik, 2004). When MNEs enter theforeign market through FDI, it is expected that MNEs will transfer advanced technology and knowledge to their affiliates. The transmitted knowledge and technology may diffuse to other locally-owned firms in the host country.

FDI inflows can also create 'crowding in' or 'crowding out' effects on the domestic investment base of the host country (Gallagher and Zarsky, 2004). The 'crowding in' effect refers to the presence and activities of MNEs helping to expand domestic industries or stimulate domestic investment in the industry. On the other hand, the 'crowding out' effect implies that the presence and activities of FDI can displace domestic firms or force them to quit the market due to increased competition.

The extent to which FDI contributes to the host country economy also depends on two types of linkages: backward linkages and forward linkages. The activities of foreign firms generate demands for intermediate goods and upstream industries are expected to expand in the host country through the backward linkages. Similarly, if MNEs help to expand the downstream industries, or the sector related to the downstream production stages, then forward linkages happen (Smarzynska Javorcik, 2004).

The institutional contexts of the host economy and the MNEs are also crucial for analysing the impacts of FDI. Developing countries offer various incentives and undertake reform initiatives to attract FDI inflows. The countries sometimes compete with each other to attract FDI inflows. However, there are various other determining factors contributing to attracting FDI in a particular country. Some factors are related to the internal issues of firms/investors, which explain why a firm will invest abroad, such as cost reduction, economies of scale. Some factors are related to the host country's situation, such as resource availability, market size, and business environment. The following part of this section discusses the various determining factors of FDI inflows.

2.4 Determinants of FDI inflows

In the literature on the determinants of FDI inflows, the most popular theory is Dunning's 'Eclectic Paradigm' or OLI (which stands for ownership, location, internalisation) approach (Dunning, 1988, Dunning, 2001). The OLI approach describes the ownership advantages of firms, locational advantages of the host country and internalisation or hierarchical governance advantages for FDI inflows (Dunning, 2000).

The ownership advantages refer to market power and competitive advantages of the foreign firms over local industries, such as product patents, product and production process, copyrights, and 'business/trade secrets'. 'Location' advantages refer to the geographical advantages of the host country in establishing plants such as resource endowment, cultural, legal, political,

institutional and market structure of the host countries, or distribution and transaction cost advantages. The internalisation advantages occur due to the diverse profit opportunities of different forms of investment. Firms may operate directly or indirectly in a host country and they can possess the business or authorise other firms or they could establish a joint venture. In each case, the firm chooses the most profitable option and gains from the diversity of these options relative to expanding in their home market.

The OLI Approach of Dunning considers both micro- and macro-aspects of FDI inflows. Factors underlying ownership and internalisation advantages are micro-issues. Within Dunning's framework, market size, trade openness, input cost, macro-economic stability, credit rating, physical and financial infrastructure are critical macro-economic determinants of FDI inflows (Nocke and Yeaple, 2007).

UNCTAD (1998), in the World Investment Report, classified the host country's determinants of FDI inflows into three broad categories: policy frameworks, business facilitation and economic factors. In the case of the policy framework, the political, economic and social stability, level of globalisation, trade liberalisation, privatisation, rules and regulations of the host country are specified as the core elements of determining FDI inflows. In the case of business facilitation factors, the business environment, rule of law, trade agreements and treaties are core determining factors for FDI inflows. Economic determinants for FDI inflow include market size, natural resource endowments, technological advancement, and physical infrastructure.

Based on an UNCTAD (1998) classification, the determinants of FDI inflows are classified in Figure 2.2.

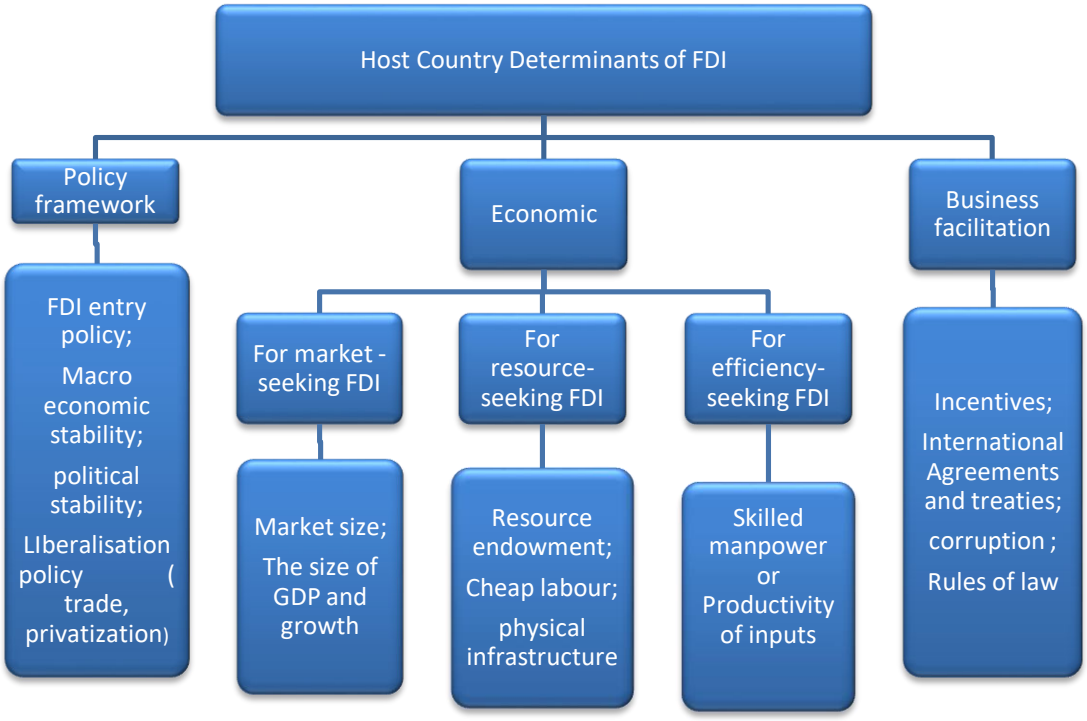

Figure 2.2: Determinants of FDI

Source: Based on the World Investment Report, UNCTAD (1998)

In Figure 2.2, the policy framework and business facilitation related determinants are applicable for all types of FDI inflows. The factors related to economic issues vary, depending on the motives of foreign investors. In the following section, I expand the policy framework, economic framework and business framework of the determinants of FDI inflows.

2.4.1 Determinants related to the policy framework

The regulations and rules of the host country for promoting and controlling the entrance and activities of foreign investment are critical for FDI inflows. Open and liberalised capital investment policies encourage FDI inflows; however, the liberalisation of FDI entry is not sufficient for attracting foreign investment. For instance, in most countries in Africa, FDI policy is very open, but the level of FDI inflows is low. The following supplementary policies and facilities have to be fulfilled to attract FDI in the country.

Firstly, macroeconomic stability offers less investment risk and hence stimulates the FDI inflows to the country. Inflation and exchange rate are considered key indicators for the macro-economic stability of a country. For example, Onyeiwu and Shrestha (2004), Asiedu (2006),

Sekkat and Veganzones-Varoudakis (2007), and Hailu (2010) found a negative association between FDI flows and the level of inflation in African countries. Schneider and Frey (1985), Faeth (2009) also show that inflation is negatively related to FDI inflows. On the other hand, Mhlanga *et al.* (2010) (in terms of South African countries) and Vijayakumar et al. (2010) (for BRIC[3] economies) discovered that inflation is an insignificant determinant of FDI inflows. Kandiero and Chitiga (2006) investigated the association between FDI inflows and the real exchange rate for 38 African countries and found an inverse relationship between FDI inflows and real exchange rate appreciation. Kyereboah-Coleman and Agyire-Tettey (2008) investigated how exchange rate volatility influenced FDI inflows into Ghana; finding that exchange rates significantly influenced the FDI inflows in Ghana and that the volatility of the exchange rate exerts a negative impact on FDI inflows.

Secondly, a country's political stability is crucial for a favourable business environment. Political stability offers confidence in investment and promotes economic growth; and hence, political stability stimulates FDI inflows into the host countries. However, the empirical relationship between political instability and FDI flows is not unanimous. Harinder and Jun (1995), Wheeler and Mody (1992) found that political risk did not exert any significant impact on FDI inflows. Jaspersen *et al.* (2000) and Hausmann and Fernandez-Arias (2000) also failed to discover any significant relationship between political stability and FDI inflows. However, Root and Ahmed (1979), Schneider and Frey (1985), Tuman and Emmert (2004) observed that political instability, such as riots and change of the government, generate a strong negative impact on FDI inflows in the developing country. Schneider and Frey (1985) also revealed that political risks related to the bureaucratic procedure, government regimes, administration delay, and property ownership laws profoundly influenced the investment decision of MNEs. Bartels *et al*. (2009) found a strong association between political factors and FDI inflows for African countries. Zheng (2009) also found political risk as a significant determining factor of FDI for China and India and Busse and Hefeker (2007) discovered that political disruption related to ethnic conflicts and the bureaucratic procedure made a significant impact on FDI inflows in Africa.

[3] Goldman Sachs economists defined the BRIC economies as Brazil, Russia, India, China in 2003. It is speculated that, by 2050, these four economies will be the most dominant. Further, BRICS is an acronym for the combined economies of Brazil, Russia, India, China and South Africa.

Thirdly, the liberalisation of national policy, especially privatisation in the industrial policy, unleashes the potential of FDI inflows. At the same time, a liberalised trade regime is considered a significant determinant of FDI inflows, as FDI inflows are usually export-oriented. Higher trade restrictions imply higher transaction costs for exports and trade restrictions make intermediate goods expensive. Moreover, trade liberalisation leads to a better business climate and opens up the window for growth prospects (Jordaan, 2005). Ramasamy and Yeung (2010) note that efficiency-seeking FDIs are usually interested in moving business to open liberalised economies. Dumciuviene and Paleviciene (2017), Chakrabarti (2001), Asiedu (2006), Cleeve (2008) and Mhlanga *et al*., (2010) found a strong positive significant relationship between trade openness and FDI inflows. However, liberalisation does not necessarily increase FDI inflows. Schmitz and Bieri (1972) found a weak correlation with openness and FDI flows and Vijayakumar *et al*. (2010) also found trade openness as an insignificant determinant for FDI inflows.

2.4.2 Determinants related to the economic factors

Market size is found to be the most robust FDI determinant in econometric studies. It is particularly important for horizontal and market seeking FDI. FDI inflows usually search for large and growing markets, with higher purchasing power. A large market also offers a high return on capital (Jordaan, 2005). In a recent panel data analysis for EU countries, Dumciuviene and Paleviciene (2017) found a strong positive impact of market size on inward FDI inflows. In a cross-country study, O'Meara (2015) identified market size and the degree of economic activity in the host country as the prime determining factors of FDI inflows. Chakrabarti (2001) argues that big market size offers benefits of economies of scale in the production and marketing and also promotes the efficient utilisation of resources. Vijayakumar *et al*. (2010), Ang (2008), Cleeve (2008), Asiedu (2006), Schneider and Frey (1985), Tsai (1994), and Pärletun (2008) also found a strong positive association between market size and FDI inflows of the host country. However, Holland and Pain (1998) and Asiedu (2002) found that market size did not exert any significant impact on FDI inflows and Laabas and Abdmoulah (2009) also found a negative association between FDI inflows and market size.

The size of GDP and growth rate is considered an important determining factor for the market seeking FDI. The growth trend indicates the level and prospects for the economic development of a country indicates domestic market opportunities for investors. Johnson (2006) argues that the growth potential of the host country attracts high FDI inflows and increases the confidence

of MNEs. Mohamed and Sidiropoulos (2010) studied 12 MENA[4] and 24 developing countries, Schneider and Frey (1985) 80 developing countries, Cleeve (2008) 16 Sub-Saharan African countries, and Mhlanga *et al*. (2010) Southern African countries: collectively, they found that there was a positive relationship between GDP growth and FDI inflow. However, Vijayakumar *et al*. (2010) did not find any significant impact of GDP size on FDI inflows for BRIC countries.

The endowment of natural resources is desirable for resource-seeking FDI inflows. Using panel data over the period from 1984 to 2000 for 22 African countries, Asiedu (2006) shows that natural resource endowment is a significant determinant of FDI inflows for African countries. In an OECD working paper, Houde and Lee (2000) note that the endowment of natural resources such as energy reserves (coal, oil), land, iron and other minerals played a significant role in attracting FDI in China. Onyeiwu and Shrestha (2004) also found the availability of natural resources is a significant determinant of FDI inflows. Mohamed and Sidiropoulos (2010), using panel data of 36 countries, found that natural resources played a vital role in FDI inflows for MENA countries.

Low labour costs could be a determining factor for resource seeking FDI inflows, particularly for labour-intensive industries. This argument is confirmed by the studies by Schneider and Frey (1985) of 80 developing countries, and Vijayakumar *et al.* (2010) for BRIC countries. However, Botrić and Škuflić (2006) found that low wages reduced FDI inflows for seven South East European countries. The possible cause for the negative relationship is that in the South East Asian countries the non-tradeable sectors are the major recipients of FDI and non-tradeable sectors require a highly skilled workforce. Therefore, investors place importance on the quality of the workforce rather than the wage level. Biswas (2002) failed to reach a conclusive result between the wage level and FDI inflows in a panel estimation of 44 countries. Biswas' (2002) study particularly investigates the determinants of the United States FDI. Investors in the United States might give priority to other factors such as political stability and the availability of natural resources rather that the wage level.

[4] The acronym MENA refers to the Middle East and North Africa region; it covers an extensive region stretching from Morocco to Iran, including all Mashriq and Maghreb countries.

Well-developed physical infrastructure provides a positive investment environment and reduces the cost of setting up production units, thus encouraging FDI inflows to the country (Wheeler and Mody, 1992). Faruk (2015), Mhlanga *et al.* (2010) and Sridharan and Rao (2010), Asiedu (2006), Kok and Acikgoz Ersoy (2009), and Dupasquier and Osakwe (2006) found infrastructure is a significant factor for attracting FDI inflow. UNCTAD (2008) and Woodward and Rolfe (1993) note that well-developed infrastructure is particularly important in attracting export-oriented and manufacturing FDI. Hobday (1994) says that multinationals establish their business in Singapore due to the well-developed transportation and communications facilities. However, Onyeiwu and Shrestha (2004) and Asiedu (2002) discovered that infrastructure did not exert any significant influence in attracting FDI. Both studies, Onyeiwu and Shrestha (2004) and Asiedu (2002) investigate the determinants of FDI inflows for African Countries. The FDI inflows to African countries are natural resource based, concentrated on the extractive industries. Therefore, infrastructure might not be a major factor for investors.

Human capital, or a skilled workforce, and productivity of inputs are considered critical determining factors for efficiency-seeking FDI. Economies which have a high quality of human capital and low wage rates are expected to attract higher FDI. Noorbakhsh *et al*. (2001) reveal that skilled human capital is a significant determinant for FDI inflows for high value-added industries. They argue that education promotes productivity and facilitates technological advancement. Rodriguez and Pallas (2008) also found that labour productivity is an important determinant of FDI inflows in Spain.

2.4.3 Determinants related to the business facilitation

Various fiscal and non-fiscal incentives offered by the host country (such as tax exemption, subsidised infrastructure and repatriation of profit facilities), bilateral and international trade agreements, as well as the institutional and governance system of the host country (such as rule of law, administrative efficiency) are essential business facilitation-related determinants.

Developing countries usually offer various fiscal and non-fiscal incentives to attract FDI; however, the response of MNES to the offered incentives depends on their motives and strategies. Most of the literature regarding the relationship between incentives and FDI inflows provide inconclusive results. Root and Ahmed (1978) discovered that corporate taxation played a vital role in attracting manufacturing FDI. Bellak and Leibrecht (2009) also found that high tax rates discouraged FDI inflows. Cleeve (2008) used three proxies to measure the role of fiscal

and financial incentives: temporary tax exclusions, tax concessions, and the repatriation of profits. The author failed to find any significant relationship between financial and fiscal incentives and FDI. UNCTAD (1998) notes that the effects of incentives can be potentially distorting and harmful. Countries offering incentives intend to divert investment away from competing host countries but in the process the government generally loses revenue and the cost of the incentives is ultimately borne by the local community. Benefits are transferred to the foreign investors. Moreover, incentives usually come with conditions that local investors cannot meet, which can discourage domestic investment (UNCTAD, 1998, page 102)

International agreements and bilateral business treaties are used as a tool for investment and trade facilitation between various countries. Büthe and Milner (2008) claim that international trade agreements, such as WTO and GATT, as well as preferential trade agreements, create a favourable investment climate and provide insurance for the investment. In a statistical model for 122 developing countries, they found that, international agreements influenced the investment decision of multi-national enterprises more than domestic policy. Biglaiser and DeRouen (2010), in a study of 126 developing economies, discovered that MNES in the United States preferred the countries which are more inclined to the IMF. In a quantitative study, Neumayer and Spess (2005) found bilateral investment treaties (BITs) to be a significant determining factor of FDI inflows and they exert a positive impact on FDI flows to a developing country.

Corruption and administrative inefficiency add extra costs to business operations and reduces the degree of profitability of investment projects. In the empirical analysis, Asiedu (2006), Cleeve (2008) and Mohamed and Sidiropoulos (2010) found a negative and significant relationship between a corruption index and FDI inflows. Al-Sadig (2009), based on panel data over the period from 1984 to 2004 for 117 countries, also found that FDI inflows decreased with higher corruption levels. The presence of administrative efficiency and the Rules of Law offer a smooth business environment. The proper enforcement of rules of law gives the foreign investor assurance of the safety of their life and property. Conversely, the weak or non-enforcement of laws and rules discourage foreign investment in developing economies (Mudambi *et al.*, 2013). Thus, the proper application and enforcement of the Rules of Law favourably attracts foreign investment into a country (Shahzad *et al*., 2012).

2.5 Foreign Direct Investment and sustainability

Global leaders and policymakers such as UNCTAD, the World Bank, and the IMF are encouraging FDI as a channel for promoting sustainable development in developing countries; however, there is no direct theory which can explain the impact of FDI on sustainability or sustainable development. Both the weak and strong sustainability theories are based on the conditions of non-declining capital stock over a period of time. FDI supplies physical capital to a capital-scarce country. FDI inflows can increase the stock of human capital through training, research and innovation, and thus contribute to achieving the necessary conditions of weak sustainability. FDI can even help to retain or protect natural resource stocks by introducing and promoting energy savings and waste reduction technology in the host country. Therefore, FDI inflows could be a potential channel for achieving the necessary conditions for weak or even strong sustainability.

However, achieving the conditions of sustainability or the promotion of sustainable development through FDI inflows largely depends on the institutional arrangements, types of FDI and the sector where FDI is directed. For instance, if FDI inflows are the 'natural resource seeking' type, it will deplete the natural capital stock and strong sustainability cannot be achieved. If institutions and governance arrangements are corrupt or inept and rent from the exhaustible resources is not reinvested entirely in the improvement of physical capital, even weak sustainability cannot be achieved.

In contrast, FDI inflows can provide for weak sustainability if it contributes to the productive base of the host country. Dasgupta (2007) measures sustainable development through changes in the social and economic productive base of the country. Institutions and capital assets (both physical and natural) are included in the concept of the economic productive base. The social-productive base considers wealth distribution. The presence and activities of FDI inflows may increase demand for the outputs of other sectors. Therefore, domestic investment will be stimulated or the production base of the host country will expand, and thus FDI contributes to weak sustainability. On the other hand, the presence and activities of FDI inflows may increase competition between firms. Increased competition may force domestic firms to exit the industry, and thus FDI contributes to a decline of the productive base of the host country. In this scenario, FDI would not meet the necessary conditions for weak sustainability.

However, FDI is a modern reality and plays a key role in the global economy. MNEs that channel FDI produce one-third of the world's GDP and two-thirds of the world's trade (OECD, 2018). Therefore, without the involvement of MNEs, the promotion or the achievement of sustainable development is not possible. The Agenda 2030 of sustainable development also emphasises the partnership and engagement with business community for achieving the targets of sustainable development and note:

> "*We acknowledge the diversity of the private sector, ranging from micro-enterprises to cooperatives to multinationals. We call upon all businesses to apply their creativity and innovation to solving sustainable development challenges. We will foster a dynamic and well-functioning business sector, while protecting labour rights and environmental and health standards in accordance with relevant international standards*" (UNGA, 2015, p. 28).

The practice of Corporate Social Responsibility (CSR) can make business or investment activities beneficial for sustainable development. According to the World Business Council on Sustainable Development (WBCSD), CSR is defined as follows:

> *"Corporate social responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large."* (WBCSD, 1999, p. 3).

The definition of CSR calls for ethical business operations and the improvement in the quality of life for local communities and society at large, which are important elements of sustainable development. The United Nations Global Compact (2013) also emphasises that businesses need to operate in a sustainable and responsible manner through business innovation and collaboration initiatives. The OECD sets guidelines for MNEs, which outline the principles for responsible business (OECD, 2011a). The guidelines state that enterprises have a responsibility to economy, environment and society, and emphasise the protection of human rights, strengthening of the capacity building of the community, job creation, environmental and social safety.

However, CSR activities and their codes of conduct are voluntary initiatives. It is very hard to measure and monitor the CSR activities and it is often cited that CSR is described in policy manuals but not in action (Clarke and Klettner, 2007). Therefore, MNEs or FDI will not necessarily promote sustainable development through practising CSR.

2.6 Conclusion

The concepts and characteristics of sustainable development, which is developed and adopted by the different group of economists and through various international agreements, imply that FDI inflows can potentially contribute to achieving the necessary conditions of sustainable development. However, it varies according to the type, sector of FDI, institutional mechanism and absorptive capacity of the country. It is essential to mobilise high quality, socially and environmentally-friendly investments for advancing sustainable development via FDI inflows. At the same time, developing countries are competing with each other to attract FDI. The strengthening of absorptive capacity, the technological readiness of the host economy, the suitable institutional mechanisms and policy frameworks are all crucial for good quality FDI inflows. As sustainable development is a responsibility for all, therefore, MNEs must adopt and practice a high level of corporate social responsibility and be aware of the possible impact of their activities on sustainable development. In the next chapter, I explore in detail how FDI can impact all three dimensions of sustainable development.

CHAPTER 3: FDI AND THE THREE DIMENSIONS OF SUSTAINABLE DEVELOPMENT

3.1 Introduction

In this chapter, I discuss the issues and mechanisms behind the impact of FDI inflows on three basic dimensions of sustainable development: the economy; the environment; and the social dimension. Each dimension of sustainable development covers a broad range of elements and issues; for instance, the economic dimension of sustainable development includes not only productivity or growth aspects, but also trade, capital formation, and the fiscal and monetary stability of the economy. The environmental dimension includes pollution, natural resource depletion, energy efficiency, biodiversity, and climate changes. The inclusiveness or the equitable distribution of the benefit of economic development is the main focus of the social dimension of sustainable development; however, social dimensions also include the working environment, human rights, labour rights, and other related issues.

The three dimensions of sustainable development are not separate; they are inter-related and inter-connected. In some cases, the economic, environment and social issues might work in the same direction; but in others, they might work counter-productively. Sustainable development can only be achieved through the integration of policies that connect all three dimensions of sustainable development and a balanced approach is needed. For instance, excessive emphasis on environmental protection policies could hurt the economic activities of a country and hinder the growth and development process. The slowdown of economic progress can create unemployment, which can also trigger social problems. On the other hand, excessive emphasis on boosting economic activities may lead to an increase in pollution levels and other environmental problems, such as global warming, resource degradation, and climate change.

While an integrated approach to policy is needed, such policy can only derive from a deep understanding of the impact of FDI on each of different elements of sustainable development. While there are cross-overs and, I have broken down the impacts of foreign direct investment inflows on sustainable development into three parts: FDI and economic development; FDI and

environmental conditions; and FDI and social development. Thus, the rest of the chapter is structured as follows: Sections 3.2, 3.3 and 3.4 discuss the theoretical and empirical literature related to the impact of FDI inflows on economic sustainability, environmental sustainability and social sustainability, respectively; Section 3.5 discusses the literature related to the impact of FDI inflows on the integrated concept of sustainable development; Section 3.6 synthesises the discussion and outcomes of Sections 3.2, 3.3 and 3.4; Section 3.7 provides a conclusion and based on the research gap and need, Section 3.7 also develops the research questions for the study.

3.2 The impacts of FDI on economic development

3.2.1 Theoretical context

FDI inflows have the potential to generate a positive contribution to the economy directly or indirectly. FDI inflows may contribute to increasing the economic growth and productive capacity of a capital-scarce country by supplying external capital. FDI can improve the productivity and efficiency of the host country by introducing new skills and advanced technology through its indirect (spillover) effect. FDI can also diffuse better corporate governance, managerial and organisational skills into affiliates and subsidiaries (OECD, 2001). Further, FDI inflows are considered less volatile than other external capital flows, as long term commitment is associated with the FDI. Although positive contributions are anticipated, FDI inflow can also create a negative impact on the economy. Moreover, the effects of FDI inflows to the host country largely depend on the absorptive capacity and type and mode of the FDI inflows.

Traditional development theories recognise that investment is the lifeblood of the economy, and economic growth is the engine of economic development. The neoclassical growth framework (Solow, 1956; Solow 1957; Lucas, 1988; Romer, 1997) can explain the contribution of FDI inflows to economic growth. The seminal papers of Solow (1956) and Solow (1957) provide the basis of applied growth analysis within the neoclassical framework. Solow (1956) identifies the aggregate production function and the sources of growth by the following derivation:

Equation 3.1 represents the aggregate production function:

$$Y = A(t)f(K, L) \qquad (3.1)$$

Where, Y = Total output produced; L = Labour in the physical units; and K= Capital in the physical units. $A(t)$ represents the cumulated effects of any shift of production function over time (t) or technological change. The production function assumes neutral technological change which implies any change in the technology does not change the ratio of marginal products of labour and capital (Hicks, 1932). By differentiating Equation 3.1 with respect to time and dividing by output Solow (1956) obtains Equation 3.2 as follows:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + A\frac{\partial f}{\partial K}\frac{\dot{K}}{Y} + A\frac{\partial f}{\partial L}\frac{\dot{L}}{Y} \qquad (3.2)$$

Where, ($\dot{x}$) represents the time derivative of variable x. As $\frac{\partial Y}{\partial K} = A\frac{\partial f}{\partial K}$ and $\frac{\partial Y}{\partial L} = A\frac{\partial f}{\partial L}$; therefore, Equation 3.2 can be written as

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \frac{\partial Y}{\partial K}\frac{\dot{K}}{Y} + \frac{\partial Y}{\partial L}\frac{\dot{L}}{Y} \qquad (3.3)$$

Here, capital (K) and labour (L) are the total factor inputs who are paid by their marginal products. Therefore, the relative share of capital can be expressed as, $w_k = \frac{\partial Y}{\partial K}\frac{Y}{K}$ and the relative share of labour can be expressed as, $w_L = \frac{\partial Y}{\partial L}\frac{Y}{L}$.

Substituting the value of w_k and w_L, Equation 3.3 can be written as:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + w_K\frac{\dot{K}}{K} + w_L\frac{\dot{L}}{L} \qquad (3.4)$$

The production function is considered to be homogeneous of degree 1 or $w_L + w_k = 1$. If per capita output, $\frac{Y}{L} = y$ and capital-labour ratio, $\frac{K}{L} = k$; then, Equation 3.4 can be expressed as:

$$\frac{\dot{y}}{y} = \frac{\dot{A}}{A} + w_k\frac{\dot{k}}{k} \qquad (3.5)$$

Equation 3.4 and Equation 3.5 imply that capital accumulation contributes to the economic growth directly in proportion to the relative share of capital. Therefore, within the framework of the Solow (1956) growth model, FDI inflows contribute to the growth process directly through capital accumulation by increasing the capital stock of the host country. In the Solow growth framework, technological progress $\dot{A}$ is considered exogenous and a determinant of long-run economic growth, but it fails to explain sources of technological progress. The Solow growth model assumes that technological progress and capital has the property of diminishing returns. The assumption of diminishing returns of capital in the Solow growth framework implies that FDI inflow may only influence the level of income in the short-run, and long-run growth will remain the same (De Mello, 1999).

The endogenous growth model proposed by Lucas (1988) and Romer (1997) explains the sources of technological progress. According to the endogenous growth model, technological progress emerges through the active choice of economic agents. Romer (1990) argues that knowledge creation or innovation is the source of technological progress.

Romer (1990) assumes that there are three sectors in the economy: the final goods sector, research and development (R&D) sector and intermediate capital good sector. The final goods sector uses intermediate capital goods and labour to produce final goods for consumption and investment. The R&D sector uses human capital and knowledge to produce new ideas or knowledge. The intermediate capital good sector uses designs created by the R&D sector. Romer (1990) breaks down the total amount of labour into two parts: the amount of labour working in the final goods sector (L_F) and the amount of labour working in the R&D sector (L_R). Workers decide which sector to work in; therefore, the structure of the labour force is also an endogenous variable.

The following equation expresses the simplified aggregate production function for the Romer (1990) model:

$$Y = {L_Y}^{1-\alpha}({X_1}^{\alpha} + {X_2}^{\alpha} + {X_3}^{\alpha} + \cdots {X_A}^{\alpha}) = {L_Y}^{1-\alpha} \sum_1^A X_i \qquad (3.6)$$

Where, L_Y is the total number of labour producing output; $L_Y = L_F + L_R$. X_i represents various types of capital goods and α represents the marginal return of the inputs, where $0 < \alpha < 1$.

Unlike the Solow model, technology A is not fixed; it depends on the number of capital goods. Workers engaged in the R&D sectors invent new capital goods. Romer (1990, p 83) specifies the evolution of the technology as:

$$\dot{A} = \delta L_R A \qquad (3.7)$$

In Equation 3.7, technological progress $\dot{A}$ depends on the existing level of technology (A) and the workers engaged in the R&D sectors (L_R). In the endogenous growth model, technological change generates from the knowledge creation and the spillover of knowledge. The profit-seeking R&D sector is the main agent for the invention of new designs or technology. Investors can patent their invented new technology butendogenous growth theories recognise the diffusion and externalities of technological progress. For example, Romer (1986) stated: "The creation of new knowledge by one firm is assumed to have a positive external effect on the production possibilities of other firms because knowledge cannot be perfectly patented or kept secret" (p. 1003).

The endogenous growth model implies that FDI incorporates innovation, technical expertise and enhanced human capital stock through the introduction of new technology, and training and skill-building activities, endogenously (Borensztein *et al.*, 1998; Grossman and Helpman, 1993; Lucas, 1988; Mankiw *et al*., 1992). Therefore, FDI can contribute to economic growth directly through capital formation and indirectly through knowledge and technology spillover effects. That is, in the endogenous growth framework, FDI inflows are able to accelerate economic growth by generating positive impacts on the marginal return of inputs endogenously through adding and diffusing new knowledge and technology (Ford *et al*., 2008; Herzer, 2012). The technological spillover effects of FDI inflows can increase the capacity or productivity of the human capital stock and can offset the diminishing returns of the capital stock inherent in the Solow growth model (Barro and Sala-i-Martin, 1995; Romer, 1997).

Blomström and Kokko (1999), Wang and Blomström (1992) and Colen *et al*. (2009) categorise the channels of knowledge and technology spillover effects of FDI inflows into five areas: demonstration; competition; labour mobility, linkages; and exports. Demonstration effects take place when domestic firms imitate or observe the advanced technologies and skills of foreign firms and apply the acquired knowledge in their production systems, which will likely boost the productivity of local firms (Wang & Blomström, 1992; Colen *et al.*, 2009).

Domestic firms may copy the new superior products, technologies, and production processes of the MNEs. This imitation generates horizontal spillover effects and accelerates the growth of the host economy (Colen *et al.*, 2009). However, domestic firms need sufficient technical skills to apply the knowledge learned through imitation (Apergis *et al*., 2006).

FDI inflows can also generate spillover effects through competition. The presence of MNEs in the host economy leads to an increase in competition in the industry. Increased competition forces the local firms to improve efficiency in the production process and management system through the invention of new technology(Glass and Saggi, 2002). Görg and Greenaway (2004) claim that increased competition removes the barrier to adopting advanced technology and also stimulates the speed of new technology adoption in the host country.

Through the labour mobility channel, positive knowledge spillovers take place when the workers of MNEs move or migrate to other firms. MNEs usually arrange training and skill development activities for their employees (Colen *et al.*, 2009). Workers who receive training may switch to domestic firms. In this case, new advanced technology and managerial systems

transmit from foreign-owned firms to locally-owned firms and contribute to increasing the productivity and efficiency of the local firms (Thakur and Burange, 2016).

MNEs can create knowledge spillover effects by establishing linkages with affiliates, subsidiaries, and domestic input suppliers of MNEs. MNEs have exposure to, and experiences with, using advanced production techniques and managerial system. Therefore, the affiliates, subsidiaries and domestic suppliers learn and adopt to advanced techniques and system from MNEs. However, to realise this type of spillover benefits, establishing linkages in the production system between foreign firms and local firms is crucially important (UNCTAD 2001). The linkages between foreign firms and local firms can be in the form of backward linkages or forward linkages. Backward linkages have taken place when MNEs purchase intermediate products or raw materials from domestic suppliers. On the other hand, forward linkages generate from the downward streaming activities of MNES with the local industries. The backward linkages of FDI promote domestic investment and help to enhance the domestic production base and employment opportunity of the host country. The linkages of MNES with the local industries also generate spillover effects through transferring knowledge directly from foreign firms to local firms (Smarzynska Javorcik, 2004).

The knowledge spillovers may also occur through the export channel (Blomström and Kokko, 1999; Görg and Greenaway, 2004). MNEs are usually export-oriented and have the expertise and advanced export networks and strategies. When MNEs do export through their affiliates, they establish trade infrastructure and distribution networks in host countries. Local firms can learn advance export strategies of MNEs and can use the network and trade infrastructure for their exporting.

The spillover effect of FDI inflows can also be classified as horizontal and vertical spillovers. Vertical spillover effects are as described previously with upstream or downstream effects benefiting through knowledge acquisition. Horizontal (intra-industry) spillovers generate when FDI inflows take place in industries that are already established in the host country (Görg and Greenaway, 2004).

FDI may also generate a negative effect in the host country economy. The initial entry of FDI inflows may improve the balance of payments situation of the host country. Later, the profit repatriation, outflows of dividends and royalties of MNEs, may adversely impact the balance of payment situation of the host country. Reis (2001) also notes that the transfer of profit to

overseas by the foreign investors might adversely affect the welfare of the host country.FDI inflows are assumed less volatile compared with other foreign capital flows (such as portfolio and equity investment). However, at the time of economic crisis, the volatility of FDI inflows may be similar to any other portfolio investment flows (Singh and Zammit, 1997).

The spillover effects of FDI could be negative and can generate adverse effects on the economic growth and productivity of the host country. In the case of imitation, the technology might be too advanced to adopt by the host firms. For competition effects, foreign firms may crowd out domestic investment that would have occurred in local competitors (Chudnovsky and López, 2008) and local firms could be squeezed out (Glass and Saggi, 2002). In some cases, local firms are even forced to leave the industry. Aitken and Harrison (1999) note that foreign multinational firms have firm-specific advantages and the benefits of economies of scale, which allows them to drive demand away from local firms. Local firms may also lose human capital stock and productivity if foreign-owned firms pay higher wages with skilled workers migrating from local firms to foreign-owned firms (Fosfuri *et al*., 2001).

The linkage effects of FDI inflows could also be negative. Instead of sourcing intermediate inputs from the local industries, multinational firms may import intermediate inputs. Therefore, the net effect of backward linkages may be negative (Aitken *et al.*, 1997; Greenaway *et al.*, 2004; Rodriguez-Clare, 1996). Aitken and Harrison (1999) also note that if local firms purchase raw materials from domestic sources but the foreign-owned firms depend on imports, local firms may also move to intermediate imports, leading to the displacement of domestic firms.

Further, the benefits of FDI on growth will not come automatically. The growth-generating impacts of FDI inflows largely depend on the absorptive capacity of the host country. Absorptive capacity refers to the strength of the host country in absorbing the knowledge and technology spillovers associated with FDI. The level of human skills and knowledge, financial development, quality of the institutions, infrastructure development, level of technological advancement, and level of economic development are considered important factors for absorbing the benefits of FDI spillover effects (Blomstrom and Kokko, 2003). Host countries need to have sufficient absorptive capacity to realise the spillover effects of FDI inflows. For example, Blomstrom *et al*. (1992) found that FDI inflows positively impact economic growth only in the higher income developing countries. In most cases, developing countries suffer from a lack of sufficient high-quality human capital stock to nurture and use the technology diffused from FDI inflows.

Borensztein *et al.* (1998) examined the effect of FDI inflows on economic growth for selected developing economies within the endogenous growth framework. They applied a cross-country regression analysis, and the results reveal that FDI stimulates economic growth and productivity; however, the higher productivity gain is achieved only if the host country exceeds the threshold or minimum level of human capital development. Therefore, the literature emphasises the improvement of human capital stock to strengthen the absorptive capacity of the host economy to maximise the benefits of FDI inflows.

The realisation of the potential benefits of FDI inflows also depends on the host country's economic policies and institutional arrangement (Gallagher and Zarsky, 2004). Balasubramanyam *et al.* (1996) examined the role of trade policies in fostering economic growth in the presence of FDI. The results support the outward-oriented liberalised trade policy to boost economic growth through FDI inflows. Alfaro *et al.* (2004) emphasise the development of the financial market for promoting economic growth through FDI inflows. Bengoa and Sanchez-Robles (2003) explored the positive relationship between FDI inflows and economic growth; in the long-run, the positive impact of FDI on growth was found to depend on the improvement of human capital stock, the macro-economic stability and liberalisation policy of the host country.

The impact of FDI also varies with the type and entry mode of FDI inflows. Nunnenkamp (2002) argues that efficiency-seeking FDI inflows are more effective than market-seeking FDI inflows for the enhancement of economic growth. It is also argued that FDI inflows in the manufacturing sector are expected to generate a higher growth effect than FDI inflows in the primary natural resource sector (UNCTAD, 2001). In most cases, the impact of FDI inflows on economic growth depends on the linkage effects and in the primary sector, there is limited scope of expansion through linkage activities. Therefore, if FDI inflows are channelled to the primary or traditional sector, then it may generate negative net impacts on economic growth. In contrast, manufacturing FDI inflows can expand the primary and services sector with the primary sector supplying raw materials to the manufacturing sector and the services sector delivering marketing and financial services for manufactured products. Further, Colen *et al.* (2009) express that FDI inflows directed to high labour-intensive industries are likely to be more positive for economic growth, than the technology-intensive industries. The prospects of linkages and growth effects of FDI for the service sectors are found to be uncertain (Alfaro, 2003; UNCTAD, 2001; UNCTAD, 2005).

Some researchers also argue that greenfield FDI has more growth prospects compared with FDI driven by mergers and acquisitions. Mergers and acquisitions initially do not supply new capital or investment to the host economy; ownership of the investment is only transferred from local to foreign investors. As a result, mergers and acquisitions do not contribute to enhancing the capital formation of the host economy. In contrast, greenfield FDI inflows directly contribute to the host country's capital formation by adding new investment (Colen *et al.*, 2009). Greenfield FDI is a new investment or new plant, and also generates additional job opportunities for the local workforce. Capital formation is crucial for economic growth. Therefore, greenfield FDI inflows are more positive in growth generation of the host country. However, in the later phases of development and through the process of sequential investment, mergers and acquisitions can make a positive impact on the host economy (UNCTAD, 1999).

3.2.2 Empirical studies

Due to the conflicting theoretical views about FDI inflows and economic growth and the growing importance of FDI, empirical researchers have investigated the relationship between FDI inflows and the host country's economic growth, some of which has been previously described. The empirical literature provides mixed results. Several studies revealed a positive impact of FDI inflows on economic growth, while others found evidence of a negative effect. A number of studies also found conditional positive results and focus on the necessity of the host country's absorptive capacity to reap the benefit of FDI inflows.

3.2.2.1 Studies finding a positive relationship between FDI and economic growth

In developing countries, FDI inflows can contribute to boosting economic growth by supplying new capital and introducing and diffusing advanced technology. Several empirical studies (Ekanayake *et al*., 2010; Haseeb et al., 2014; Hassen and Anis, 2012) investigate the impact of FDI inflows in developing countries and discover that FDI inflows exert a positive effect on economic growth in developing countries. For Latin American countries, Bengoa and Sanchez-Robles (2003) investigate the linkages between FDI, and economic growth covering data from 1970 to 1999. They employ a fixed effect and random effects panel Ordinary Least Square (OLS) estimation procedure and find that FDI inflows are positively associated with economic growth in these countries. Similarly, Choong and Lim (2009) investigated the role of FDI inflows in improving Malaysia's economic condition. The study concluded that FDI inflow performs a key role in expanding domestic sectors and overall economic growth.

An ample amount of empirical research applies various co-integration and causality analysis technique such as the Autoregressive Distributed Lag (ARDL) approach, the Vector Error Correction Model (VECM), and Granger causality to investigate the short-run and long-run relationship and direction of causality between FDI inflows and economic growth. For example, Acaravci and Ozturk (2012) employed the bound testing Autoregressive Distributed Lag (ARDL) technique to examine the co-integration among FDI inflows, export and economic growth for selected European economies. The finding of the study favoured FDI promotion policies for accelerating economic growth. The study mentions FDI inflows as the main engine of economic growth. Nguyen (2017) also applied ARDL to detect the short-run and long-run impact of FDI using annual time-series statistics for the period of 1986-2015 in Vietnam. The study found that FDI inflows influenced economic growth positively in the long-run. However, the study did not find any significant impact on growth in the short-run.

Choe (2003) investigated the impact of FDI inflows and domestic investment on economic growth for 80 developing countries. This study found a strong co-integration and causal relationship among the variables and revealed that the causality from economic growth to FDI inflows was more prominent than the causality from FDI to economic growth. Similarly, Sothan (2017) investigated the causal link between economic growth and FDI for Cambodia over the period from 1980 to 2014 and found a strong one-way causal relationship, from FDI to economic growth, in Cambodia.

Employing the Pedroni panel co-integration technique and causality analysis, Agrawal (2015) examined the linkages between FDI inflows and economic growth for five BRICS economies, investigating data from 1989 to 2012. The study found that FDI inflows and economic growth are strongly co-integrated. The study additionally discovered a long-run strong unidirectional causality from foreign direct investment to economic growth in these countries. Iamsiraroj (2016) also searched for a causal relationship between FDI inflows and economic growth, applying a simultaneous equation analysis approach for 124 countries from 1971 to 2010. The study revealed a strong two-way causal relationship between economic growth and FDI inflows.

The impact of FDI inflows on economic growth may differ by sector. Therefore, several empirical studies investigate the impact of FDI inflows on economic growth for sector-level data and discover that FDI inflows in the manufacturing sector have higher growth potentiality than other sectors. For instance, Ehijiele *et al.* (2016) examined the contribution of FDI inflows on the performance of the manufacturing sector in Nigeria. The study discovered that FDI

inflows exert a positive impact on the output growth of the manufacturing sector in Nigeria. Eze *et al.* (2019) investigated the causality between FDI and manufacturing output growth in Nigeria. The study discovered a unidirectional causality from FDI inflows to manufacturing output growth. Wang (2009) investigated the impacts of sector-level FDI inflows on economic growth for 12 Asian countries covering data from 1987 to 997. The study revealed that FDI inflows in the manufacturing sector exerts a strong positive impact on economic growth for the selected countries. While, in the case of non-manufacturing FDI inflows, the growth impacts were found to be non-significant for the selected countries.

3.2.2.2 Studies finding a negative and insignificant relationship between FDI and economic growth

FDI inflows may generate a negative impact on economic growth by creating crowding-out effects on domestic investment. Several empirical studies supported the negative impact of FDI inflows on economic growth in the host country. Elboiashi (2011) investigated the impact of FDI inflows on economic growth for low-income and middle-income economies in Sub-Saharan Africa, covering annual time series data from 1992 to 2012. The study found that FDI inflows negatively impacts economic growth. FDI inflows also squeezed out the domestic sector and hindered the growth prospect of the local industry.

Similarly, Ruranga *et al.* (2014) analysed the relationship amongst FDI, economic growth, domestic savings and trade for Rwanda covering data from 1970 to 2011. Their study did not find any significant relationship between FDI inflows and economic growth. Mencinger (2003) investigated the correlation between FDI and economic growth for eight Central and East European countries and found a negative relationship between FDI and economic growth. The study mentioned that the crowding-out effect on domestic investment and the absence of the establishment of backward linkages may be the cause of the negative relationship.

The FDI inflows in the selected countries were concentrated to the tertiary sector such as trade, commerce and finance sector, which had little scope to generate backward linkages. Moreover, the relationship between FDI inflows and fixed capital formation of the selected countries are found to be negative, which implies a crowding out of domestic investment due to FDI inflows.

Several empirical studies discovered an insignificant relationship between FDI and economic growth. Roy and Mandal (2012) investigated the causal link between economic growth and FDI for nine selected Asian nations, employing the Granger causality test. The study did not find

causality from FDI to economic growth for most of the selected countries. In Turkey, Aga (2014) explored the co-integration between economic growth and FDI inflows. The study could not find any linkages between economic growth and FDI inflows. Alagöz *et al.* (2008) analysed the link between FDI and economic growth for Turkey using data from 1992 to 2007. Their study did not find evidence of Granger causality between FDI inflows and economic growth in any direction for Turkey.

3.2.2.3 Studies findings conditional positive results with a focus on the absorptive capacity of the host country

Several empirical studies supported the idea that FDI inflows have the potentiality to generate a positive impact on the economic growth of the host country, conditional on their absorptive capacity, such as sufficient human capital skills, institutional capacity, as well as trade and economic openness. For instance, Zhang (2001) examined the causal pattern of FDI inflows and output growth for selected East Asia and Latin American economies. The study found that the impact of FDI on economic growth depends on the host country's institutional and economic characteristics. The study also revealed that FDI inflows were more likely to create a positive impact on economic growth for those countries that had liberalised trade and economic policy, improved educational levels, and macroeconomic stability.

Carkovic and Levine (2002) critically examined the contribution of FDI inflows on the economic growth of the host country. The study did not find any significant positive impact of FDI inflows on economic growth when the effects of other growth potential variables were controlled; therefore, the study concluded that the presence of foreign investment does not automatically exert a positive influence on economic growth. The study mentioned that the growth generating effects of FDI depend on the level of financial development, educational attainment and the level of economic development of the recipient country.

Brahim and Rachdi (2014) emphasised institutional arrangements in boosting economic performance through FDI inflows for selected MENA economies covering the period from 1984 to 2011. The study discovered that the impact of foreign investment on economic growth is not automatic, but instead, conditional. The development of good institutional arrangements is required to foster economic growth through FDI inflows.

Furthermore, several empirical studies have emphasised the role of economic and trade liberalisation for harnessing the potentialities of FDI inflows in boosting economic growth. Basu *et al.* (2003) explored co-integration and causalities between FDI inflows and economic performance for selected developing countries covering data from 1978 to 1996. The study reveals two-way causality between FDI and economic growth, but only in the economies which have a higher degree of open trade policy. The study did not find a causal relationship from FDI inflows to economic growth for the less liberalised economies. Therefore, the study suggested liberalisation is essential for boosting economic growth through FDI inflows.

Yao (2006) investigated the relationship between FDI inflows, exports and economic growth to discover the effectiveness of export promotion and investment liberalisation policies in China. The empirical results of the study support the open policies of China and found strong positive effects of FDI inflows and export on economic growth. Azman-Saini *et al.* (2010) examined the relationship between economic growth and FDI inflows utilising the panel data analysis technique over the period 1976 to 2005. The study revealed that FDI inflows did not exert a positive effect on economic growth independently. The positive benefit of FDI inflows is found to be strongly dependent on the degree of openness of the country. Therefore, the study suggests enacting liberalisation policies to harness the positive spillover effects of FDI inflows in boosting economic growth. Similarly, Azman-Saini *et al.* (2010) and Iamsiraroj (2016) suggest that the presence of trade and economic liberalisation are required for the benefits of FDI inflows to be realised.

3.2.2.4 Studies focusing on the spillover or indirect effects of FDI

The indirect or spillover effects of FDI inflows are considered more prominent than the direct effect. Therefore, several studies examined the direct and indirect effects of FDI inflows for economic growth. For example, Li and Liu (2005) employed an instrumental variable analysis approach to examine whether FDI triggers economic growth for a sample of 84 countries (both developed and developing) covering data from 1970 to 1999. They conclude that FDI and economic growth are positively associated with both developed and developing countries. The study also revealed that FDI inflows have a strong positive interaction effect on the level of human skills and a negative interaction effect with the technology gap in developing countries. Therefore, the study concludes that FDI not only promotes growth directly but also stimulates growth indirectly through its interaction with other growth-enhancing variables.

Changyuan (2007) investigated the direct and spillover effects of FDI inflows on the economic performance of different regional states in China, covering data from 1987 to 2001. The study discovered that FDI inflows did not contribute directly to economic growth, but it positively impacted total factor productivity; therefore, FDI inflows contribute indirectly to economic growth in China. Similarly, Mullen and Williams (2005) investigated the impact of FDI inflows on regional growth and productivity in developed countries. The study found that FDI inflows exert a strong positive influence on regional economic performance and productivity. They also note that indirect or spillover effects are more prominant than the direct effects of FDI inflows for accelerating the economic activities in different regions.

Anwar and Nguyen (2014) investigated the spillover effects of FDI inflows in a large sample of manufacturing industries in Vietnam and revealed the diverse impact of FDI inflows for different regions of Vietnam. Some regions experienced a positive impact; some regions experienced a negative impact. The study found that the key channel of positive spillover effects of FDI inflows is the backward linkages channel. Chen *et al.* (2013) also found a strong role of backward linkages effects of FDI inflows in promoting growth and exports in China.

Table 3.1 summarises the key findings of some other studies related to the spillover effects of FDI inflows on economic growth.

Table 3.1: Summary of studies related to FDI and its spillover effects

Author (s) and Year of the study	Country /ies	Method	Results of FDI and spillover effect	Key findings
Aitken and Harrison (1999)	Venezuela	OLS, Panel Data Model	Net Negative spillover effect	FDI inflows positively impact the domestic firm's productivity through technology spillover.
Blomström *et al*. (2001)	East Asia and Latin America	OLS	Conditional	FDI inflows have the potential for knowledge spillovers but subject to human capital improvement in the host economy.
Altomonte and Resmini (2001)	Poland	Econometric model	Positive spillover	Both backward and forward linkages play a key role in promoting economic growth through FDI inflows.
Smarzynska Javorcik (2004)	Lithuania Manu-facturing sector	OLS and Olley-Pakes regression	Positive productivity spillovers	The joint venture firms generate positive spillover effects; whereas, fully foreign-owned firms generate limited spillover effects.
Kiyota *et al.* (2008)	Japan Multi-nationals	Firm behavioural analysis	Positive vertical backward linkages for developing countries	The backward linkage effects play a key role in generating spillover effects in accelerating economic growth through FDI channels in developing countries.

Author (s) and Year of the study	Country /ies	Method	Results of FDI and spillover effect	Key findings
Blake *et al.* (2009)	Chinese manu-facturing	Firm-level productivity	Positive spillover	Multinational firms generate positive spillover effects by stimulating export activities of state-owned firms. However, these spillover effects do not appear in fully private domestic firms.
Liang (2017)	China	Panel data model	Positive productivity spillovers	Both joint ventures and fully-owned firms generate positive spillover effects for domestic-owned firms, fully foreign-owned firms provide the greatest spillover effects.
Mutenyo *et al.* (2010)	Sub-Saharan Africa	2SLS econometric technique	Crowds-out domestic private investment	The efficiency gain and spillover effects of FDI inflows are limited.
Mishra (2011)	India	Panel framework	Mixed spillover effect	The spillover effect is not significant and consistent
Du *et al.* (2012)	China	Panel data model	Positive spillover	The backward and forward linkage effects are significant sources of productivity spillover effects from FDI inflows
Ola-David and Oyelaran-Oyeyinka (2012)	Africa (Kenya and Nigeria)	Binary logistic regression model	Not Automatic	Foreign competition intensified the speed of innovation, development of new products and processes, quality certifications, ICT usage and the ownership status of the firms.
Bruhn and Calegario (2014)	Brazil	Generalised Linear Models (GLM) approach	Some positive effects and some negative impacts of FDI inflows on productivity performance	Labour-intensive industries experienced a negative impact on productivity due to the entry of foreign firms.
(Kemme *et al.*, 2014)	Indian IT industry	Panel data model	Positive effects on exports	FDI has positive effects on exports but this positive effect does not spillover to non-FDI-recipient firms.
Sur and Nandy (2018)	Indian automobile industries	Stochastic frontier analysis	Limited spillover effect	The demonstration or imitation effects of FDI inflows are positive and significant for efficiency spillovers in the Indian automobile industries.

Therefore, the theoretical and empirical studies provide mixed and inconclusive evidence regarding the impacts of FDI on the host country's economic development. FDI inflows have the potential to generate both progressive and hostile impacts on the recipient country's economic development efforts through its direct and spillover effects. The magnitude of the effects depends on the physical, institutional and regulatory capacity of the recipient country. The impact of FDI on the host country’s economic development also depends on the type and motive of the FDI inflows. To reap the benefits of the FDI inflows, the host country should carefully formulate its policies to promote and regulate FDI.

In this thesis, I investigate the broad research question of whether FDI assists or hinders sustainable development in developing countries, using the Bangladesh manufacturing sector as a case study. Based on the three dimensions of sustainable development, the analysis is broken down into three parts – economic, environment and social sustainability. The diverse outcomes regarding the impact of FDI on a host country's economic development indicates the need for country and sector specific analysis. As such, a key hypothesis being investigated in the thesis is the degree to which FDI inflows in the manufacturing sector contribute to economic sustainability in Bangladesh.

3.3 The impact of FDI inflows on environmental conditions

3.3.1 Theoretical context

The recent development literature has shifted the focus from economic growth to green growth or ecologically-friendly development (Capasso *et al*, 2019; Recalde, 2014; Zhang, 2016). Green growth or development activities require a decoupling of growth from environmental destruction. FDI inflows are considered a viable means of promoting environmentally friendly technology. However, there is debate in the literature about the impact of FDI inflows on the host country's environmental standards and outcomes. FDI inflow can improve, worsen or may not generate any impact on the host country's environmental standards and outcomes. The environmental impacts of FDI depend on the type of FDI inflows, or the industry where FDI inflows take place, the performance of the MNEs, the growth and development pattern of the host country. The host country's development and environmental policies, rules, and regulations also influence the degree and nature of the environmental impacts of FDI.

In general, FDI can contribute positively to the environmental conditions of the host country by introducing advanced, efficient technology in production and resource management systems. FDI inflows can also diffuse environmentally-friendly technology and management system to the local industries, through spillover effects (Araya, 2005; Eskeland and Harrison, 2003; OECD, 2001). Multinational firms (MNEs) usually originate from advanced developed countries. Therefore, MNEs have some advantages over local firms, such as access to state-of-the-art technology, higher innovation capacity, experiences and exposure to better management and marketing systems. Modern, sophisticated technology improves resource efficiency and can reduce industrial waste and thus help to improve environmental conditions.

Moreover, multinational firms usually need to meet higher operational and management compliances in their home country. The monitoring and reporting system of MNEs is likely to be better than domestic firms, as MNEs not only follow the host country's regulations but also comply with the international rules and regulations to satisfy their stakeholders (OECD, 2001). If domestic firms learn from foreign firms and use better management and technology from the foreign firms, or are forced to use the advanced technology to qualify as suppliers for foreign firms, positive environmental spillovers can be generated in the host country. Therefore, FDI inflows can make a positive contribution to the host country's environmental conditions.

The linkages effects of FDI can also improve the environmental standard of the host economy. Local industries may be voluntarily inspired to improve their environmental management due to the linkages established with foreign affiliates; or, they may be forced to do that to meet the international standard. Local firms may try to imitate foreign affiliate's environmental technologies or hire workers with environmental expertise, as trained by multinational enterprises. In India, Ruud (2002) found that local firms are part of a broader logistical network and forced to improve their environmental performances to be eligible. In China, Christmann and Taylor (2001) discovered that domestic firms with a large percentage of sales going to multinational enterprises are more likely to adopt ISO 14001 than firms that are not part of such linkages.

However, the consequences of FDI inflows on the environment could be harmful as well. Copeland and Taylor (1994), in a theoretical explanation of the pollution haven hypothesis, argue that developed countries maintain a higher environmental standard and more stringent environmental regulation than developing countries. Therefore, the regulation costs for polluting industries in developing countries is lower than in developed countries. Moreover, developing countries might have a tendency to lower environmental regulations, or may not enforce existing regulations, to attract more FDI inflows in the country (Gallagher and Zarsky, 2005). As a result, dirty or polluting industries may shift from developed economies to developing economies, through FDI inflows.

The shifting of polluting industries from developed to developing economies via FDI is referred to as the 'pollution haven' hypothesis**.** The presence of a pollution haven potentially results in a degradation of environmental conditions and increases the pollution level of the host country.

In addition, Smarzynska and Wei (2001) and Copeland and Taylor (2013) note that foreign investors have a preference to invest in countries where environmental regulations are already compromised.

In contrast, research also shows that the cost of compliances with environmental regulations is a small part of production costs; only 2 to 3 percent on average (Adams, 1997; OECD, 1998; UNEP, 2000). Moreover, multinational firms can potentially improve the environmental conditions of the host country by promoting advanced, efficient green technology and management systems. Therefore, FDI can generate a 'pollution halo effect' in the host country. The pollution halo hypothesis advocates that multinational firms not only need to comply with the host country's regulations and standards, they also need to fulfil the requirements of the parent country's environmental regulations, which forces MNEs towards improved environmental performance. Moreover, due to the global corporate social responsibility movement, high environmental standards sometimes do not discourage investment; rather, it is preferred by investors (Gentry, 1998). Besides, the demonstration or imitation effects of FDI can also contribute to improving the overall environmental standard of the host economy (OECD, 2002).

The environmental impacts of FDI also depend on the types and sectoral structure of FDI inflows. The natural resource-seeking or extractive FDI activities are more destructive than efficiency-seeking and market-seeking FDI (Rothman, 1998; Zhang, 2014). Compared with horizontal FDI, vertical FDI might be more polluting (Tang, 2015). In the case of vertical FDI inflows, there is a tendency to shift the most polluting part of the production chain to the less stringent regulated country to reduce the production cost.

Gallagher and Zarsky (2005) note that the environmental impacts of FDI are mostly depend on the specific choices and decisions made by MNEs with regard to environmental practices. They argue that the transfer of environmentally friendly technology and management practices through FDI depends on the environmental performance of the MNEs, and the nature of the sector where FDI has been directed. As developing countries have less bargaining power and lack the capacity to enforce regulations and laws, the choice of technology (whether MNEs use the best available, newer, cleaner technology or dump older, dirtier technologies) is a voluntary decision of MNEs. In terms of management practice, whether the companies adopt the parent country's system or follow the host country's system, is also a choice of MNEs.

The scale and compositional effects of FDI activities also play a significant role in the environmental impacts of FDI inflows. Gallagher and Zarsky (2005) point out that even if MNEs perform better compared to domestic industries in using environmentally friendly technology and management practices, the scale effect of the additional economic activities of MNEs is likely to accelerate the environmental degradation in the host country. On the other hand, the compositional change in the production process can be beneficial for the host country environment. MNEs may experience higher economic efficiency in production; therefore, energy, water, and raw materials used per unit output will be lower than in the domestic industries. Economic efficiency also contributes to reducing the amount of waste and emissions in the production process. Therefore, the economic efficiency of MNEs can be translated into greater environmental efficiency.

Araya (2005) emphasises the technology effects of FDI inflows in assessing its environmental impacts. MNEs introduce new advanced technology in the transfer of machinery, equipment, patent rights, expatriate managers and technicians, from the parent multinational enterprises to the affiliates; further, MNEs train their affiliates about better environmental and risk management practices. Araya (2005) argues that advanced, efficient techniques could reduce pollution and resource depletion, as well as minimise, and even offset, scale effects of FDI. However, the author also underscores that advanced environmental technology and the know-how may or may not be transferred to the local industry. The transfer of technology responds to cooperation between local firms and foreign investors through joint training programs.

Several theoretical and empirical literatures focus on the Environmental Kuznets Curve (EKC) hypothesis, which explains the environmental impact of FDI. The EKC hypothesis is developed based on the Kuznets hypothesis of income inequality (Kuznets, 1955). The Kuznets hypothesis refers to an inverted U-shaped relationship between per capita income and income inequality. In the investigation of the environmental impacts of the North American Free Trade Agreement, Grossman and Krueger (1991) noticed the inverted-U relationship between economic growth and the environmental quality for the first time. The EKC hypothesis refers to a situation where the environmental condition of a country initially worsens with an increase in per capita income, but improves once per capita income reaches a certain point. Grossman and Krueger (1991) argue that at higher levels of per capita income, environmental regulations become more stringent due to increased environmental awareness, compositional change in the output mix, increased demand for green products and the ability to bear the cost of environmental protection. Grossman and Krueger (1995) also argue that at a higher income level, the country

has a tendency not to produce environmentally polluting products; rather, the country prefers to import polluting product from developing countries to protect its own environment. Figure 3.1 shows the Environmental Kuznets Curve.

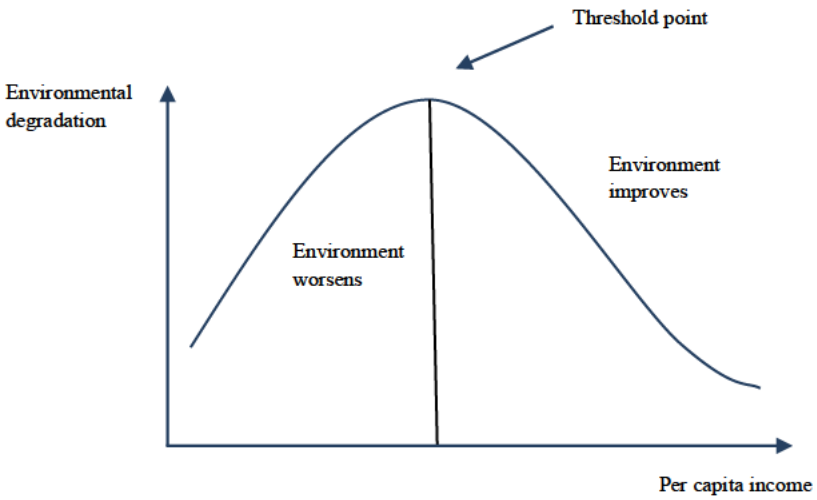

Figure 3.1: The Environmental Kuznets Curve (EKC)

Grossman and Krueger (1991) identify three effects – the scale effect, the composition effect, and the technique effect – for explaining the EKC relationship through trade openness and FDI inflows.

The scale effect of FDI inflows is negative for the environmental quality in the host country. The presence of FDI intensifies the economic activities of the host country and this intensification of economic activities leads to environmental degradation. Therefore, even if multinational firms use less polluting technology, the overall pollution level of the host country will increase due to the larger scale of economic activities.

The composition effect is related to the allocation of resources. FDI can bring changes in the structural composition of the economy. The composition effect of FDI inflows can be both positive and negative for environmental quality depending on the type of structural change. UNCTAD (1999) reports that FDI inflows help to expand the service sector activities both in developed and developing countries. The activities of service sectors are usually less polluting in nature; therefore, structural shifts induced by FDI may generate a positive impact on the environmental quality of the host economy. On the other hand, if FDI inflows contribute to increasing the share of polluting industries in the economy, the compositional effect will be negative for the environment.

The technique effect refers to the effects of technological change in the production system. Foreign firms are expected to use environmentally friendly technology compared with local firms in developing countries. Cleaner technology may transfer or diffuse from foreign firms to local firms. Therefore, the technique effect is expected to be positive in improving the environmental quality of the host economy. In addition, FDI may promote economic growth and increase the per capita income of the host economy. Higher-income level generates increased environmental awareness among the community. Therefore, there will be a higher demand for better environmentally friendly products. Environmental awareness forces local governments to adopt and enforce stringent environmental regulations. Panayotou (1997) defines increased environmental awareness as the income effect of FDI inflows on environmental regulations.

In general, the scale effects from increased FDI inflows are likely to be negative for the environment, while the composition and technique effects are expected to be positive to the environmental conditions of the host country. In the short-run, the scale effect is more dominant than the composition and technique effects; in the long-run, composition effects, and technique effects play a more dominant role than scale effects and contribute to the inverted U-patterned EKC relationship in the host country.

However, the existence of EKC is a subject of debate both in the theoretical and empirical literature. Stern and Common (2001) commented that the pollution level relates to time rather income level. Panayotou (1997) and Panayotou (2000) note that if the income levels of developing countries are close to the turning point, the increases in pollution and resource depletion will continue for a long time and can lead to significant and possibly irreversible damage. I turn now to a broad discussion of the empirical literature.

3.3.2 Empirical studies

The empirical studies related to FDI and environmental performance mostly concentrate on the validity of pollution halos, pollution havens and the existence of an EKC relationship.

3.3.2.1 Studies finding evidence of pollution halos

The pollution halos hypothesis postulates that FDI inflows improve the environmental conditions of the host country. Eskeland and Harrison (2003) provide evidence in favour of the pollution halo hypothesis. They found that foreign companies were cleaner and used less energy

in their factories in Mexico, Côte d'Ivoire and Venezuela. Blackman and Wu (1999) also found strong support in favour of the pollution halo hypothesis in China. Their study suggests that using advanced technology in electricity generations, FDI inflows contribute to reducing the pollution level in China. The practice of better management and increased competition also contribute to the halo effect of FDI.

Guoming *et al*. (1999) found that multinational enterprises transferred environmental management skills to their Chinese partners, and some multinational enterprises co-operated with the Chinese government on environmental matters. They also found that multinational enterprises promoted less pollution and energy techniques to local manufacturing industries. Warhurst (1999) conducted 25 case studies to analyse the role of FDI as a channel for clean technology transfer in mineral extraction. The studies revealed that technological collaboration between suppliers and recipients, and training, could potentially contribute to the improved environmental performance of local firms.

Rondinelli and Vastag (2000) studied the Aluminium Company of America (Alcoa Corporation) and revealed that the affiliates of the company generally used advanced environmental technologies in their operations in developing countries. Andonova (2003) also found that multinational enterprises performed better than other organisations in terms of adopting and practising environmental norms and rules, and exert a positive impact on environmental standards in European economies. Similarly, Albornoz *et al.* (2009) found that, in Argentina, multinational firms exert a positive impact on environmental quality by practising environmental management and insisting that affiliates follow higher environmental standards. The study also discovered that environmental spillover is higher in those firms in which absorptive strength and export activities are relatively high.

In a co-integration analysis, Maji and Habibullaha (2015) found evidence supporting the pollution halo hypothesis. The study applied the ARDL Bound Testing approach and found FDI inflows contribute to reducing CO_2 emissions. Al-mulali and Tang (2013) also revealed evidence supporting the pollution hallo hypothesis for gulf economies. For G20 countries, Lee (2013) discovered that FDI inflows have little effect on CO_2 emissions. Antweiler *et al.* (2001) also supported the pollution halo hypothesis for SO_2 emissions for a sample of 43 developed and developing economies.

Several studies focus on corporate social responsibilities and the implementation of rules and regulations for realising the halo effects of FDI. The corporate social responsibility practised by MNE_S (or cross-border corporate environmental management) could play an important role in improving environmental conditions. Haufler (2001) and Garcia-Johnson (2000) claim that collaborative approaches, development of internal codes of conduct, and voluntary standards play a key role in the promotion of environmental management and self-regulation. The rules and regulations of the host and source countries are key in shaping corporate environmental strategies. For example, host country regulations may influence investors' environmental behaviour (Gentry, 1998; O'Connor, 2000; UNCTAD, 1993). In a case study of the Mexican manufacturing sector, Gentry (1998) found Mexican regulations played a key role in the investor's decision to undertake environmental investment.

Several studies suggest strengthening the role of NGOs or civil societies for promoting environmental halo effects of FDI. The implementation of the law in developing countries, and its enforcement, can be weak (Gentry, 1998; Guoming *et al.*; 1999, Jha, 1999; Rasiah, 1999). Therefore, in addition to the formal regulations, non-formal efforts by NGOs can contribute to improving the environmental standards of companies. Newell (2001) notes that the creation of environmental NGOs increased the monitoring and scrutinising of the social and environmental performance of MNEs. The NGOs place pressure on companies to disclose and follow the codes of business. The World Bank policy research report, 'Greening Industry: New Roles for Communities, Markets, and Governments' (World Bank, 2000) emphasises the role of civil society in improving the environmental performance of firms. Mol and Carter (2006) also highlight the role of the local community and civil society pressures in cleaning up industrial toxic and hazardous waste in China.

3.3.2.2 Studies finding evidence of pollution havens

The pollution haven hypothesis postulates that the presence of FDI worsens the environmental conditions of the host country. In a case study of Mexico, Dasgupta *et al.* (2000b) found that foreign companies were not systematically cleaner than local companies. Guoming *et al.* (1999) explored MNEs that managed natural resources poorly in plastic and leather industries in China. Rasiah (1999) also provides evidence of MNEs engagement in destructive environmental practices in Malaysia. Grimes and Kentor (2003) note that less develop countries, which have a high dependency on foreign investment, faced a higher level of carbon dioxide (CO_2)

emissions. The study also argues that foreign-owned firms have a high intensity of energy consumption, which results in increased energy-related emissions and pollutions.

In a co-integration analysis, Baek and Koo (2009) also found evidence of the pollution haven hypothesis for two Asian countries, India and China. The study revealed a co-integration between FDI inflows, energy consumption and economic growth for two Asian countries. The study found that FDI inflows strongly influenced the energy consumption level and degraded environmental quality of the host countries. Pao and Tsai (2011) also confirmed the existence of the pollution haven hypothesis for BRIC (Brazil, Russia, India, and China) countries. Chandran and Tang (2013) also found a strong linkage between CO_2 emissions and FDI for five ASEAN countries. Kaya et al. (2017) investigated the long-run and short-run relationship between FDI inflows, economic growth, trade openness and CO_2 emissions in Turkey, using data from 1974 to 2010. The study revealed a strong long-run co-integration among the variables. The study also found that FDI inflows and trade openness positively impacts on CO_2 emissions in the long-run. The study also identified bi-directional causalities between foreign investment and CO_2 emissions in Turkey. Bi-directional positively causality between FDI inflows and CO_2 emissions implies that pollution and FDI inflows influence each other. The causality direction from FDI inflows to CO_2 emissions indicates that an increase of FDI inflows leads to an increase of CO_2 emissions in the country. At the same time, the causal direction from CO_2 emissions to FDI inflows indicates that high pollution levels in the host country is favourable for attracting more FDI inflows . The higher degree of pollution levels may indicate limited environmental monitoring capacity or a low enforcement level of environmental regulations in the host country. Therefore, positive bidirectional causality between FDI inflows and CO_2 emissions supports the pollution haven hypothesis.

Similarly, Omri *et al.* (2014) used a panel data analysis for 54 economies over the period from 1990 to 2001 and revealed bi-directional causalities between FDI inflows and CO_2 emissions. Hoffmann *et al.* (2005) tested the causalities and their directions between FDI inflows and CO_2 emissions for low, middle and high-income countries at the global level. The study revealed that a one-way causal link existed from CO_2 emissions to FDI inflows in low-income economies. The causality from CO_2 emissions to FDI inflows in middle and high-income economies was found to be insignificant. Therefore, the pollution haven hypothesis was rejected for middle and high-income countries but found to be valid for low-income economies. As above, poor monitoring and the lack of strict environmental regulations may be the cause for

FDI investments in low-income countries where CO_2 emissions are high. Ridzuan et al. (2014) also supported the pollution haven hypothesis for selected ASEAN countries.

3.3.2.3 Studies related to the EKC hypothesis

Several studies investigated the presence of the EKC hypothesis to explore the relationship between FDI inflows and environmental conditions of the host country. However, the existence of EKC is a long-debated issue. The results of the existence of EKC vary by the model specification, estimation procedure and interpretation of the findings of the studies (Agras and Chapman, 1999; Cole, 2003; Harbaugh et al., 2002; Heerink et al., 2001; Millimet et al., 2003; Nahman and Antrobus, 2005). The results may also vary for different pollutants and countries.

Due to the availability of the data and the importance of CO_2 emissions and energy consumption on global climate change, several econometric studies investigated the validation of the EKC hypothesis in the presence of FDI inflows by investigating the link and causality among foreign investment, level of energy use, CO_2 emissions, and economic growth. For example, Pao and Tsai (2011) investigated the linkages between FDI inflows, economic growth, CO_2 emissions and energy consumption for BRIC countries covering data from 1992 to 2007. Employing multivariate Granger causality analysis, the study found a long-run co-integration among the variables and validated the Environmental Kuznets curve (EKC) relationship for BRIC countries. The causality analysis of the study also found bi-directional causalities between FDI inflows and energy pollutants. The study also detected that economic growth 'Granger causes' FDI inflows.

Similarly, Kivyiro and Arminen (2014) supported the EKC pattern for CO_2 in the presence of FDI inflows and energy use. Badri and Parvizkhanlu (2014) tested the EKC relationship for selected petroleum exporting countries, applying the fixed-effects model in panel data (covering 1990 to 2009). Their study found evidence of the EKC U-shaped pattern. FDI inflows were found to negatively impact on CO_2 emissions and positively impact on economic growth, thus FDI inflows contributed to improving environmental quality. Shahbaz *et al.* (2015) employed a co-integration technique for different income groups using a global panel and validated the EKC U-shaped pattern and pollution haven hypothesis. The study also identified that two-way causalities are running between CO_2 emissions and FDI inflows at a global level. Kim and Beak (2011) also supported EKC relationship. The study discovered that in the long run, economic

growth deteriorated environmental quality in developing countries. However, economic growth helps to improve environmental quality in developed economies.

In contrast, several empirical studies did not find sufficient evidence in favour of the EKC hypothesis in the case of CO_2 emissions, energy consumption and FDI inflows. Narayan and Narayan (2010) investigated the Environment Kuznets Curve (EKC) hypothesis for developing countries in different regions. The study assumes that if the short-run income elasticity of CO_2 emissions is larger than the long-run elasticity, the EKC relationship exists. The study found evidence supporting the EKC relationship in the Middle Eastern and South Asian region. The short-run elasticities are larger than the long-run elasticities, which implies that CO_2 emissions have fallen over time with the increase of income.. However, in East Asian, Latin American and African regions the study found that the income elasticity is smaller in the short run than in the long run. Therefore, the study rejected the EKC relationship for East Asia, Latin America and African regions. Asici (2013) explored the causal link between economic growth and environmental performances for different income-group economies, and found that economic growth worsens environmental quality in middle-income countries to a greater extent than low and high-income countries. However, economic growth positively impacts the environmental quality in high-income countries. Therefore, the study failed to validate the EKC hypothesis.

Furthermore, the EKC hypothesis might exist for some environmental pollutants, but not others (Barbier, 1997; Munasinghe, 1999). Nordström and Vaughan (1999) underscore that the EKC relationship exists for locally confined pollution, such as water pollution. However, EKC does not seem to hold for pollutants that disperse into a greater geographical space (such as carbon dioxide emissions). Torras and Boyce (1998) support the EKC hypothesis for sulphur dioxide (SO_2); although for heavy particles, they reveal a monotonically-decreasing relationship. In the case of carbon dioxide (CO_2) emissions, Holtz-Eakin and Selden (1995) found evidence of the EKC for selected economies, covering data from 1951 to 1986. Kacar and Kayalica (2014) and Hilton and Levinson (1998) also found evidence of the EKC pattern for sulphur and lead emissions, respectively. Perman and Stern (2003) tested the validity of the Environmental Kuznets curve for 74 countries. They employed panel data estimation process to investigate the co-integration between sulphur emissions and economic growth; they confirm there is a long-run co-integration between the variables. However, they did not find evidence of the existence of the EKC hypothesis.

Hettige *et al*. (2000) express concerns about water pollution in the industrial sector and reject the EKC relationship. They found that due to an intensification of industrial activities in middle-income countries, water pollution was alarming and ongoing. Harbaugh *et al.* (2002), using a panel data model, rejects the inverted-U shaped EKC relationship for major air pollutions. Applying the simultaneous equations model, Shen (2006) explored the existence of the EKC relationship for SO_2 emissions, three water pollutants and dust in China, and found evidence of the EKC relationship for water pollution and SO_2 emissions. However, there was no significant relationship for dust.

Several studies investigated the EKC relationship through the scale effect, composition effect, and technological effect. For example, De Bruyn *et al*. (1998) conducted an empirical analysis of three major air pollutants within a dynamic model to investigate the existence of the EKC pattern. The study discovered a link between economic growth and air pollution. They note structural and technological change may lead to declining emissions over time.

Cole and Elliot (2003) investigated which effects (scale or technique) played a key role in different air pollutants. The study revealed that the technique effect is stronger than scale effects in the case of sulphur dioxide (SO_2) emissions, but scale effects are more prominent for CO_2 and nitrogen oxide[5] emissions. In contrast, for China, Jayanthakumaran and Liu (2012) found that the scale effect is stronger than the technique effect for sulphur dioxide (SO_2) emissions.

Therefore, the theoretical and empirical studies fail to establish any conclusive relationship between foreign direct investment inflows and the host country's environmental conditions. It mostly depends on the performance of the MNEs, host country's environmental policies, regulations, and their enforcement, nature of the sector/industry where FDI inflows are channelling, the management methods and types of technology used in foreign affiliates of transnational/multinational corporations. The diverse and inconclusive results regarding the impact of FDI inflows on various aspects of environmental sustainability of a host country suggests that country-specific analysis is required when making policy conclusions. As such, a key hypothesis being investigated in the thesis is the degree to which FDI inflows in the manufacturing sector contribute to environmental sustainability in Bangladesh.

[5] Oxides of nitrogen are a mixture of gases comprising nitrogen and oxygen. Two of the most toxicologically significant compounds are nitric oxide (NO) and nitrogen dioxide (NO_2); other gases in this group are nitrogen monoxide (or nitrous oxide, N_2O), and nitrogen pentoxide (NO_5).

3.4 The impacts of FDI inflows on social development

Improvement in the overall quality of life and social equality are the primary concerns of the social dimensions of sustainable development. The quality of life depends on various issues such as employment and income, environment, health, education, working conditions, and social and political rights. Social equality mainly focuses on the inclusive nature of development. In most cases, the literature related to the impact of FDI inflows on the social dimension of sustainable development discusses the effects of FDI inflows on employment generation, poverty reduction and income inequality.

3.4.1 FDI and employment generation

Employment generation is crucial for improving the quality of life as it provides income to households and increases access to different social facilities, such as education, health, and housing. FDI inflows can create direct and indirect employment to the host country (Gorg, 2000). Through new investment, FDI inflows often create jobs directly. It can also create indirect jobs, through backward and forward linkages. Backward linkages occur when multinationals procure raw materials from local industries. In purchasing intermediate products from the domestic firms, multinationals can boost the economic activities of domestic firms, which in turn generates further employment. By creating demand for the upstream products and services, as well as establishing linkages with distributors of local firms, multinationals can also generate additional jobs for the local workforce through forward linkage channels.

The activities of FDI can further create employment in other sectors through multiplier effects. The increased income, in turn, generates additional demand for other sector products. As a result, the production and activities of other sectors will increase, and employment generation will also increase. The degree of the indirect effect of employment creation by FDI inflows is higher than its direct effects. In 1997, the global FDI inflows generated 26 million direct jobs and 42 million indirect jobs (IFC, 2013, p. 49). Therefore, each direct employment creation by FDI inflows stimulated 1.6 indirect jobs through its linkages.

However, the scale of the impacts of foreign direct investment on employment creation depends mostly on the types of the FDI inflows (greenfield or brownfield) production techniques used in the sector (capital or labour-intensive) and linkages established with the local industries ('crowding in' or 'crowding out'). For example, if the presence of foreign direct investment crowds out domestic investment due to increased competition, the net effects on employment

generation could be negative. Multinational enterprises (MNEs) are large international organisations that have greater economic power and scale than local competitors. Therefore, FDI inflows may force local firms to quit the market (Kurtishi-Kastrati, 2013). The number of jobs created by the MNEs might be greater or smaller than the jobs lost in the local industries. As a result, the net number of job creations by the FDI inflows could be negative due to substitution effects (Hill, 2001). Similarly, if FDI inflows take place in labour-intensive sectors, employment generation will be higher than capital-intensive FDI inflows. Moreover, MNEs use relatively capital-intensive technology, compared with the local industries, which reduces their possible effect on job creation.

The empirical findings of the impacts of foreign direct investment on employment generation also provide mixed results. Several studies discover a positive impact of FDI inflows on employment generation. For example, Craigwell (2006) found that FDI inflows contributed strongly to employment creation in the Caribbean region. Nunnenkamp and Bremont (2007) investigated the extent to which FDI inflows influenced job creation and in Mexico. They employed a GMM estimator for panel data from 1994 to 2006 and discovered that foreign direct investment had a strong positive impact on employment generation in the manufacturing sector in Mexico. Federico and Alfredo (2008) evaluated the influence of export-oriented FDI inflows on domestic employment generation for the period of 1996 to 2001 for selected manufacturing industries in Italy. The results show that foreign direct investment has a strong positive influence on employment generation. Federico and Alfredo's (2008) study also revealed that FDI inflows did not crowd out the employment of small plants in the country.

Ajaga and Nunnenkamp (2008) also found a positive association with FDI inflows and employment generation in the USA. They examined long-run links between foreign direct investment, economic performances and employment for US states. Utilising the co-integration technique and Granger causality tests covering data from 1977 to 2001, they reveal co-integration and bi-directional causalities between economic performances and FDI inflows. Ndikumana and Verick (2008) show that FDI inflows create crowding in effects on employment and local investment in Sub-Saharan Africa. They also found bi-directional causalities between domestic investment and FDI inflows.

In contrast, several studies reveal a negative impact of FDI inflows on employment generation. For instance, Buffie (1993) (within a bi-sectoral dual economy system) investigated the influence of FDI on domestic capital accumulation and underemployment. The study found that

in the long run, FDI inflows generated crowding-out effects in high-paid manufacturing industries. However, the study also found that in traditional and primary sectors, FDI inflows produced crowding-in results and helped to reduce underemployment levels significantly. Rizvi and Nishat (2009) investigated the contribution of FDI inflows on employment using the panel estimation technique for India, China, and Pakistan, covering data from 1985 to 2008. The results of the study indicated that FDI inflows did not create employment opportunities in the selected countries. The study suggested these countries should look for alternative strategies to stimulate employment. Similarly, Onimisi (2014) also found a negative association between employment level and foreign direct investment in Nigeria. The study recommends establishing a partnership between the research institutions and industries to build necessary adaptable skills.

The theoretical and empirical literature related to the impact of FDI inflows on employment creation indicates that the indirect effects are more prominent than the direct effects. The empirical findings suggest that FDI inflows have a positive impact on employment creation in the countries where FDI inflows help to expand backward industries or generate crowding in effects in domestic investment. The presence of necessary skills and expertise is also important for the effectiveness of FDI in generating employment. The impact of FDI inflows on employment generation also depends on the type of FDI inflows such as labour-intensive or capital intensive, greenfield or mergers and acquisition. In terms of employment creation, labour-intensive and greenfield FDI inflows are more beneficial than mergers and acquisition and capital intensive FDI inflows.

3.4.2 FDI and poverty reduction

Poverty reduction is another critical issue of concern in assessing the social effect of foreign direct investment. In developing economies, poverty is a major social challenge. Poverty causes a lot of social problems such as malnutrition, low life expectancy, childhood labour, and a low standard of living. FDI might not create any direct effect on poverty reduction in the host economy. However, FDI can indirectly contribute to poverty reduction through the following channels: the systematic channel of foreign direct investment-growth-poverty reduction; the redistribution of revenue income channel; and the enterprise's channel.

3.4.2.1 The systematic channel of FDI-growth-poverty reduction

The systematic FDI-growth-poverty reduction relationship suggests that if per capita GDP increases, then the average income level of poor communities will increase. Therefore,

economic growth positively impacts on poverty reduction (World Bank, 1990; Goudie and Ladd, 1999; Kakwani, 1993; Lipton and Ravallion, 1995; Osmani, 2005; Roemer and Gugerty, 1997). In general, boosting economic growth is often considered as a catalyst or tool to reduce the poverty level. At the same time, FDI inflows can stimulate economic growth in various ways; for example, through the direct supply of new capital and creating new employment. FDI can also stimulate growth through various spillover effects, such as increasing productivity and efficiency through the transfer of knowledge and technology, and by establishing production linkages with local firms.

Dollar and Kraay (2001) claim that economic growth raises the income level of the bottom income group at the same rate as the rate of economic growth. They also state that opening up the economy stimulates growth and poverty reduction and reduces the income inequality. The study revealed that a 100 percent increase in the trade share would have the cumulative effect of raising incomes by 25 percent over a decade. The impact of FDI on economic growth was found to be higher than the impact of total trade on growth; a one percentage point increase in FDI inflows as a share of GDP would result in a cumulative effect on average incomes over the course of a decade of 13 percent. The study also revealed that the distributional effect or the effect of trade openness on income inequality was insignificant or close to zero. The estimated coefficient for the overall per capita income growth was 1.04 when the dependent variable is per capita income growth for the bottom quintile. Thus, globalization or FDI inflows contribute to poverty reduction through stimulating economic growth in the host countries. Adams (2004) estimates the elasticity of poverty in respect to economic growth using data from 126 economies, including 60 developing economies and found that economic growth reduces the degree of poverty. The growth elasticity of poverty was -2.79 indicating that a one percent increase in economic growth contributed to reducing the poverty level by 2.79 percent in the selected economies.

Several studies also demonstrate that boosting economic growth is critical for reducing poverty, as the intensification of economic activities contributes to employment generation and provides opportunities for poor communities. Tsai and Huang (2007) investigated the link between poverty and economic growth in Taiwan, and claim that economic growth reduced poverty in the country in short and long run. The study also discovered that international trade contributed to reducing the poverty level through direct and indirect effects. In Nigeria, Ijaiya *et al*. (2011) investigated the effect of economic growth on poverty covering data from 1980 to 2008, and found a positive effect of economic growth on poverty reduction.

However, economic growth may not always contribute directly to reducing the poverty level in the host economy. Growth might be a necessary condition but insufficient for reducing poverty. The origins of economic growth and how the growth benefits are distributed among different income groups are also important for poverty reduction. Islam (2004) investigated the co-integration among employment generation, poverty reduction and economic growth. The results demonstrate that the effect of economic growth on poverty reduction is not homogeneous – that is, the same level of growth rates could impact poverty reduction differently. The types of growth and how it reacts with employment creation are more important for poverty reduction. In Malaysia, Mulok *et al*. (2012) also examined the empirical linkage between poverty reduction and economic growth, and claim that economic growth is essential but insufficient for poverty reduction. The study focuses on the improvement of income distribution for reducing poverty.

3.4.2.2 Redistribution of revenue income channel for poverty reduction

The redistribution of the revenue income channel suggests that the corporate tax paid by the foreign firms and their subsidiaries helps to increase the tax base and capacity of the host government to adopt more welfare and poverty alleviating activities, thus contributing to reducing poverty. Klein *et al.* (2001) commented that multinationals and their subsidiaries are paying revenue to the host government, which increases the likelihood of adopting basic service facilities and redistributive activities by the government. Thus, FDI generally helps to reduce the poverty level. Nonetheless, the revenue effects of foreign direct investment on poverty reduction depend mostly on the fiscal incentive programs offered by the host government to attract FDI. Developing countries often fear imposing a high corporate tax, especially for foreign firms, as high taxes may draw away FDI inflows to other countries.

The empirical research on the impact of FDI inflows on poverty reduction is limited. No empirical research has so far been carried out which investigates the impact of the redistribution of revenue income channel of FDI on poverty reduction in the host country.

3.4.2.3 Poverty reduction through enterprise channel

The enterprise channel demonstrates that MNEs can contribute to poverty reduction directly by creating employment opportunities for poor, unskilled communities and adopting corporate social activities for the wellbeing of the poor. Prahalad (2012) argues that multinationals could boost the economic activities of the lowest income group communities and thus help a huge

number of people rise out of poverty. The author emphasises the potentialities of underdeveloped economies and urges companies to utilise those potentialities to reduce poverty. The practice of corporate social responsibility (CSR) may also influence poverty reduction of the host economy indirectly. For instance, the assurance of paying the minimum wage and other working facilities can contribute to upgrading the living quality of people.

MNEs sometimes engaged in various social welfare activities with local agencies, such as relief work, infectious disease-prevention activities, and providing a stipend for education. These types of activities may indirectly influence the poverty reduction of the host economy; however, it is more likely that multinational firms are more technologically advanced and recruit skilled workforce instead of the unskilled workforce. At the same time, small-scale industries usually offer more employment, as small industries are labour-intensive by nature. Moreover, CSR is a voluntary initiative. Foreign firms may not adopt a higher standard, and in most cases, the CSR role is limited and has an insignificant impact on poverty reduction (Pradhan, 2007).

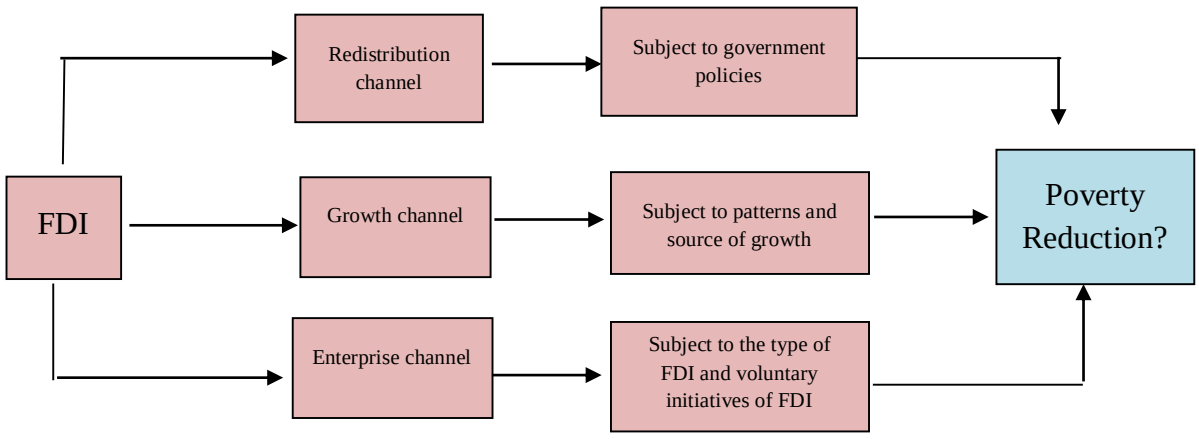

Figure 3.2: Effects of FDI inflows on poverty reduction

Figure 3.2 illustrates the contribution of foreign direct investment to poverty reduction in the host economy through growth, enterprise, and redistribution channels, which depicts that the effect of foreign direct investment on poverty reduction is still a subject of debate and conditional. The contribution of FDI inflows to poverty reduction in the host country through the growth channel mostly depends on the distributional effects and sources of growth. If FDI inflows contribute to increasing the share of high-technology based industries in economic growth, it may create an adverse effect on the income distribution of the countries. Economic growth may not increase the income level of poor communities and thus, an improvement in the poverty situation due to economic growth is not ensured. Similarly, the effects of FDI

inflows on poverty reduction through redistribution of revenue channel largely depends on the fiscal policy of the government. If the revenue income received from the MNEs is not reinvested or spent on social programs (such as education, health) and welfare activities, the redistribution effect will not materialise. Furthermore, the effects of poverty reduction through the enterprise channel mostly depends on the CSR activities of MNEs. CSR is a voluntary initiative of MNEs and has a very limited role for poverty reduction. Therefore, the growth, redistribution and enterprises channels do not provide a guaranty of poverty reduction in the host country through FDI inflows.

3.4.2.4 Empirical studies investigate the direct relationship between FDI inflows and poverty reduction

Outside of the indirect linkages (through growth, enterprise, and redistribution channels), several studies also empirically investigate the direct relationship between FDI inflows and poverty reduction. The studies employ different econometric techniques and use different indicators or measurements of poverty such as the poverty rate, income of the bottom 20 percent, the Human Development Index (HDI), and headcount ratios of poverty. Regardless of indicators, the studies provide inconclusive and diverse findings about the impact of FDI inflows on poverty reduction of the host country.

Using the poverty rate as an indicator of poverty measurement, Hung (2005) investigated the relationship between poverty reduction and FDI inflows, covering data from 1992 and 2002 for Vietnam. The study reveals that FDI contributed to reducing poverty, and shows that if foreign direct investment increases by 1 percent, then 0.05% of people will be lifted out of poverty (poverty rate). The study also discovered that FDI inflows positively contributes to the economic growth in Vietnam and the economic growth did not make any significant adverse effect on income distribution in the country. Jalilian and Weiss (2002) investigated the effect of FDI on poverty for ASEAN economies covering data from 1987 to 2000. The study considers the income of the bottom 20 percent as the poverty measure and also discovered a positive contribution of foreign direct investment on poverty reduction. Ucal (2014) also supports the view that FDI inflows contribute to reducing poverty for 26 developing economies.

Using the Human Development Index (HDI), several empirical studies show that FDI inflows contribute to improving the poverty level of the host economy. Reiter and Steensma (2010) investigated the relationship between foreign direct investment and poverty for 49 developing

economies, covering data from 1980 to 2005. The study indicates a strong positive effect of foreign direct investment on human development. The study also revealed that the institutional quality of the host country is crucial for making FDI inflows beneficial for poverty reduction in the host country. For example, the impact of FDI inflows on poverty reduction was found to be insignificant in countries with high corruption. Sharma and Gani (2004) investigated the effect of foreign direct investment in human development for low and middle-income countries, covering data from 1975 to 1999. The study also uses the Human Development Index (HDI) and found bidirectional strong causal influences between the Human Development Index and foreign direct investment. The presence of a bidirectional causal relationship between the Human Development Index and FDI inflows implies that countries with a higher level of human development attract more FDI inflows and that these inflows have a stronger effect on poverty reduction.

Similarly, Gohou and Soumaré (2012) examined the impact of foreign direct investment on poverty reduction of 52 African countries, using HDI during 1990 and 2007. Applying Instrumental Variable Regression analysis, the study also discovered that foreign direct investment had a strong positive effect on poverty reduction. The study also discovered that FDI inflows had greater impacts on poverty reduction in poorer countries compared to relatively wealthier countries. Poor countries usually attract labour-intensive FDI inflows and thus create new jobs for poor, low-skilled workers, which contributes to reducing poverty. Soumaré (2015) investigated the association of FDI and welfare improvement in Northern Africa, covering data from 1990 to 2011, and shows that FDI inflows contribute significantly to improving welfare.

In contrast, several empirical studies did not find any significant effect of FDI inflows on poverty reduction, taking HDI as an indicator of poverty measurement. For instance, Tsai and Huang (2007) failed to find any significant relationship between poverty reduction and foreign direct investment in Taiwan. Hussain *et al*. (2010) also examined the influence of FDI intensity on human development in Pakistan, using the Human Development Index, and report neutral effects of foreign direct investment in human development in Pakistan.

The studies, which consider the poverty headcount ratio, also found both positive and negative results about the impact of FDI inflows on the poverty level in the host country. For example, Shamim *et al*. (2014) and Zaman *et al*. (2012) use the poverty headcount ratio and found a positive impact of FDI inflows on poverty reduction in Pakistan. Fowowe and Shuaibu (2014) also used the poverty headcount ratio to discover how foreign direct investment affects a poor

community for 30 African economies and discovered a positive contribution of FDI on reducing poverty. The study also revealed that higher human development and institutional quality enhanced the efficiency of FDI in reducing poverty. Bharadwaj (2014) investigated the influence of FDI inflows on poverty for selected developing economies, from 1990 to 2004. The study found FDI inflows and the headcount ratio had a negative relationship and contributed to poverty reduction. In a time series analysis, Israel (2014) also discovered a positive co-integration between poverty reduction and FDI inflows in Nigeria. Using panel analysis, Uttama (2015) found a positive impact of FDI in reducing poverty in the ASEAN countries.

Some studies found a negative impact of FDI inflows on poverty reduction, using the headcount ratio as the proxy of poverty reduction. Ali *et al.* (2009) examined the effects of foreign direct investment on poverty reduction in Pakistan. The study shows that foreign direct investment had a negative influence on poverty reduction in Pakistan in both the short run and long run. The study also discovered that government expenditure on social sectors and the education level of the country played significant roles in reducing poverty in Pakistan, Calvo and Hernandez (2006) investigated the effect of FDI on poverty covering data from 1984 to 1998 for Latin America. This study also used the poverty headcount ratio and discovered that the positive impact of foreign direct investment differs from the primary economic situation of the host economy and behaviour of the subsidiaries. In Nigeria, Akinmulegun (2012) and Ogunniyi and Igberi (2014), in East and Latin America, Huang *et al.* (2010) also found a negative relationship between FDI and poverty reduction

Therefore, the empirical results regarding the effects of foreign direct investment on poverty reduction are inconclusive, and the findings vary by countries and regions. FDI is profit-driven; poverty reduction is not the prime goal of FDI inflows. FDI inflows can contribute to the poverty reduction of the host country through stimulating growth, employment creation, strengthening government financial capacity through tax revenue and participating social welfare activities. The findings of the empirical literature suggests that if the economic growth generating from FDI inflows does not create an adverse impact on the income distribution of the host country, FDI inflows will be found to be positive for poverty reduction. The government's fiscal policies, the social, political and economic intuitional quality, the economic and human capital development level, and the type of FDI inflows are also important in determining the effects of FDI inflows on poverty reduction in the host country.

3.4.3 FDI and income inequality

Equality is one of the core issues within the concept of sustainable development. In general, equality refers to the degree of inclusiveness and fairness in resource distribution and decision-making. Equality also refers to the degree of freedom or capabilities following Sen (1986). Income inequality is an important parameter to measure the inclusiveness of development. Income inequality indicates how the benefit of economic growth and development is being distributed through the entire population.

FDI inflows may generate both negative and positive effects on the income distribution of the host economy. Using Heckscher-Ohlin and Stolper-Samuelson models of international trade, Mihaylova (2015) argue that multinationals can take advantage of the abundance of low-skilled labour in developing countries Therefore, FDI is expected to funnel to the labour-intensive sector and create employment for low skilled labour; thus, the demand for low skilled labour will increase. This increased demand leads to increased wage levels for low-skilled labourers, holding everything else constant. The increased wage of low-skilled workers contributes to reducing income inequality.

The relationship between income inequality and FDI is also explained by the Kuznets hypothesis of income inequality. According to the Kuznets hypothesis, the income inequality of a country rises until the country reaches a certain income level, after which inequality begins to fall (Kuznets, 1955). At the early development phase, an economy typically experiences a transition process from the low paid traditional (agriculture) sector to the high-paid modern industrial sector and service sector. This transition leads to an increase in the income variation between low-income and high-income sectors. In the later phase, when the modern industrial sector starts to produce more output, more labour will be transferred from the traditional agriculture sector to the modern industrial sector. The number of excess labourers in the traditional sector will decline, and marginal productivity of the labour force will increase in the traditional sector. As a result, income inequalities decline in the country (Adelman and Robinson, 1989). Therefore, FDI inflows might help to increase the average income level of people and reduce income inequalities of the host country.

On the other hand, if FDI inflows are efficiency-seeking, it will increase demand for skilled workers; the wages of the skilled workers will increase relative to unskilled workers. Therefore, FDI inflows may raise income inequalities by increasing wage differences (Hemmer *et al.*,

2005). Further, Girling (1973) argues that FDI depth in low-income countries tends to develop a new elite class, which is considerably more highly paid than other labour classes. Evans (1979) also notes that the 'labour elites' usually play an influential role in the state mechanism, and get extra economic and political advantages, which increases inequality further.

The theories regarding the impact of FDI inflows on income inequalities of the host country are diverse and conditional. The issue is hard to settle theoretically. In recent years, researchers have focused on investigating the relationship between income inequality and foreign direct investment. However, the empirical finding on FDI inflows and income inequalities also show mixed results.

Several studies found that FDI inflows lead to an increase in income inequality in the host country. For example, using the pooled Gini coefficient, Choi (2006), covering data from 1993 to 2002 for 119 countries, found that foreign direct investment positively impacts the Gini coefficient and worsens income inequality. In a panel data analysis, Alderson and Nielsen (1999), for 88 countries and covering data from 1967 to 1994, found a positive link between income inequality and FDI inflows. A survey study of fifteen countries on FDI and income inequality conducted by Bornschier and Chase-Dunn (1985) demonstrates that FDI deepens income inequality. Herzer *et al*. (2013) found that FDI contributed to increases in inequality in the long-run and Halmos (2011) found that FDI leads to higher income inequality for 15 Eastern European countries.

Further, several studies show that the impact of foreign direct investment on income equality varies according to the degree of economic and human resource development of the host economy. Mihaylova (2015) assessed the relationship between income inequality and foreign direct investment for selected Central and Eastern Europe (CEE) covering data from 1990 to 2012, by employing the fixed effect regression analysis. The study found that FDI inflows influence income inequality, but it varies according to the human capital and economic development of the host country. The result shows that if the level of human capital and economic development is low, it is more likely that FDI inflows will increase income inequality. In the panel data analysis, Beer and Boswell (2002) and Basu and Guariglia (2007) also discovered that FDI inflows deepen the income inequalities. The studies suggest adopting policies for fostering educational facilities for the poor. In an IMF working paper, Jaumotte *et al*. (2008) also found the detrimental distributional impact of FDI and stressed the need for

education and training to address the problem of rising inequality in developed and developing countries.

Several studies, especially of developed countries, reveal that FDI contributes to reducing income inequality. In the USA, Bhandari (2006) and Chintrakarn *et al.* (2012) found that FDI had a beneficial distributional impact, but the impact was not homogeneous across states. Pan-Long (1995) investigated the effect of FDI on the Gini coefficients and claims that FDI inflows and income inequality are negatively related. For the European Union (EU) countries, Grimalda *et al.* (2010) found that FDI increases income inequality only in the new EU member states. Chintrakarn *et al.* (2012) (in a panel co-integration analysis for American states) found FDI inflows contribute to reducing income inequality.

Furthermore, several studies fail to find any statistically significant relationship between income inequality and FDI inflows. In a panel data analysis of 88 countries over the period from 1985 to 1991, Milanovic (2002) found that FDI inflows did not have any significant effect on income distribution. Similarly, Sylwester (2005) failed to find any significant distributional effects of foreign direct investment, for 29 developing economies from 1970 to 1990. Bhandari (2007) empirically tested the impact of FDI inflows on income inequality for Eastern Europe and Central Asian transitional economies (covering data from 1990 to 2002). Applying the fixed-effect model, this study found that foreign direct investment did not exert any significant effect on overall income inequality. Nevertheless, when the effects were broken down into different components, the study revealed that FDI inflows increase wage income inequality but reduce capital income inequality.

Ucal *et al.* (2016) examined the short- and long-run impact of FDI on income inequality in Turkey. The study employed the ARDL modelling approach and covered data from 1970 to 2008. The empirical results show the existence of co-integration among the variables and found FDI inflows positively impact income inequality in the short-run; however, the study did not find any significant effect in the long-run.

Several empirical studies find evidence of the Kuznets hypothesis of income inequalities while investigating the impact of FDI inflows on income inequality in the host economies. For example, in Ireland, Figini and Görg (1999) supported the Kuznets hypothesis and found an inverted U-shaped pattern, where FDI contributed to increasing inequality at the earlier stage of development and, in the later phase of development when per capita income reached a certain

level, FDI reduces income inequality. Herzer and Nunnenkamp (2011) supported the Kuznets hypothesis for a sample of ten European countries. Using panel co-integration and causality techniques over the period 1980 to 2000, they discovered that foreign direct investment contributes to reducing income inequality in the long-run. However, in the short-run, FDI inflows contributed to increasing income inequality.

Aghion *et al.* (1998) support the Kuznets inverted U-shaped pattern of income inequality and argue that due to the adoption of new technologies by domestic firms, initial-stage income inequalities might increase with rising economic growth but later stage economic growth will contribute to reducing income inequalities.

As with other areas, the empirical analysis provides mixed results about the impact of FDI inflows on income distribution in the host country. It appears however that the stage of development is important. FDI can reduce inequality when there are mature political and economic institutions. Where a country is in the early phases of development, FDI worsens inequality by creating an elite labour force that receives the local benefits of FDI while unskilled workers suffer due to competition. It also appears that countries with a higher level of human capital (such as education skill, knowledge) experienced a positive impact of FDI inflows in reducing income inequality. The type of FDI inflows, such as labour-seeking or efficiency-seeking FDI, is also an important factor. Compared to efficiency-seeking FDI, labour-seeking FDI inflows are more beneficial for improving income distribution in the host country, particularly in developing countries.

The theoretical and empirical literature reviewed in this section reveal that the impact of FDI inflows on the social conditions of a country depends on the host country's social, economic and political context, the sector and industry where FDI is being channelled, and more importantly the type and motive of FDI inflows. As such, a key hypothesis being investigated in this thesis is the degree to which FDI inflows in the manufacturing sector contribute to social sustainability in Bangladesh.

3.5 FDI and sustainable development

Sustainable development is a wide-ranging, integrated concept. The economic, social and environmental dimensions of sustainable development are interrelated and interconnected. Therefore, the impact of foreign direct investment in sustainable development must be discussed in an integrated way. However, due to the inherent complexity, most of the earlier

studies and analysis discuss the impact of FDI on sustainable development by breaking down the impacts on the three dimensions of sustainable development and focussing on one aspect. The research that describes all three dimensions of sustainable development is very limited.

In contrast, Gallagher and Zarsky (2004) examined the performance of FDI inflows on economic, environmental and social parameters of sustainable development in Mexico. They found that FDI inflows generated some positive contribution to the Mexican economy, export and productivity in the manufacturing sector. However, FDI failed to create sufficient backward linkages in the economy, and the contribution of the domestic economy to export growth was negligible. They also found that environmental performance worsened due to the scale effects and inadequate government commitment to environmental regulation. In the case of social performances, FDI inflows played a minimal role in employment creation and intensified the income inequality and outgoing migration.

Chudnovsky and López (2008) also analysed the influence of foreign direct investment on sustainable development in Argentina, based on the three pillars of sustainable development. Their study shows that the direct effects of FDI on the economic performances in Argentina seemed to be positive, but the indirect or spillover effects were less encouraging. They analysed the effects of FDI inflows on unemployment and income inequality to investigate the social and environmental impacts. The study found that the impact of FDI inflows on income inequality was insignificant and FDI did not appear to be the main reason for income inequality in Argentina. In terms of environmental impacts, they note that foreign-owned firms practise better environmental management activities. The environmental management also spilled over to the domestic firms, and thus contributed to improving the environmental quality of the host economy.

Gallagher and Zarsky (2005) examined the case studies and statistical evidence of the impacts of FDI on sustainable development in developing countries. They particularly examined the impact of FDI inflows on economic growth, technology spillovers and environmental performance of FDI inflows. They found no consistent relationship between FDI inflows and the relevant variables. In the case of Mexico, they found that despite a large volume of FDI inflows, technology and knowledge spillovers were minimal, or close to zero. The study also shows that FDI ‘crowded out' domestic investment in Mexico and ‘hollowed out’ domestic manufacturing capacity, as foreign firms were import-based and did not contribute much to the expansion of backward industries. The foreign firms also had an insignificant influence on

domestic capacity building for innovation. In terms of environmental performance, multinational firms out-performed local firms. The study also shows that the standard environmental regulations of the host economy are the critical determining factor for the environmental performances of the firms. In the case of the social consequences of FDI inflows, the study found that the number of jobs created by FDI was small compared with the amount of FDI inflows. They conclude that FDI is no 'miracle cure' for the recipient country to achieve sustainable development.

In contrast, Nagaraja (2013) investigated the question of whether the deployment of foreign direct investment fosters sustainable development. Based on secondary data, the study examined the impact of FDI inflows on the gross domestic product, employment generation, gross fixed capital formation, and exports for nine selected developing economies. The results found that FDI inflows positively impact on economic growth and development for most of the countries, particularly in Brazil, Malaysia, Republic of Korea, Uganda and Thailand. FDI inflows also generated a positive impact on employment in Nigeria and Zambia. Nagaraja (2013) also discovered that FDI inflows in the mining and manufacturing sector generate jobs in Africa, and claims that FDI inflows made a positive contribution to employment growth through boosting capital formation and exports.

Voica *et al.* (2015) investigated how sustainable development is related to the flow and stock of FDI in the European Union, and demonstrates that the environmental effects of the FDI inflows are the most prominent effects for sustainable development. Considering the importance of the environmental effect, Voica *et al.* (2015) focused on the importance of investment in mitigating climate change-related projects and fostering responsible green business practice. They stress the importance of investing in renewable energy development and clean technology innovation, and focus on economic growth to reap the beneficial effects of FDI inflows for social improvement. The study notes that the social effect is closely related to economic growth. The increased growth increases the capability of the country to allocate financial resources to social sustainability projects. Voica *et al.* (2015) also note that foreign investment can play a complementary role in addition to public efforts in achieving the SDGs.

WWF (2003) examined the potentialities and challenges of FDI inflows in economic development and environmental protection in the context of sustainable investment. Based on the outcome of six case studies, they recommended adopting a coherent development strategy and effective policies. The report emphasised the establishment of high internal standards

throughout the global operations of MNEs, including 'corporate citizenship standards' in investment areas and called for promoting institutional innovation at the local level.

Huang (2001) analyses the ways FDI inflows react with the three aspects of sustainable development. The study notes that FDI provides both opportunities and challenges for sustainable development, for both developing and developed countries. Huang (2001) argues that the economic activities of FDI are not the leading causes of environmental and social problems. Externalities, market failures, common property characteristics, and inadequate policy frameworks are responsible for generating adverse environmental consequences of FDI inflows. In the case of attracting FDI inflow, Huang (2001) did not find enough evidence in favour of the 'race to the bottom' principle; nor did it find any evidence of the 'race to the top' principle. Huang (2001) claims that most of the multinationals follow the guideline of CSR and try to run their business in a responsible manner, for their own reputation. Therefore, multinationals are contributing to sustainable development efforts.

Ridzuan *et al.* (2017) empirically investigated the effects of foreign direct investment on three basic dimensions of sustainable development (environment, economy, and social dimensions) for Singapore. Employing an Autoregressive Distributed Lag (ARDL) model, the study found that FDI inflows positively contribute to the economic and environmental pillars of sustainable development by boosting economic growth and reducing CO_2 emission level in that country. However, FDI inflows worsen social sustainability by increasing the income inequality of the country. The study called for targeting FDI, which pays higher wages and facilities to reduce the income gap of the country. It is the literature is this subsection that I particularly hope to contribute to.

3.6 Conclusion

The chapter analyses the relationships and mechanisms by which FDI can impact upon three dimensions of sustainable development in the recipient country. Although FDI inflows have received substantial attention and are considered an important vehicle for advancing sustainable development in developing countries, very limited research has been carried out in relation to sustainable development and FDI inflows. Even less research integrates the impact on three dimensions on sustainable development.

The theoretical and empirical literature reviewed in this chapter shows that FDI can impact three pillars of sustainable development, both positively and negatively. Further, the effects could be through a direct channel or indirect channel. Table 3.2 summarises the effects of FDI on three pillars of sustainable development.

Table 3.2: The consequences of FDI on sustainable development

	Effects of FDI inflows on three pillars of sustainable development			
	Direct		**Indirect (spillover) effect**	
	Positive	**Negative**	**Positive**	**Negative**
Economy	- Increase capital and tax base - Long-run commitment and less volatile than portfolio investment - Improve BOP situation	- Pressure for tax holidays - Repatriate profits - Increases imports and deteriorates BOP	- Provide market access and information - Increase exports - Increase competition and decrease inefficiency - Increase efficiency and productivity through transferring advanced technology (linkages, training, turning over trained labour and demonstration)	- The export share of domestic firms may decrease - Crowds out domestic investment within these sectors - May not establish linkage with domestic firms (heavily depends on the use of foreign suppliers) - Technology might be inappropriate for local needs
Environment	- Introduction of environmentally- friendly technology and products - Introduction of a better environmental management system	- Increase pollution levels and waste due to increased economic activity (scale effect)	- Introduces cleaner, energy-efficient technology - pollution halo hypothesis - Buyer pressure for higher environmental ratings/standards - Spillovers by forcing and demonstration - Pressure on the host government for introducing higher standard waste disposal systems - Environmental Kuznets Hypothesis	- Shifting of dirty industries (pollution haven hypothesis) - Relaxing environmental regulations to attract FDI - Depletion of natural resources by resource seeking FDI - Shifting of the polluting part of the production chain in the case of vertical FDI
Social Conditions	- New investment / plants create new jobs - Improved social conditions due to CSR activities	- Dismissal of workers for efficiency reasons - Natural resource seeking FDI can displace the local communities and destroy their residents' livelihoods.	- Income rises and poverty decreases - Higher wages - Higher labour standards and social compliance - Training and worker skill development - Inverted U relationships between economic growth and income inequalities (Kuznets Hypothesis)	- Loss of employment due to 'crowding out' effect - Groups with particular labour skills could be harmed - Can increase income inequalities - Technology might not be suitable for local needs - Increased urban migration

The theoretical and empirical literature shows that FDI inflows offer both opportunity and challenges for sustainable development in a country. The impacts of FDI inflows on the various components of the three dimensions of sustainable development are subject to FDI type, the motivation for FDI, and the sector that FDI flows are directed. Appropriate regulatory and institutional frameworks are crucial for making the FDI inflows effective for sustainable development. Every country has a different productive structure, different domestic economic policies, and different social, political and institutional frameworks; therefore, the impacts of FDI inflows differ from country to country.

In this study, I investigate the research question of whether FDI promotes or hinders sustainable development in developing countries, using Bangladesh as an example of an emerging middle-income country. Based on the three dimensions of sustainable development, the three Research Questions are:

1. To what extent are FDI inflows in the manufacturing sector contributing to the economic sustainability in Bangladesh?
2. To what extent are FDI inflows in the manufacturing sector contributing to environmental sustainability in Bangladesh?
3. To what extent are FDI inflows in the manufacturing sector contributing to social sustainability in Bangladesh?

In the following three chapters – Chapter 4, Chapter 5 and Chapter 6, I examine the Research Questions one, two and three respectively using both descriptive and empirical analysis taking Bangladesh manufacturing sector as a case study. Chapter 7 unites the findings of Chapter 3, 4 and 6 to get the overall impact of FDI inflows on sustainable development in Bangladesh. Chapter 8 provides the conclusions of the thesis.

CHAPTER 4: MANUFACTURING FDI AND ECONOMIC SUSTAINABILITY IN BANGLADESH

4.1 Introduction

This chapter seeks to determine the answer to Research Question One, related to the impact of manufacturing FDI inflows on economic sustainability in Bangladesh. The Bangladesh economy has passed through various reforms and refinements since its independence in 1971. From a macroeconomic perspective, the economy has achieved some success; however, the country is still one of the lower-middle-income countries, and the industrial base of the country is low. One of the prime goals of the development strategy of Bangladesh is to transform the country from a low value-added agrarian economy to a high value-added industrial economy.

The manufacturing sector usually plays a key role in long-term structural change in an economy. Generally, manufacturing brings changes to the economic structure and shifts the economy from labour intensive to capital intensive and technology intensive (UNIDO, 2016). Since the inception of the New Investment Policy (1982), the export-oriented manufacturing sector has been the focus of attention with new development strategies, trade policies and industrial policies. Technological advancement is the key to increase productivity, efficiency and competitiveness. Considering the low investment base and the limited capacity of the country in technological advancement, the government is promoting FDI in the manufacturing sector. The government's current development plan suggests continuing liberalisation of the foreign investment regime to ensure a more sophisticated production process and to improve product quality (GOB, 2015a). Although positive contributions are anticipated, FDI inflows may also adversely impact the economic advancement of the country through direct and indirect effects.

Sections 4.2 and 4.3 briefly describe the key development policy changes and the macroeconomic performance of the Bangladesh economy. Section 4.4 describes the trend, composition, determinants, policies and regulations of FDI inflows in Bangladesh. Section 4.5 provides a descriptive statistical analysis to investigate the impacts of export-oriented FDI inflows on the economic sustainability in Bangladesh. Section 4.6 provides an empirical analysis to explore the long-run and short-run effects and dynamics of FDI inflows in the manufacturing sector in Bangladesh.

4.2 Evolution of Bangladesh economy

Bangladesh is a small South Asian country with a population of over 160 million. As per the World Bank classification, Bangladesh is a lower-middle-income economy. Real GDP has been growing at over 6 percent during the last two decades (MOF, 2017). The development strategy and economy of Bangladesh has undergone successive refinements and reforms since its independence in 1971.

In the early 1970s, economic management in Bangladesh mostly followed the import-substituting, inward-looking development policy within an overall framework of a state-controlled economy (Razzaque *et al*., 2003). The public sector played a key role, and high government controls and regulations were imposed on private sector investment. Controls included investment sanctioning, price controls, discretionary quantitative import restrictions, exchange controls and high import tariffs (Ahmed, 2005; Mahmud *et al*., 2008). The government imposed high tariffs at a maximum rate of 400 percent and imported products were considered luxury items. Only a few items were permitted for importation and these were known as the 'positive-list' (Rashid, 2000). The level of exports was also low; one item (raw jute and jute products) accounted for more than 80 percent of the total exports until mid-1980s. Therefore, the total trade volume was low (GOB, 2015b; Salim, 2003) and an overvalued fixed exchange rate system was in operation.

Following the socialist development path, the government nationalised over 90 percent of medium and large enterprises (Nath, 2012). Intending to protect the infant industries of the newly independent country and to reduce the fiscal deficit and balance of payment deficit, the government pursued a very rigid import-substituting industrialisation strategy (Rashid, 2000). This import substitution policy can contribute to the industrialisation of the country by replacing

imported goods with domestic production. The reduction in imports can also contribute to improving the external balance situation of the country.

However, the import substitution and inward-looking strategy was not only a constraint to the advancement of industrialisation in the country but also generated a distorted incentive structure and undermined the potential for export growth (Hossain and Alauddin, 2005). Both the fiscal and trade balances underperformed as a result of the protected trade policy. The country faced severe macroeconomic imbalances through the 1970s and early 1980s.

In the 1970s, the average real GDP growth was around 4 percent. However, the growth of manufacturing was higher at around 8 percent with the growth of agriculture at around 2.5 percent (Nath, 2012; Rashid, 2000). The manufacturing value added to GDP ratio was around 10 percent. The country faced a high annual average inflation rate of about 37 percent during the 1970s (Sultana and Uddin, 2013). High import tariffs make imports expensive, and the high cost of imported raw materials also increased production costs. Further, the government increased the money supply to feed the construction and rehabilitation needs of the newly independent nation. The rise in international oil price also contributed to the rapid increase in the price level.

The Bangladesh Government initiated major reform programs in the late 1980s and adopted market-oriented liberalisation policies. The reforms programs were guided by the Structural Adjustment Programme (SAP) as prescribed by the World Bank and the Structural Adjustment Facility (SAF), prescribed by the IMF. The policy reforms included intensifying privatisation, trade liberalisation, financial sector reforms, and agricultural reforms (Mahmud et al., 2008). The key characteristics of trade liberalisation were reducing and withdrawing quotas from imported items, removing the barriers against rationalisation of the tariff structure, and depreciating the exchange rate to encourage exports (Razzaque *et al*., 2003; Mahmud *et al*., 2008).

The government initiated various measures to stimulate export growth; significantly, the tariff and other non-tariff barriers were removed. Most products were permitted for importation. Only a few items were banned or restricted for importation for national security and welfare reasons; therefore, the 'positive list' for imports was replaced by the 'negative list' and 'restricted list' (Rashid, 2000).

Bangladesh used customs tariffs as the main instrument for trade liberalisation. As part of the rationalisation of tariff structures, the government gradually reduced the average customs duty, and the number of operative tariff slabs was also reduced. Table 4.1 depicts the change in customs tariff rates and slabs from 1994 to 2017 in Bangladesh.

Table 4.1: Customs tariff rate and slabs in Bangladesh from 1994 to 2017

Fiscal Year[6]	1994	2000	2005	2010	2012	2013	2015	2016	2017
Maximum Tariff rate (%)	300	37.5	25	25	25	25	25	25	25
No of operative tariff slabs	12	5	5	5	5	5	5	6	6
Unweighted Average tariff rate (%)	84.9	22.2	15.4	13.9	13.5	12.3	12.0	13.0	-

Source: Compiled from National Board of Revenue, Government of Bangladesh (NBR, n.d.) and World Development Indicator's database (World Bank, 2018c)

The Government also brought in changes to the exchange rate system. An overvalued and fixed exchange rate system was in practice until the mid-1980s to support the conservative or inward-looking trade policy. The Bangladesh currency was fixed with the Pound Sterling. Later, instead of a fixed exchange rate, the central bank adopted a managed-floating exchange rate (pegged to a raft of currencies) and started steadily depreciating or using a 'crawling peg' (an exchange rate adjustments system in which a currency is allowed to fluctuate within a group of rates) (Razzaque *et al*., 2003). In the mid-1990s, to comply with their IMF obligation, the government adopted a fully-floatinged exchange rate system determined by the demand and supply of the related currencies. However, in order to avoid excessive volatility and stabilise the foreign exchange market, the central bank closely monitors the exchange rate and buys and sells foreign exchange (Hossain and Ahmed, 2009).

As part of the fiscal reforms, the government introduced a Value Added Tax (VAT) in the early 1990s. The government also initiated the Financial Sector Reform Programme (FSRP) to bring efficiency to monetary policy and the financial and banking system. The government tried to enforce indirect controls on monetary policy, instead of using direct controls (Mahmud *et al*., 2008).

[6] Bangladesh Government calculates and publishes most of the macro-economic data in fiscal year (July to June). For example, the fiscal year 1994 refers to July 1993 to June 1994.

In addition to liberalisation and fiscal reforms, the government offers various incentives to expand the export-oriented industrialisation in the country which includes: duty drawback facility (1983); back-to-back letter of credit facility (1987); easing international credit facility; bonded warehouse (1978); incentives for export performance (1986); rebate on tax and duty for machinery imports; exemption of income tax; subsidy on interest rate; and tax holiday facilities (Mahmud *et al*., 2008, Rashid, 2000).

The government also brought changes to the development planning system. Since independence, the government of Bangladesh has formulated and adopted eleven investment and industrial policies for the industrial development of Bangladesh. From the first New Industrial Policy (1982) to the latest, the industrial policies focus on the expansion of the private sector, promotion of market forces, and the liberalisation of imports, exports and foreign investment to bring efficiency and competitiveness in industry. The main features of the policies are described in Table 4.2.

Table 4.2: Main Industrial policies and features in Bangladesh

Industrial policy	Main features
Industrial investment policy (IIP) (1973)	- limited private investment by restricting permissible investment up to 2.5 million Bangladesh currency or USD 0.32 million; - foreign private investment was only allowed in the form of a joint venture with the state with marginal equity participation; - nationalised most medium and large industries.
New Industrial investment policy (1974)	- promoted private sector participation in manufacturing and reduced the role of the public sector through divestment.
Revised Investment Policy (1975)	- expanded export-oriented private sector investment.
New Industrial Policy (NIP) (1982)	- stimulated industrial development through private sector expansion; - large scale denationalisation.
Revised Industrial Policy (RIP) (1986)	- more liberal policies were adopted to stimulate manufacturing export growth; - export incentives were offered, and deregulation pursued; - the negative list was progressively reduced.
Industrial Policy (1991)	- promoted a market-based competitive economy
Industrial Policy (1999)	- the share of the manufacturing sector in GDP targeted to reach at least 25%, in which employment share a minimum of 20% of total employment.
Industrial Policy (2005)	- the share of the manufacturing sector in GDP targeted to reach at least 30-35% by the next decade in which employment share a minimum of 30% of the total employment; - more focus was given to small and medium industries.
Industrial Policy (2009)	- modernisation of the economy, diversification of the economic base; - create a vibrant and dynamic private sector for sustainable industrial growth
National Industrial Policy (2010)	- increase productivity and efficiency; - enhancement of skill; - encourage female workforce in the industrial sector
Industrial Policy (2015)	- diversify the base of the economy; - boosting economic and employment growth; - improve infrastructure for stimulating investment; - uplift the economic status and livelihood of the majority of people.
Industrial Policy (2016)	- by creating new entrepreneurs and productive employment, bring sustainability and inclusiveness in industrial growth and the production system

In Bangladesh, the Government formulated the Five-Year Plan as the main development guideline of the country. At the time of writing, the Government is implementing the 7th Five Year Plan (2016-2020). The 7th plan is targeted at increasing the share of the manufacturing sector in the economy to 21 percent. The 7th plan is also targeted to increase export performance to $USD 54 billion and mobilise a substantial amount of foreign direct investment (around $USD 10 billion by 2020) (GOB, 2015a). Besides the five-years plan, the government has the

long-term Perspective Plan 2010-2021. According to the current Perspective Plan, the successful and systematic execution of the development strategies and targets will transform the country into a middle-income country by 2021. The country will also be able to achieve improved higher education and living standard, socio-economic conditions and justice.

Development documents and strategies placed the export-oriented manufacturing sector as the engine of economic growth and employment creation in Bangladesh. The 7th plan notes that the manufacturing sector can act as the catalyst for achieving sustainable economic growth in the country. The 7th Plan focuses on diversifying industries and export items, as well as increasing the productivity, competitiveness and efficiency levels in the manufacturing sector.

Bangladesh attained success in achieving the Millennium Development Goals (MDGs) targets in several areas, such as poverty reduction, and gender parity for primary and secondary level education. The Government of Bangladesh also has a strong commitment to achieving the SDG targets. The 7th Five Year Plan period (2016-2020) coincides with the commencement of the Sustainable Development Goals (SDGs) of the United Nations. The government has already aligned the targets and strategy of the 7th plan with the targets of the SDGs (GOB, 2016).

4.3 Performance of the major economic indicators for the Bangladesh economy

The launching of policy reforms in the late 1980s and the 1990s brought some positive development in the overall macroeconomic situation in Bangladesh. The following sections describe the outcomes in major economic indicators for the Bangladesh economy from 1980 to 2017.

4.3.1 GDP Growth

Bangladesh maintained more than 6 percent annual real GDP growth over the last decade. The average real GDP growth of Bangladesh was 3.8 percent during the 1980s and increased to 4.53 percent in the first half of the 1990s. It then reached 4.9 percent in the second half of the 1990s. The real GDP growth accelerated in 2005 and crossed 6 percent (World Bank, 2018c).

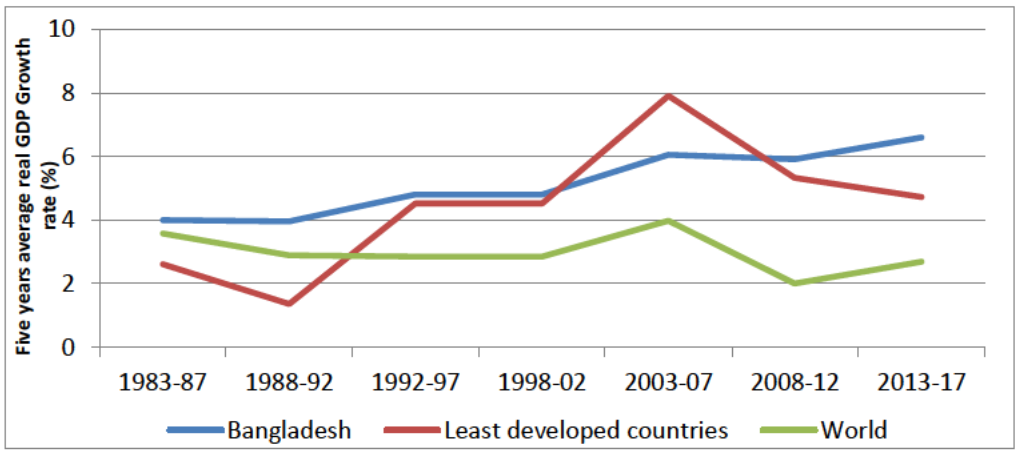

Figure 4.1: Five-year average real GDP Growth trend in Bangladesh from 1983-2017

Source: World Development Indicator, (World Bank, 2018c)

As shown in Figure 4.1, the Bangladesh GDP growth rate exceeded the world average growth rate of GDP in the early 1980s and continued to do so for the rest of the period. Compared with the average growth of Least Developed Countries (LDCs), Bangladesh has maintained a more stable and consistent growth path for the last few decades.

4.3.2 Structural Transformation

The Bangladesh economy experienced a slow structural transformation process. The sectoral contribution of agriculture declined gradually with a marginal increase in the manufacturing sector, as shown in Figure 4.2.

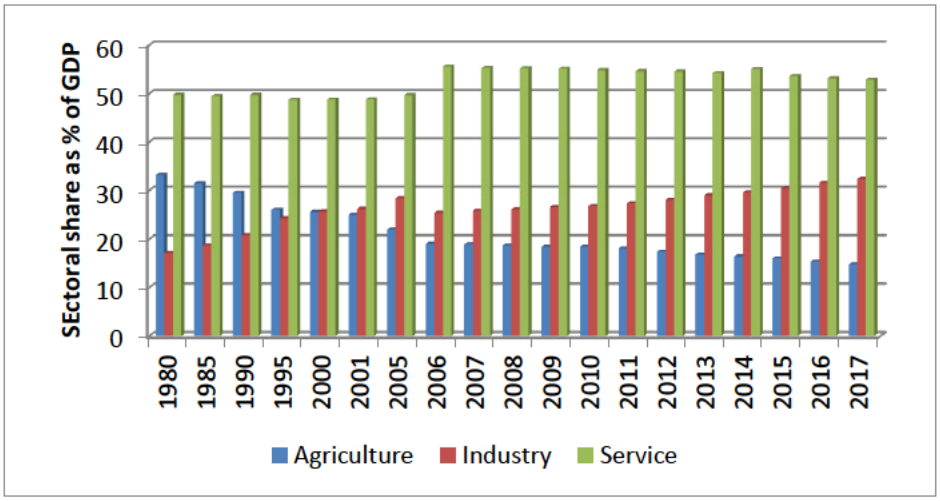

Figure 4.2: Sectoral Contribution to the GDP

Source: Various years of Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.)

The service sector share to GDP remained roughly the same over the period; however, there was marginal variation from year to year. The share of the agricultural sector to GDP started to decline from the early 1980s. The average share of the agriculture sector in the economy was 33 percent in the first half of the 1980s, which reduced to 29 percent in 1990 and reached 25 percent at the end of 1980s. The agricultural share further declined and to 14.74 percent in 2017.

In contrast, the industry sector's share in the economy started to increase from the beginning of the 1980s. In 1980, the industrial sector's share was around 17 percent, from which point it slowly increased and reached 21 percent in 1990. At the end of the 1990s, the industrial sector's share was around 26 percent, which further increased to 32.42 percent in 2017. While this demonstrates improvement, transforming the Bangladesh economy from a traditional low-value-added agrarian economy to an advanced high value-added-industrial economy remains a long-term challenge for the government.

4.3.3 Savings and Investment

Both the classical and neoclassical growth theories endorse the importance of savings and investment to accelerating economic growth. As with many other developing countries, Bangladesh suffers from a lack of sufficient domestic savings and investment to achieve the target growth. Figures 4.3 and 4.4 represent the savings and investment trend of Bangladesh over the period from 1990 to 2017.

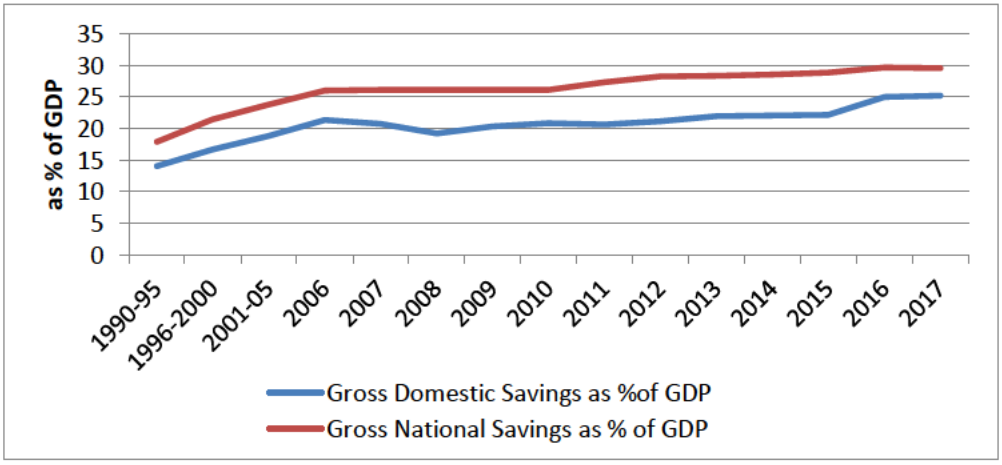

Figure 4.3 Gross national and domestic savings as % of GDP in Bangladesh from 1990-2017

Source: Various years of Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.)

Figure 4.3 depicts an increasing trend for gross domestic and national savings as a percentage of GDP; however, the figure is low compared to some other Asian economies. For example, in 2017, the gross domestic savings as percentage of GDP was 30.0 percent in India and 46.7 percent in China. Both the domestic and national savings increased at a higher pace in 1990s; however, domestic and national savings as a percentage of GDP faced a declining trend after 2006 and this continued until 2008. The domestic and national savings path rebounded and followed an increasing trend from 2008, but the trend levelled off over the last decade. In 2011, the gross domestic savings rate was 28.3 percent and reached 29.64 percent in 2017. Similarly, the national savings rate increased from 21.2 percent in 2011 to 25.33 percent in 2017.

Bangladesh has also experienced slow progress in boosting the investment level. As shown in Figure 4.4, the gross investment to GDP ratio started to increase from the beginning of the 1990s and increased steadily until 2006. Gross investment as a percentage of GDP reached 26.2 in 2005 from 19.99 percent in 1995.

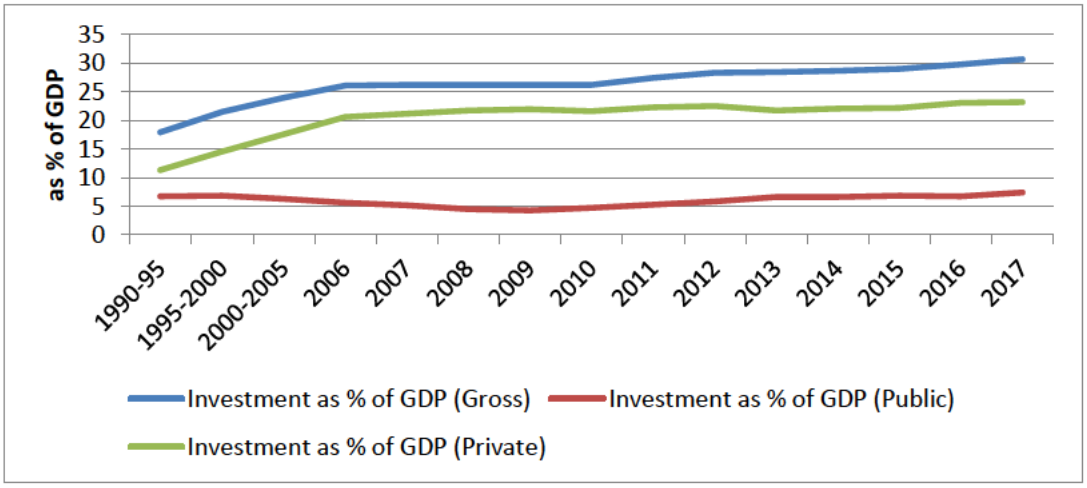

Figure 4.4: Public, private and gross investment as % GDP in Bangladesh from 1990-2017

Source: Various years of Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.)

After 2006, a virtual stagnation noticed in the overall investment to GDP ratio in Bangladesh. Figure 4.4 demonstrates that the share of private investment is higher than the share of public investment in Bangladesh, but private investment has grown slowly over the past decade. The sluggish growth of investment is a big challenge for the Bangladesh economy. Bangladesh needs to increase the investment to GDP ratio to 35 percent to achieve the target growth (Abdin, 2015).

4.3.4 Government Revenue

High fiscal deficits and low revenue are the major structural constraints of the Bangladesh economy in implementing development projects. Figure 4.5 indicates that the revenue to GDP ratio declined in the first half of the 2000s. The introduction of VAT triggered revenue earning at the mid-1990s.

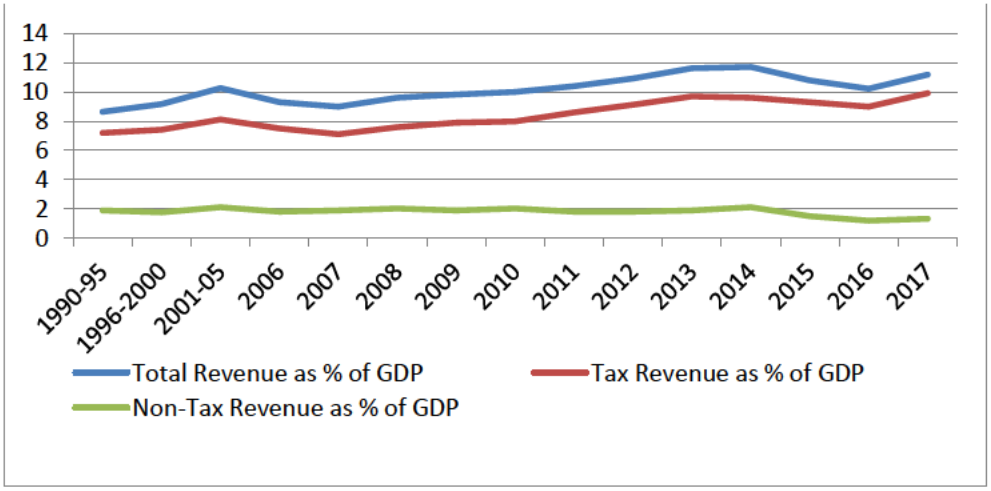

Figure 4.5: Revenue as percentage of GDP in Bangladesh from 1990 to 2017

Source: Various years of Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.)

The average revenue GDP ratio is around 10 percent for the last ten years, which is the lowest in South Asia. The average revenue GDP ratio is around 35 percent in developed economies (World Bank, 2018c). The low level of revenue earning weakens the government's capacity to implement the development agendas and slows down economic progress.

4.3.5 Inflation

The inflation rate is an important indicator of macroeconomic stability. Bangladesh maintains a moderate inflation rate, with some fluctuations, and remains under 10 percent over the last two decades, as shown in Figure 4.6.

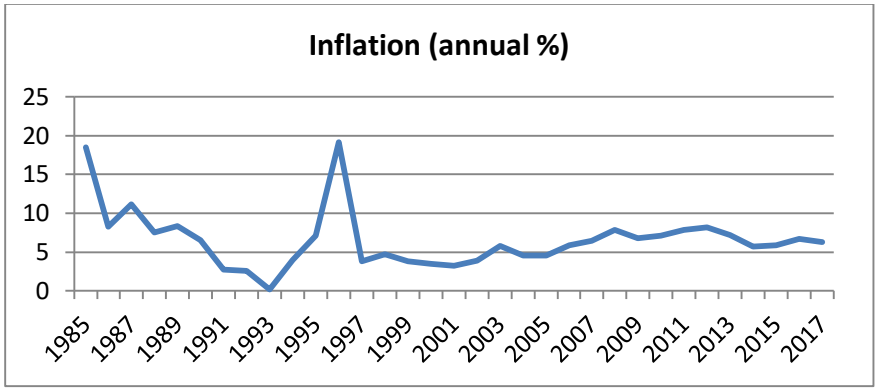

Figure 4.6: Inflation trend in Bangladesh during 1985 to 2017

Source: World Development Indicator (World Bank, 2018c)

The average inflation rate in the early 1990s was 5.5 percent; however, the average inflation rate increased in the second half of the 1990s and crossed into double-digits in 1996. The catastrophic cyclone and flood caused a loss of crops in 1995 and this contributed to increased price levels. However, at the beginning of the 2000s, the average inflation rate fell to 3.03 percent, after which it increased reaching 9 percent in 2011. Recent inflation rates show a declining trend; the average inflation rate for the last five years is around 7 percent. The inflation rate in Bangladesh is still high compared to the global inflation rate or even the inflation rate of other low-income countries (World Bank, 2018c) High inflation leads to weakening investor confidence and lowering the incentive to save. High inflation also adversely affects the poor, as their real wage reduces with the increase in prices. The poor also have less access to interest-bearing accounts and hold minimal financial or real assets other than cash (Ha and Ohnsorge, 2019).

4.3.6 Import and Export Growth

The import and export growth of Bangladesh has fluctuated over the period. Figure 4.7 illustrates the high but fluctuating growth rate for imports over the last three decades. In the early 1990s, Bangladesh adopted a liberalised import policy to support export-oriented domestic industries. In the early 1990s, the average import growth was around 15 percent. In the second half of the 1990s, the average growth rate was lower and Bangladesh maintained an average of 11 percent import growth between 2000 and 2015.

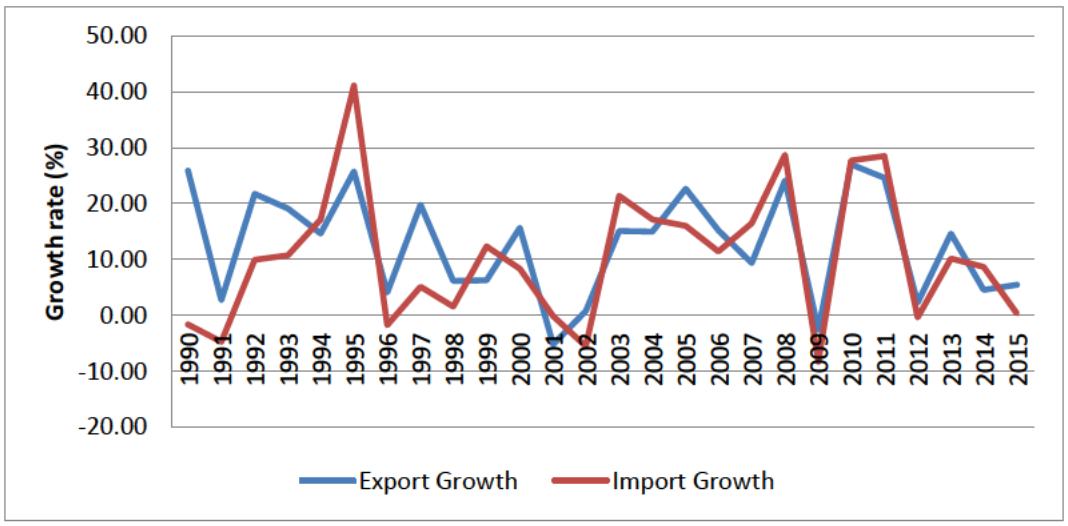

Figure 4.7: Export and Import growth during 1985-2015

Source: Calculated from World Development Indicator database (World Bank, 2018c)

The most notable performance of the Bangladesh economy over the last few decades is its export growth. The country achieved an average of 14 percent export growth, until the global financial crisis in 2008. In 2010 export growth was 27 percent; however, there is a declining trend in export growth for the last few years. The export performance of Bangladesh is dominated by one product: readymade garments (RMG). The RMG industry comprises more than 80 percent of export earnings in Bangladesh. The lack of diversity in the total export basket increases the export vulnerability level of the country. Diversifying export types is the main challenge for future trade policy in Bangladesh.

4.3.7 Balance of Payments

The current account balance trend experienced a regular fluctuation for the last two decades in Bangladesh. As shown in Figure 4.8, at the beginning of the 1990s Bangladesh experienced a negative current account balance. In 1995, the current account balance to GDP was -2.2 percent. From this period onwards, the current account balance increased, but remained negative until 2002. After 2002, there was some improvement in the current account balance but it remained negative and fluctuated regularly. Similarly, Bangladesh has experienced a negative trade balance throughout the last two decades with the only exception being in 2002. In 2001, Bangladesh export earnings faced a sudden fall and negative export growth for the first time since the mid-1980s due to the economic recession in USA and EU (Bhattacharya, 2003).

However, the export performance rebounded immediately in the next year. Export earnings were 16.10 percent higher in 2002 than the previous year. In contrast, imports were continuously declining due the regulatory measures taken by the government to control foreign exchange reserves. As a result, the trade balance increased sharply in 2002 (Bhattacharya, 2003). Overall, there has been an improving trend in recent years.

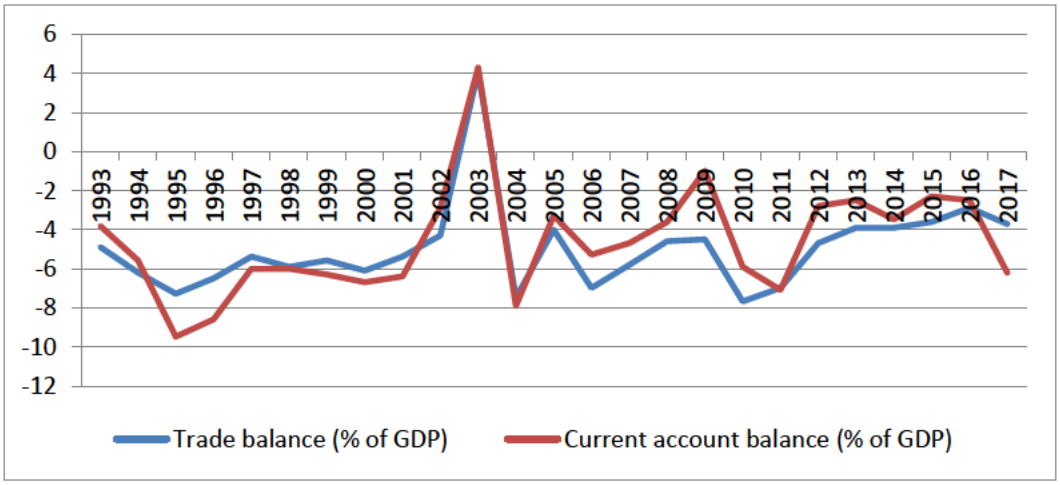

Figure 4.8: Trend of trade balance and current account balance in Bangladesh from 1993 to 2017

Source: Calculated from World Development Indicator database (World Bank, 2018c)

Overall, the Bangladesh economy shows some improvement and solidity over the last three decades. The stable and consistent GDP growth, the declining trend of the budget deficit, improvement in trade accounts and the impressive performance of exports indicates that Bangladesh has become more stable and prosperous. However, the slow progress in savings and investment and the low revenue to GDP ratio provide a challenge for the future growth prospects of the country. Bangladesh needs to boost both private and public investment. The government is trying to encourage private investment through various policies and incentives. Public investment is also required, particularly in the area of physical infrastructure development, such as power supply and port facilities to create a favourable environment for private investment (GOB, 2015a). The political and administrative systems also need to improve to establish investor confidence.

Although Bangladesh achieved success in GDP growth, the sources of growth or structural composition of growth is not as impressive with the industry sector only slowly replacing the agricultural sector. Therefore, transforming the economy from a low value-added agrarian economy to the advanced high value-added industrial economy remains a long-term challenge for the Bangladesh economy.

The Bangladesh economy also suffers from a lack of diversification. Economic growth and export growth primarily come from one single industry (textile and clothing) which exposes the fragility of this sector and makes the Bangladesh economy vulnerable to any domestic or international crisis. The initiatives for diversifying the economy, especially in the industrial sector in terms of product, market, and services, are crucial for sustainability. Moreover, sustainability requires an inclusive and diverse economy.

The rapid expansion of the manufacturing sector is the cornerstone of development policies in Bangladesh. Rapid globalisation offers many benefits, but also poses substantial challenges to this sector. To make the sector globally competitive there is a need to improve product quality and introduce industrial sophistication and technological advancement, with long-term investment essential. The low level of domestic savings, investment, and revenue earning clearly indicate the limited domestic capacity and the need for foreign investment.

4.4 FDI inflow in Bangladesh: policies, trend, sectoral composition and determinants

Like many other developing countries, Bangladesh is progressively adopting more open policies and offering various incentives to attract foreign direct investment for the last four decades. Bangladesh recently reached the status of a lower-middle-income country due to its strong growth performance over the last decade, stable macroeconomic situation and poverty reduction efforts (World Bank, 2019). Bangladesh has a target to reach the level of an upper-middle-income country by 2021. The country is also in the process of transitioning from an agriculture-based economy to an industrial economy.

However, the industrial base of the country is low and suffers from limited technological advancement. The country needs to raise the investment rate at least 33 percent of GDP to reach the targets of the current development plan (GOB, 2015a). Public investment is estimated to account for 23 percent of the total and private investment is targeted at around 77 percent of

total investment. It is estimated that foreign investment needs to increase to at least 3 percent of GDP (GOB, 2015a, p. 40). The country is attempting to create a favourable investment climate to attract more FDI inflows; however, it has achieved little success in FDI inflows in the country. The net FDI inflow as a percentage of GDP is still low and concentrated to only a few sectors. Lack of coherence policy, a low level of skilled workers, limited purchasing capacity, inadequate infrastructure facilities, lack of good governance and high level of corruption are the major impediments to attracting FDI in Bangladesh.

4.4.1 The major policies to encourage and regulate foreign investment in Bangladesh

Bangladesh does not have any specific FDI policy to regulate and protect FDI in the country. The country is actively promoting foreign investment through its industrial policy and various liberalisation and export-oriented growth strategies. *The Foreign Private (Promotion and Protection) Investment Act, 1980*, is the core legal basis to regulate the private investment in the country. The other laws affecting foreign investment include Industrial Policy 2005, 2010 and 2016, *The Bangladesh Export Processing Zones Authority Act, 1980*, and *The Bangladesh Economic Zone Act, 2010*.

The government enacted *The Foreign Private (Promotion and Protection) Investment Act, 1980* to facilitate and mobilise foreign investment from capital-exporting developed countries. The Act sets out the equal treatment of domestic and foreign investors and provides all legal protections from nationalisation and expropriation. The Act also ensures the repatriation of capital and dividend. The Act does not impose any prohibition for foreign investment for specific sectors; however, the National Industrial Policy 2005 and 2010 reserves four sectors exclusively for public investment due to national security. The sectors are defence, forests, nuclear power, and security printing.

The government imposes an additional restriction on investing in 17 controlled or regulated industries. The industries include (BIDA, 2018):

- Private power generation and distribution;
- Deep-sea fishing;
- Setting up a private bank and financial institutions;
- Setting up a private insurance company;

- Investing in natural gas extraction and distribution;
- Investing in coal extraction and distribution;
- Investing in other minerals extraction and distribution;
- Refining and recycling of crude oil;
- Establishing industries that use mineral resources as inputs;
- Telecommunication and satellite industries;
- Aviation industry;
- Shipping industry; and
- Large physical infrastructure projects such as express highways, port, railways

The government provides special incentives to encourage investment in priority sectors: the Industrial Policy Act of 2016 offers special financial incentives and policy support for high-priority industries. High priority-industries include industries that have the potential to generate large-scale employment, substantial export revenue and those with a recognised ability to encourage innovation and technological advancement. The priority include software and information technology; textiles and readymade garments; leather industries; jute industries; pharmaceuticals and food processing and agricultural industries.

The government passed *The Bangladesh Export Processing Zones Authority Act, 1980* to regulate and encourage the export-oriented investment in the export promotion zone areas. Under this Act, the government established the first Export Processing Zone (EPZ)[7] in Chittagong in 1983. Later, seven more EPZs were established in Dhaka (Savar), Mongla, Ishwardi, Comilla, Uttara, Karnaphuli (Chittagong) and Adamjee (Dhaka). A private EPZ owned by Korean investors is also in operation in Chittagong. The primary objective of establishing the EPZ is to provide a territory or area with necessary facilities where potential investors can find an investment-friendly climate (BEPZA, Website).

Bangladesh also enacted *The Bangladesh Economic Zone Act, 2010* intending to accelerate economic activities and create employment opportunities. Special Economic Zones (SEZs)[8] are geographically delineated areas set up by the government, offering various incentives to attract

[7]Export Processing Zones (EPZs) are special designated economic territories where production plants can manufacture, import and shipp their products with reduced or minimum customs duty and tax. EPZ usually offers incentives and a barrier-free environment to attract foreign investment for export-oriented production. It also provides better and well-maintained physical infrastructure facilities for business.

[8]Special Economic Zones (SEZs) are geographically located special economic enclave where rules and regulations are applied differently from rest of the country for operating business and trades in those areas. The business entities enjoy special privileges to set up and run their business in SEZs.

inward investment. The Act permits private entrepreneurs to participate in managing the economic zones and develop physical infrastructure facilities within the zones. At present, there are 55 government-owned, and eleven privately-owned economic zones operating. As part of the promotion of foreign investment, Bangladesh signed and ratified a number of bilateral and multilateral investment and trade agreements. Bangladesh has already signed 28 bilateral investment treaties with countries such as Austria, China, Denmark, France, Germany, India, Indonesia, Iran, Italy, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Switzerland, Thailand, United Kingdom and the United States. The treaties provide the guarantee of national treatment, avoidance of double taxation, duty-free access facilities and preferential tariff treatment. Several other regional trade agreements are under negotiations (BIDA, 2018).

Bangladesh also offers some fiscal incentives to attract domestic, as well as foreign, private investment. Bangladesh provides tax holidays up to twelve years for encouraging foreign and domestic investment into 'thrust' or critically important and some physical infrastructure sectors. ‘Thrust’ sectors include pharmaceuticals, textiles, fertiliser, biotechnology, chemicals and dyes, automobiles, electronics, software and ICT related industries (BIDA, 2018). Physical infrastructure projects such as deep seaports, express highways, renewable power generation, water treatment plants, as well as export processing and special economic zones, also enjoy a tax holiday facility. Table 4.3 represents the tax holidays for investment projects in Bangladesh.

Table 4.3: Tax holidays for various investment projects in Bangladesh

Year	Rate of tax holidays for thrust sectors located in urban areas	Rate of tax holidays for thrust sectors located in rural areas	Rate of tax holidays for physical infrastructure projects	The maximum rate for projects located in EPZs	Infrastructure Projects
Year-1	100%	100%	100%	100%	100%
Year-2	100%	100%	100%	100%	100%
Year-3	60%	70%	80%	100%	100%
Year-4	40%	55%	70%	50%	100%
Year-5	20%	40%	60%	50%	100%
Year-6		25%	50%	50%	100%
Year-7		10%	40%	25%	100%
Year-8			30%		100%
Year-9			20%		100%
Year-10			10%		100%
Year-11					70%
Year-12					30%

Source: Bangladesh Investment Development Authority website (BIDA, 2018)

Other fiscal incentives offered by the government include (Bangladesh Investment Development Authority website (BIDA, 2018):

- Duty-free importation of raw material and machinery;
- Exemption from tax on dividends;
- 100 percent repatriation of capital and dividends;
- Stamp duty exemption and a waiver from the registration fee for establishing a factory;
- Duty and tax exemption on exports;
- Waiver of customs duty for importing up to two vehicles;
- Avoiding double taxation;
- Rebate on income tax;
- Foreign exchange account facility;
- Exemption of income tax on royalty;
- Zero capital gains tax;

- Unlimited work permit for foreign nationals who are involved in the projects;
- Residence and citizenship facilities for a certain amount of investment; and
- Extra tax exemption for investment in rural areas.

The Bangladesh Investment Development Authority (BIDA) is the key organisation responsible for regulating and promoting foreign investment in Bangladesh. The responsibilities of BIDA include pre-counselling services; facilitating the registration and approval of projects; providing technical support; and facilitating foreign loan and credit supports. Bangladesh Export Processing Zone Authority (BEPZA) also monitors, supervises and regulates the activities of investment projects located inside the Export Processing Zones; however, any foreign investment project also requires clearance from the respective ministry.

4.4.2 Foreign Direct Investment trends and composition

Despite offering various incentives and policy reform measures, Bangladesh achieved minimal success in attracting FDI in the country. Until 1995, the amount of FDI inflow in the country was negligible. The liberalisation reform initiatives of the late 1980s, the establishment of the export processing zones in 1983 and the opening up the energy and power sector for private investment in 1996 contributed to increasing FDI inflows in the country.

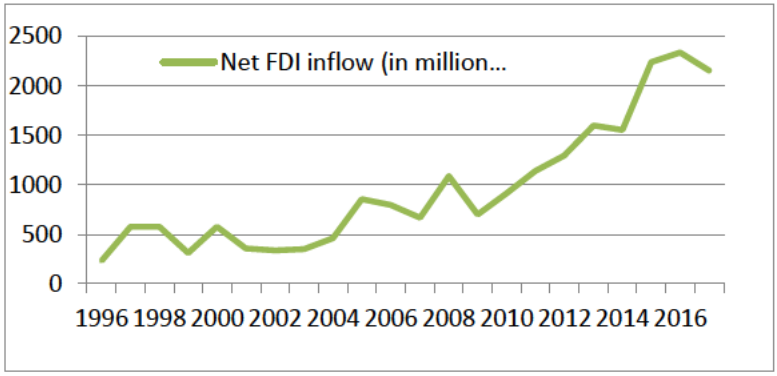

Figure 4.9: Net FDI inflow (in million USD) in Bangladesh from 1996-2017

Source: World Development Indicators (World Bank, 2018c)

As shown in Figure 4.9, FDI inflows increased after 1996. Since then Bangladesh has been experiencing a general upward trend of net FDI inflows with some periodical fluctuation. Several deregulations and privatisation policies such as *The Bangladesh Telecommunication Act, 2001*, and the legalisation of private participation in the power sector under the National Energy Policy of 1996, contributed to the upward trend in FDI inflows.

External shocks like the 1997 Asian Financial crisis and the 2008 Global Financial Crisis have caused fluctuations but no lasting damage. Despite the upward trend, FDI inflows remain generally low and recent growth is sluggish. During the first half of the 1990s, the annual average FDI inflows were only USD 6.7 million, which increased to USD 339 million in the second half of the 1990s and reached USD 2152 million in 2017. However, net FDI inflows as a percentage of GDP in Bangladesh remains below 2 percent (World Bank, 2018c).

FDI inflows in Bangladesh are clustered into five broad sectors – agriculture, manufacturing, power, trade and transport sectors. The manufacturing sector receives the highest share of FDI inflows. Table 4.4 presents the sectoral inflow of FDI in Bangladesh from 1996 to 2017.

Table 4.4: The sector-wise FDI inflows in Bangladesh from 1996 to 2017 (in million USD)

Year	Agriculture & fishing	Manufacturing	Power, gas, and petroleum	Trade and Commerce	Transport and telecommunications	Others	Total
1996	0.26	89.07	46.98	92.25	1.48	1.57	**231.61**
1997	1.35	162.37	242.09	158.86	5.93	4.69	**575.29**
1998	1.38	139.78	235.19	164.31	25.31	10.49	**576.46**
1999	2.94	191.74	83.54	27.53	0.53	2.48	**309.12**
2000	15.18	193.46	301.09	53.24	5.4	10.27	**578.64**
2001	1.06	132.25	192.44	27.57	0.85	0.3	**354.47**
2002	1.59	142.95	57.87	70.83	48.54	13.69	**335.47**
2003	4.07	165.04	88.18	43.98	45.88	3.09	**350.24**
2004	1.73	139.46	124.05	66.59	127.51	1.09	**460.41**
2005	2.32	219.27	208.26	130.48	281.95	2.98	**845.26**
2006	1.26	104.86	208.25	130.24	346.91	0.96	**792.48**
2007	7.33	142.68	215.94	92.87	201.9	5.64	**666.36**
2008	14.43	168.49	101.02	153.4	641.39	7.58	**1086.31**
2009	11.79	211.29	51.15	161.59	250.14	14.2	**700.16**
2010	13.63	238.78	92.06	186.63	360.31	21.91	**913.32**
2011	5.59	425.5	238.21	263.39	182.78	20.91	**1136.38**
2012	60.85	515.21	126.63	163.7	375.64	50.53	**1292.56**
2013	31.04	702.05	98.88	354.51	326.21	86.57	**1599.26**
2014	31.58	722.87	49.76	414.16	237.18	95.73	**1551.28**
2015	24.72	841.23	573.6	419.16	258.42	118.26	**2235.39**
2016	43.15	846.81	434.31	283.22	582.05	143.18	**2332.72**
2017	35.17	980.24	260.37	409.58	238.71	227.49	**2151.56**

Source: FDI Survey Report, July-December, 2017, Bangladesh Bank (Bangladesh Bank, 2017)

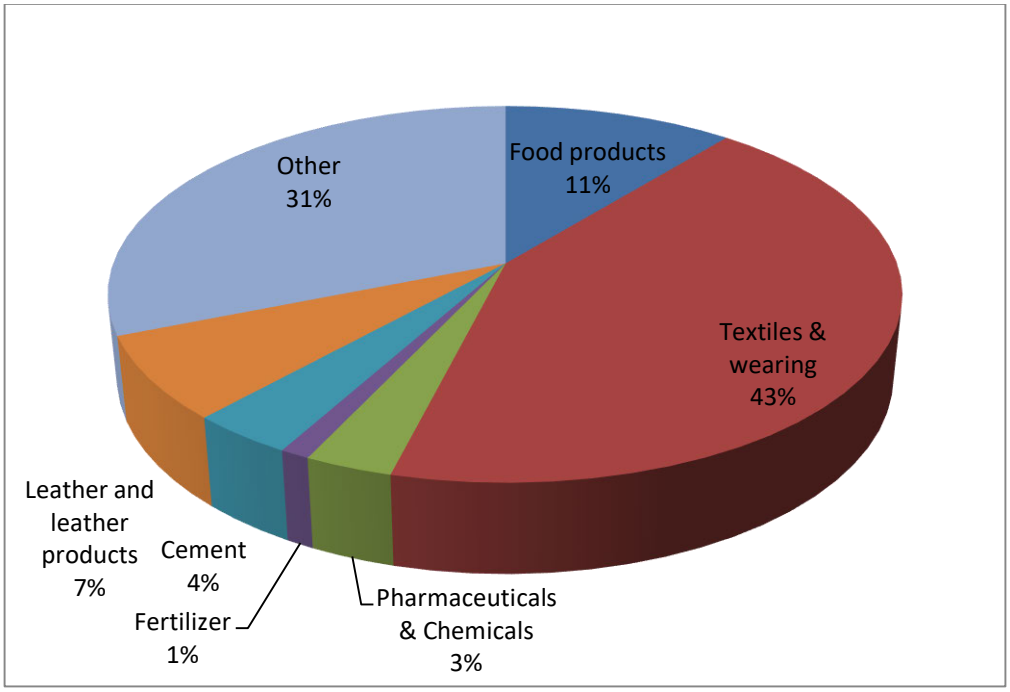

Figure 4.10: Manufacturing FDI inflows in 2017

Source: FDI Survey Report, July-December, 2017, Bangladesh Bank (Bangladesh Bank, 2017)

Figure 4.10 represents the distribution of manufacturing FDI among different industries in 2017. It is noticed that manufacturing FDI inflows in Bangladesh are concentrated in the low-tech and low-value adding industries. The technology-intensity used in the production process reflects the level of value-addition in the industry. OECD (2011b) and UNIDO (2018b) classified manufacturing industries by technology, where, high-tech industries include the manufacture of pharmaceuticals, medicinal chemicals, communication equipment medical instruments, aircraft and spacecraft. Medium-tech industries include machinery and equipment, electrical machinery and apparatus, motor vehicles, transport equipment. Low-tech industries include the manufacture of food products, tobacco products, textiles wearing apparel; leather and footwear, plastic products. Figure 4.10 depicts that textiles and wearing, food products, leather and footwear dominate the share of manufacturing FDI inflows in Bangladesh, which are categorised as low-tech and low-value adding industries.

Bangladesh received FDI from 36 countries across the globe. The top ten investing countries, and their respective share in total FDI inflows in 2017, are: United Kingdom (14.55 percent); Singapore (9.42 percent); Norway (9.42 percent); South Korea (9.03 percent); United States (8.36 percent); Hong Kong (7.75 percent); India (5.33 percent); Netherlands (5.29 percent); Malaysia (5.29 percent); and China (4.19 percent).

4.4.3 Determinants of FDI inflows in Bangladesh (prospects and challenges)

The discussion in section 4.4.1 and 4.4.2 show that the Government of Bangladesh is attempting to increase FDI inflows in the country with various policy measures and incentives. However, the success in attracting FDI inflows in the country is very limited. Market size, the availability of cheap labour, and open and liberalised economic and trade policies offer Bangladesh good prospects for attracting FDI inflows. However, political instability, lack of policy coherence, the low purchasing power of the majority of people in the country, and insufficient infrastructure facilities hinder the prospects for FDI inflows.

Large market size attracts market-seeking FDI in the host country. In terms of the nominal GDP and the size of the population, the market size in Bangladesh is large. However, in terms of the per capita income, the market size is relatively small. Per capita income in Bangladesh is low with an average per capita income of only USD 1,900 (MOF, 2019). Therefore, low purchasing power limits the scope of market-seeking FDI inflows. However, if Bangladesh can maintain its high GDP growth and reach the level of a middle-income country with improved income distribution, there are considerable prospects to attract market-seeking FDI.

Bangladesh is becoming an increasingly open and liberalised economy, which is necessary to attract foreign investment, but not sufficient. In addition to the open, liberalised policy, other conditions, such as skilled human resources, physical infrastructure facilities, prudential macroeconomic conditions, efficient administrative and regulatory system, are essential to attract FDI.

The availability of cheap labour is one of the prime determinants of FDI in labour-intensive industries. Due to the high levels of unemployment, labour costs in Bangladesh are very low. Globally, Bangladesh is the cheapest country for a high skilled labour and the second cheapest for a low and unskilled labour (UNCTAD, 2013). Therefore, Bangladesh is an ideal destination or a natural candidate for a labour-intensive industry. However, there is a concern that investors might take advantage of the availability of cheap labour and loose labour laws to exploit local labour markets.

The availability of cheap labour is not sufficient for FDI inflows. Strengthening the absorptive capacity and particularly the development of human capital is crucial for attracting high-technology based FDI inflows and realising the spillover effects of FDI inflows. The lack of an adequately trained workforce is one of the top five impediments to doing business for

subsidiaries of multinational firms in Bangladesh (UNCTAD, 2013). Bangladesh achieved some success in improving primary education enrolment, but the dropout rate beyond primary education is high due to poverty. The gross enrolment for tertiary education is 17 percent, but less than two percent of the population completed tertiary degrees and the number of scientifically and technically trained people is low (World Bank, 2018c). Human resource development is crucial in attracting efficiency-seeking FDI in Bangladesh. Recently, the government took initiatives to build several High-tech Parks[9] to attract FDI inflows in high technology industries. However, Bangladesh needs to complement the physical facilities with the development of the human skills required for high technology industries.

Poor physical infrastructure and facilities impedes FDI inflows in Bangladesh. The interrupted and insufficient power supply, congested and high-trafficked road facilities, limited rail network and, most importantly, the absence of deep and modern seaports, restricts FDI inflows. On the other hand, infrastructure could be a potential sector for FDI inflows. With appropriate policy measures, the government can encourage FDI inflows in infrastructure projects, such as the construction of highways, bridges, railway networks, power plants, and upgrading the port facilities.

Well-developed, modern infrastructure not only encourages foreign investment, it also stimulates local investment in other sectors and industries. The limited land availability and complications related to the acquisition and purchase of land by foreign companies also impose obstacles to foreign-private investment projects occurring in the infrastructure sector (Rashed *et al*., 2014). The government has been trying to promote foreign investment in the physical infrastructure sector with the public-private-partnership (PPP) initiatives[10]. *Bangladesh Public-Private-Partnership Act, 2015 also* emphasised the requirement for foreign financing partnerships in infrastructure development projects.

Macroeconomic stability provides confidence to investors. Bangladesh has achieved some success in maintaining macroeconomic stability in terms of GDP growth and inflation management for the last two decades; however, instability in the external sector arises due to a large trade deficit.

[9] High-tech Park provide a one-stop platform, facilities and a congenial business environment to develop information-technology based sophisticated industries.

[10] A Public-private partnership (PPP) is a collaboration between the government entity and private-owned company to build, finance and mange projects to spur development.

In addition, tax revenue as a percentage of GDP is still very low, and the low level of savings and investment, and large fiscal and external deficits generates threats to the overall macroeconomic stability of the country. As investors require a stable, growing economy, prudential macroeconomic policies and measures are required to improve FDI inflows.

Along with macroeconomic stability, political stability and the rule of law are essential factors for doing business in a country. Bangladesh frequently suffers from political and social unrest. General strikes called by political parties, students and workers movements reduce productivity and increase business costs . Terrorist attacks, such as the one on 1st July 2016 in the diplomatic area in which 20 people were killed (including foreign citizens), are also an ongoing threat for FDI inflows in Bangladesh.

Bangladesh does not have any FDI policy. The bureaucratic procedure in Bangladesh is also lengthy and complicated.. It is claimed that the Bangladesh Development Authority provides a one-stop support facility to start an investment project in Bangladesh; in fact, several institutions, department and laws are involved in the process. In terms of the ease of doing business, Bangladesh ranks 177 out of 190 countries (World Bank, 2018b). In terms of the key indicators of doing business, Bangladesh performs worst amongst other South Asian countries. Table 4.5 presents the doing business indicators of selected South Asian countries.

Table 4.5: Doing Business Indicators in Selected South Asian Countries

Indicators (rank)	Bangladesh	India	Pakistan	Sri Lanka	Nepal	Maldives
Ease of doing business	177	100	147	111	105	24
Starting a business	131	156	142	77	109	111
Dealing with construction permits	130	181	141	76	157	11
Getting electricity	185	29	167	93	133	8
Registering property	185	154	170	157	84	42
Getting credit	159	29	105	122	90	20
Protecting minority investors	76	4	20	43	62	4
Paying taxes	152	119	172	158	146	73
Trading across borders	173	146	171	86	76	61
Enforcing contracts	189	164	156	165	153	44
Resolving insolvency	152	103	82	88	76	46

Source: Doing Business 2018 (World Bank, 2018b)

High levels of corruption in the public sector also adds extra costs to doing business in Bangladesh. Corruption is common in public procurement, project implementation, tax collection, and other regulatory systems (Business Anti Corruption Portal, 2018; World Bank, 2018b). Bangladesh ranked 146 out of 176 countries in the corruption perception index of Transparency International (TIB, 2018).

In general, Bangladesh has the potential to attract labour-intensive, market-seeking and even efficiency-seeking FDI to the country. The low purchasing power of the large income group, low levels of technical and higher education, corrupt and inefficient governance system and poor infrastructure facilities are the major impediments for FDI inflows. The government needs to improve this complex, multi-layered situation. FDI inflow can also play a significant role in overcoming the challenges through projects in the infrastructure sector and extending their activities in the training and skills development area.

4.5 The nexus between FDI inflows and economic sustainability: the performance of the export-oriented manufacturing sector in Bangladesh

The Bangladesh economy is slowly moving from an agricultural to an industrial economy. The industrial base of the country is still low and also suffers from low technological advancement and sophistication. The government has adopted open liberalised economic policies and is encouraging private investment. Along with the domestic investment, Bangladesh is also continuously trying to attract more FDI inflow, especially in the export-oriented manufacturing sector, to give the country a sustainable industrial base. The improvement and expansion of the physical capital base is a necessary condition for economic sustainability. FDI inflows can help the country overcome the challenges, and can contribute towards the expansion of advanced, sophisticated high value-added industrialisation. To set the scene for the econometric analysis that follows, this section examines the extent to which FDI inflows have promoted economic sustainability in Bangladesh using a descriptive analysis.

4.5.1 Impact on growth, structural dynamics and export performance of the manufacturing sector

The key aim behind promoting FDI in the export-oriented manufacturing sector is to accelerate the manufacturing and economic growth of the country. Figure 4.11 describes the economic and manufacturing growth and FDI inflows in Bangladesh during 1988 to 2017. Over the past two decades, manufacturing growth performance is not uniform. The manufacturing growth path experienced substantial volatility and periodic fluctuations throughout this period. Manufacturing growth followed an upward trend from the late 1980s to mid-1990s, and a downward trend during the second half of the 1990s. The East Asian Crisis of 1997-98 adversely impacted the manufacturing performance of Bangladesh. Manufacturing growth rebounded in 1998 and a positive growth path followed, due to positive policy strategies and favourable international market conditions. The growth process slowed again during the Global Financial Crisis (GFC) in 2008-09. The average manufacturing growth reached 9.47 percent during 2010 - 2015, and exceeded double-digits in 2015.

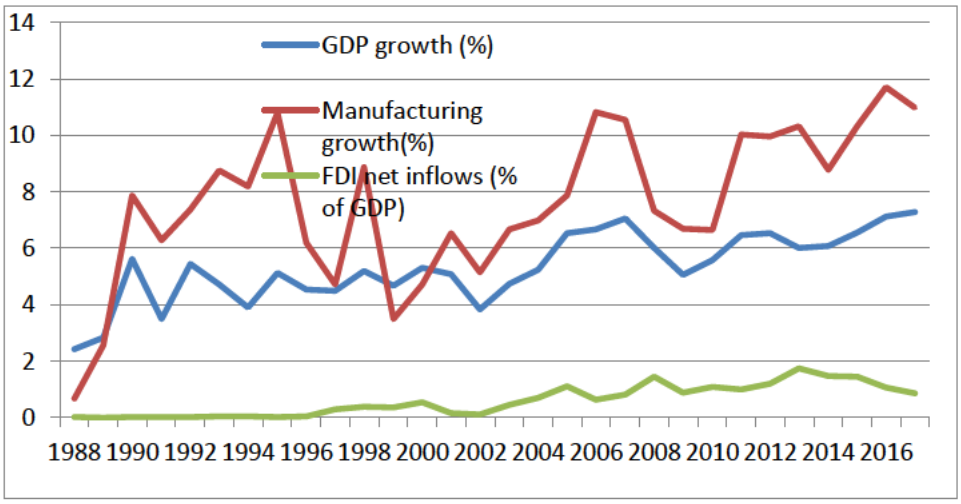

Figure 4.11: FDI inflows and the growth of real GDP and the manufacturing sector in Bangladesh from 1988 to 2017

Source: World Development Indicators (World Bank, 2018c)

Figure 4.11 also shows that the growth path of GDP follows the growth path of the manufacturing sector in Bangladesh to a degree. In the latter part of the 1980s, manufacturing growth exceeded GDP growth and both growth paths are closely aligned since 1998. FDI inflows may positively contribute to manufacturing and economic growth in Bangladesh, which is the subject of the econometric analysis that follows.

FDI inflows may also have contributed to the structural transformation of the country. Table 4.6 describes the structural dynamics of the Bangladesh economy. The share of the manufacturing sector in the economy has increased over the period and recently surpassed the agricultural sector.

Table 4.6: Structural dynamics of the manufacturing sector in Bangladesh

	Sectoral share as % of GDP					
Sector / Fiscal Year	**2005**	**2011**	**2013**	**2015**	**2016**	**2017**
Agriculture	21.91	18.01	16.78	16	15.35	14.74
Industry	28.44	27.38	29	30.42	31.54	32.42
Manufacturing	16.58	17.75	19	20.16	21.01	21.74
Large scale manufacturing	11.72	14.32	15.49	16.58	17.37	18.01
Small scale manufacturing	4.85	3.43	3.51	3.58	3.64	3.73
Service	49.65	54.61	54.22	53.58	53.12	52.85

Source: Various years of Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.)

Moreover, as shown in Table 4.6, within the manufacturing sector, the share of large enterprises[11] increased, and the share of small enterprises declined over the period. The liberalisation policies and the FDI inflows may have helped to expand large enterprises and adversely affected small enterprises. The reduction in the share of small enterprises may negatively impact on the economic sustainability of the country. Evidence shows that small-scale manufacturing enterprises have more potential to contribute to employment creation and provide a bridge between agriculture and modern manufacturing (GOB, 2015a).

FDI inflows also helped to improve the export performance in Bangladesh. FDI inflows have the potential to improve export performance in the host country through greater integration with the international market, thereby improving the quality of the product as well as increasing efficiency and competitiveness in the production process.

[11] Bangladesh Bureau of Statistics (BBS) defines large-scale enterprises as those with at least 250 workers. medium scale enterprises as those with less than 250 workers and more than 100 workers. Small establishment have less than 100 workers (BBS, 2012).

Compared with the FDI inflows, manufactured exports increased at a higher rate over the last two decades in Bangladesh. Manufactured exports increased from $USD3706 million in 1996 to $USD32952 million in 2016 (World Bank, 2018c). The manufacturing sector comprises more than 80 percent of Bangladesh exports, and manufactured exports also hold around 96 percent of total merchandise imports in Bangladesh (World Bank, 2018c).

Figure 4.12 shows the manufactured export growth trend in Bangladesh. Manufactured exports grew at a rapid rate of 15 percent a year on an average over the period from 1996 to 2016; however, the presence of regular fluctuations in the growth trend indicates volatility and unsustainability of manufacturing growth in Bangladesh.

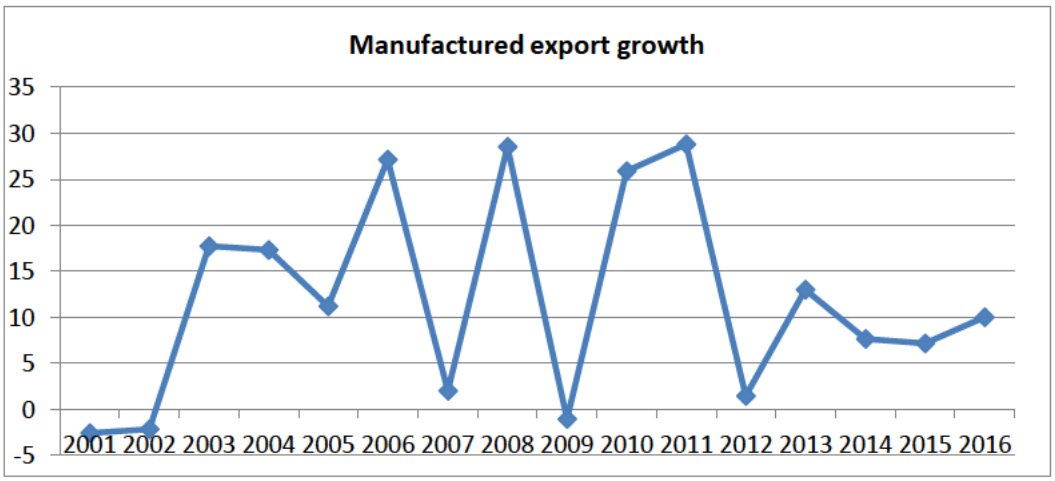

Figure 4.12: Manufactured export growth in Bangladesh during 2001-2016

Source: Based on the World Development Indicator's data (World Bank, 2018c)

Another alarming feature of manufactured exports of Bangladesh is the high dependence on one sector - textiles and clothing. Table 4.7 and Figure 4.13 describe the composition of Bangladesh exports and manufactured exports in Bangladesh. The textiles and clothing sector comprises more than 85 percent of manufactured exports in Bangladesh.

Table 4.7: Composition of Bangladesh exports

	% of total export						
Fiscal Year	**2003**	**2006**	**2011**	**2012**	**2013**	**2014**	**2016**
Primary commodities	**7.06**	**7.34**	**4.18**	**4.12**	**3.99**	**4.57**	**3.81**
Frozen food	4.91	4.36	2.73	2.46	2.01	2.11	1.56
Agricultural products	0.39	0.90	1.46	1.66	1.98	1.33	0.90
Jute	1.26	1.14	..	..	..	0.42	0.51
Others primary	0.50	0.67	..	..	..	0.70	0.84
Manufactured goods	**92.94**	**92.66**	**95.82**	**95.88**	**96.01**	**95.43**	**96.19**
RMG & textile	75.01	75.06	78.15	78.55	79.61	81.13	82.01
Jute goods	3.93	3.43	4.86	3.98	3.81	2.32	2.18
Chemical products	1.53	1.95	0.46	0.42	0.34	0.31	0.36
Engineering products	0.20	1.05	1.35	1.55	1.36	1.22	1.49
Leather & footwear	3.62	3.35	2.60	2.74	3.03	2.25	4.03
Other manufactured	8.64	7.81	8.40	8.64	7.85	8.21	6.12
TOTAL EXPORTS	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Calculated from various years Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.)

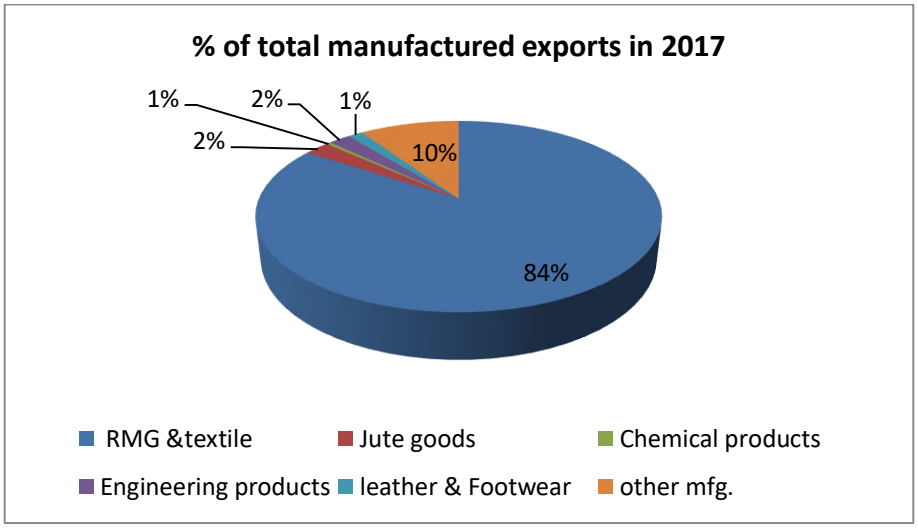

Figure 4.13: Composition of major manufactured exports in Bangladesh in 2017

Source: Economic Review 2019, Ministry of Finance, Government of Bangladesh (MOF, 2019).

As shown in Table 4.7 and Figure 4.13, the composition of manufactured exports for the last two decades has become increasingly dependent on readymade garments (RMG) and textiles. Diversification of exports is a necessary condition for the sustained and long-run growth of the manufacturing sector.

Diversification of manufacturing exports is the priority agenda of trade and industrial policies of the government; however, the government has failed to achieve success in diversifying the manufacturing sector. The heavy reliance on the readymade garments and textiles industry, and poor performance of the other manufacturing sectors, has restricted the prospects for sustainability in manufacturing.

4.5.2 The impact of FDI on the domestic production base: the 'crowding in' and backward linkages effects

The expansion of domestic production capacity is crucial in advancing the economic sustainability of a country. FDI could potentially help to build the domestic production capacity of a country with its crowding-in effect. The crowding-in effect occurs when FDI inflows encourage domestic investment. FDI can stimulate domestic investment by diffusing new technology and knowledge, establishing linkages with domestic firms and providing greater market access.

On the other hand, FDI may generate a negative impact on the domestic productive capital stock by creating crowding-out effects. Multinational firms are usually large and technologically advanced. Therefore, MNEs have the advantage of economies of scale; domestic firms may not be able to compete with MNEs and are forced to exit the market.

Gross fixed capital formation is one of the popular indicators to determine whether FDI inflows crowd-in or crowd-out domestic investment (Acar *et al.*, 2012). Gross fixed capital formation refers to net addition to the fixed assets of a country. Table 4.8 describes the FDI inflows and gross fixed capital formation status in Bangladesh, where the gross fixed capital formation as a percentage of GDP has increased from 20.73 percent in 1996 to 25.83 percent in 2005 and reached 30.5 percent in 2017.

Table 4.8: FDI inflow and gross fixed capital formation (as % of GDP) in Bangladesh from 1996-2017

Year	1997	2000	2005	2010	2014	2015	2016	2017
FDI inflow as % of GDP	0.03	0.05	1.1	1.1	1.5	1.5	1.1	0.9
Gross fixed capital formation as % of GDP	21.8	23.8	25.8	26.2	28.6	28.9	29.7	30.5

Source: World Development Indicators (World Bank, 2018c)

Table 4.9 describes the composition of gross investment in Bangladesh. The total annual private investment as a percentage of GDP reached 23 percent in 2017, which is about 9 percent higher than the average of the 1995-2000 period (MOF, 2017). The share of FDI in total annual investment has also increased by roughly 5% over the period.

Table 4.9: Investment as % of GDP (gross, public, private and foreign) in Bangladesh from 1991 to 2016

Year	Investment as % of GDP (Gross)	Investment as % of GDP (Public)	Investment as % of GDP (Private)	FDI inflow as % of GDP	FDI as % of total investment
1991-95	17.94	6.69	11.24	0.01	0.06
1996-2000	21.51	6.79	14.52	0.31	1.44
2001-2005	23.87	6.3	17.58	0.49	2.05
2006	26.1	5.6	20.6	1.10	4.20
2007	26.2	5.1	21.1	0.64	2.43
2008	26.2	4.5	21.7	0.82	3.12
2009	26.2	4.3	21.9	1.45	5.53
2010	26.2	4.7	21.6	0.88	3.36
2011	27.4	5.3	22.2	1.07	3.90
2012	28.3	5.8	22.5	0.98	3.47
2013	28.4	6.6	21.7	1.19	4.18
2014	28.6	6.6	22	1.27	4.44
2015	28.9	6.8	22.1	1.44	5.00
2016	29.7	6.7	23	-	-

Source: Calculated based on the various years of the Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.) and Economic data, Bangladesh Bank (Bangladesh Bank, n.d.).

The descriptive statistics suggest that with the expansion of foreign investment, the domestic productive capital stock has also increased. Further, as per the investment registration report of the Bangladesh Investment Development Authority local investment is the principal constituent; more than 90 percent in the total investment basket in Bangladesh (BIDA, 2018).

Backward linkages are the key channel for generating crowding-in effects of FDI (Gallagher and Zarsky, 2004). Backward linkages stimulate upstream domestic investment and production units. FDI may increase demand for raw materials and thus help to expand the backward linkages in the country. However, the presence of foreign firms may also generate a negative effect on the backward linkages. The entry of foreign firms can increase competition in the industry and local firms may be forced to exit. Therefore, the net demand for intermediate goods and services can decline (Smarzynska Javorcik, 2004).

Further, if foreign firms rely on specialised foreign-sourced intermediate inputs for their product, the presence of FDI will negatively impact the expansion of domestic upstream firms. In respect to backward linkages, another concerning issue is that multinational firms are usually use superior technology and less raw materials. As a result, FDI inflows can negatively impact the expansion of upstream industries. It is also argued that export-oriented foreign firms are generally managed by the parent company and need higher quality requirements. MNEs maintain a global sourcing and distribution network and this might create an adverse effect on the backward linkages effect (Amendolagine *et al*., 2013). Therefore, the net effect on backward linkages depends on elements, such as the preference for foreign-sourced intermediate inputs, import propensity and the foreign firm's intensity of using intermediate goods.

Bangladesh manufactured exports performed very well over the last two decades, but manufactured imports grew even faster than exports in most years. The external sector had an average $USD58 million deficit per year from 2000-2011. As shown in Table 4.10, the import penetration ratio[12] of the country grew from 51.54 percent in 1972 to more than 84 percent by 2015, which indicates the increasing demand for foreign supplied raw materials in the country and may indicate a lack of backward linkages.

Table 4.10: Import penetration ratio in Bangladesh during 1972-2015

Year	1972	1980	1985	1990	1995	2000	2005	2013	2014	2015
Import penetration ratio in %	51.54	58.85	64.85	65.72	71.45	77.11	77.40	86.89	88.20	84.43

Source: Calculated based on the World Development Indicators data (World Bank, 2018c)

[12]Import penetration ratio is the ratio between the imports value and total domestic demand in percentage terms. It shows the degree to which domestic demand is fulfilled by imports.

Table 4.11 also shows that large and medium firms rely more on imported, rather than locally sourced, inputs. More than 60 percent of raw materials used in the medium and large firms are sourced from foreign suppliers. Moreover, large foreign firms prefer imported raw materials due to price and quality differences (GOB, 2005). A higher preference for the imported raw materials limits the potential for backward linkages in the manufacturing sector.

Table 4.11: Raw materials used in manufacturing firms

	Value of raw materials (in million TK)				
Enterprise size	**Local**	**Foreign**	**TOTAL**	**Local (% of total)**	**Foreign (% of Total)**
Micro	141999	21543	163542	86.8	13.2
Small	480663	254824	735487	65.4	34.6
Medium	347399	583049	930448	37.3	62.7
Large	655853	959743	1615596	40.6	59.4

Source: Survey of Manufacturing Industry-2012, BBS, Government of Bangladesh (BBS, 2012)

An analysis of the backward linkage effect in the readymade garments and textiles industries in Bangladesh is provided in the following part of this section.

Using Input-Output tables, Masum (2016) calculated the backward linkage coefficient for the clothing industry. The author found that the domestic backward linkages coefficient for readymade garments and textiles sector in Bangladesh is 1.86, which implies that a one unit increase inoutput increased the production of domestic upstream industries by 1.86 units. The domestic backward linkages coefficient for readymade garments and textiles sector in Bangladesh is 37 percent lower than China, 15 percent lower than India and 4 percent lower than Thailand.

The backward linkage industries of textile and clothing have several segments in the production cycle. Figure 4.14 demonstrates the production cycle and the different segments of apparel products.

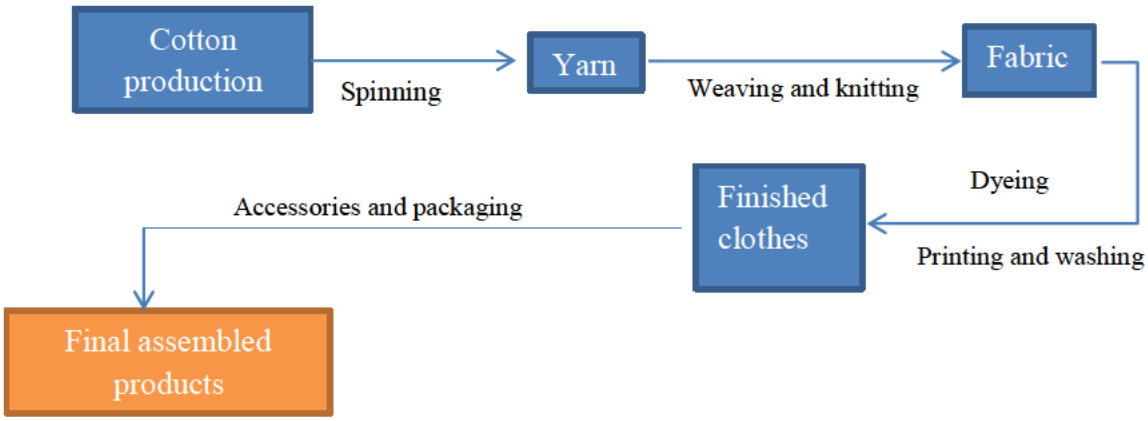

Figure 4.14: Integral parts of backward linkages of readymade garments industries

The production cycle of the readymade garments product starts with cotton production. Bangladesh has minimal capacity for cotton production, as there is a scarcity of land for farming cotton. The weather and the quality of soil in Bangladesh are also not suitable for high-quality cotton production (Habib, 2016). Therefore, backward linkage effects in this segment is close to zero. The next segment of the production chain is spinning, which produces the yarn. Due to the lack of raw materials, Bangladesh also has a minimum capacity of yarn production.

The weaving and knitting stage of the production cycle transforms yarn into fabric. The number of knitting industries in Bangladesh has increased over the last two decades. However, the weaving factories have not expanded significantly (MOF, 2016). The key constraint to setting up weaving firms is the lack of sufficient investment (Masum, 2016). Therefore, in Bangladesh, from cotton production to fabric production, the backward linkages effects are low. Foreign investment in this sector could be effective and highly beneficial to create FDI backward linkages in the sector as a whole.

Dyeing-printing-washing is the next stage where fabric is transformed into standard cloth to produce final garments. This sub-sector is very strong for backward linkages and is able to meet 100 percent of the demand; however, 90 percent of the inputs of this sub-sector is met by imports, and only a few domestic firms have modern technology and technical know-how (Quasem, 2002).

Accessories and packaging industries are the final stage in production. The main products of these industries are buttons, zippers, labels and tags. There has been a high level of growth in the number of accessories and packaging firms and the firms are able to fulfil the domestic demand (BGAPMEA, 2018).The quality of the product is also high (Bhattacharya *et al.*, 2002).

The above analysis of backward linkages for readymade garments and textiles sector shows there is mixed success with expansion in some segments and limited domestic growth in others. In particular, cotton and fabric are the primary raw materials for clothing production and Bangladesh has a limited capacity for cotton and fabric production, mostly relying on imports. Bangladesh has strong backward linkages in the accessories and packaging segment. However, in the RMG supply chain, cotton and fabric contain the majority share of the value creation. Nachum *et al.*, (2017) estimated that cotton and fabric contribute 76 percent of value creation of the total value creation of the upstream segments of RMG products in Bangladesh. Accessories contribute only 26 percent of value creation. Therefore, Bangladesh made success in the low-value adding segments of the backward linkages. Another concern with the backward linkages in the RMG sector is the lack of technological advancement and sophistication, especially in the dyeing-printing-washing segment of production.

4.5.3 The impact on productive capacity (productivity, efficiency, competitiveness, technological advancement, and innovation)

FDI inflow is often considered to be an essential channel for the transfer of advanced technology and knowledge from a developed country to a developing country. This advanced technology and expertise contribute to increasing productivity and efficiency. The central anticipation of promoting export-oriented manufacturing FDI is that it will raise the productivity of domestic firms through its spillover and linkage effects. Multinational firms can create positive spillover effects to increase labour productivity in domestic firms through demonstration, labour turnover and training activities. Tables 4.12 and Table 4.13 represent the level and growth of labour productivity, respectively, for five selected South Asian countries over the period 1990 to 2015.

Table 4.12: Per-hour labour productivity levels from 1990 to 2015 in selected South Asian countries (based on GDP at constant 2011 PPP)

	Per-hour labour productivity				
Year/country	Bangladesh	India	Pakistan	Nepal	Sri Lanka
1990	1.6	2.1	4.4	2.1	6.3
2000	2.1	3.0	5.8	2.7	8.2
2010	2.8	5.4	6.9	3.0	11.9
2015	3.5	6.9	7.7	3.2	15.3

Source: Asian Productivity Organization (APO) productivity database 2017 (APO, 2017).

Table 4.13: Average growth of per-hour labour productivity from 1990 to 2015 in selected South Asian countries (based on GDP at constant 2011 PPP)

	Growth of per-hour labour productivity				
Year/country	Bangladesh	India	Pakistan	Nepal	Sri Lanka
1990-95	2.2	3.2	3.4	2.2	4.2
1995-00	2.5	4.1	1.9	2.9	1.1
2000-05	3.7	4.6	3.3	0.8	3.7
2005-10	4.3	5.0	2.1	1.0	5.1
2010-15	3.1	4.8	2.2	1.8	3.6

Source: Asian Productivity Organization (APO) productivity database 2017 (APO, 2017).

Labour productivity has increased over the period in all selected countries. The average labour productivity growth is around 3 percent for Bangladesh, Pakistan, and Sri Lanka and 4 percent in India, Labour productivity level is low in Bangladesh compared with other selected countries. In 2015, the labour productivity level of Bangladesh was almost half that of India and Pakistan. Labour productivity of Sri Lanka is nearly five times higher than in Bangladesh.

Labour productivity reflects only partial productivity in the production process. However, the low level of labour productivity indicates production inefficiency. The overall productivity also

depends on production techniques, or the technology used in production. The technical efficiency and total factor productivity give a more general picture of production efficiency.

Table 4.14: Total factor productivity growth in selected South Asian countries from 1990 to 2015

	Total factor productivity growth				
Year/country	Bangladesh	India	Pakistan	Nepal	Sri Lanka
1990-95	0.5	1.9	0.9	0.3	3.8
1995-00	-0.3	2.5	0.4	1.1	2.2
2000-05	-0.2	3.1	2.9	-0.4	1.8
2005-10	-0.5	3.5	0.2	0.5	1.7
2010-15	0.3	1.2	2.6	-0.2	0.9

Source: Asian Productivity Organization (APO)'s productivity database 2017 (APO, 2017).

Table 4.14 presents total factor productivity growth in selected South Asian countries over the period 1990-2015. Compared with other South Asian countries, total factor productivity growth is very low in Bangladesh, and the country also experiences negative total factor productivity growth during the study period; however, the situation is improving.

Table 4.15 presents the average labour productivity growth in the manufacturing sector over the period 2000 to 2015. In the manufacturing sector, the labour productivity growth performance of Bangladesh is slightly better than some South Asian countries, but far behind India.

Table 4.15: Labour productivity growth in the manufacturing sector in selected South Asian countries from 2000 to 2015

	The average annual growth rate of labour productivity in the manufacturing sector				
Year/country	Bangladesh	India	Pakistan	Nepal	Sri Lanka
2000-2015	3.2	7.0	0.9	1.1	2.0

Source: Asian Productivity Organization (APO) productivity database, 2017 (APO, 2017)

FDI inflows could increase labour productivity by providing training, and diffusing technical and management knowledge. The low labour productivity and the poor performance of total factor productivity demonstrate that these benefits might not have materialised in Bangladesh. In Bangladesh, FDI is channelling to the low value-adding, labour-intensive industries, which may limit the scope of these benefits. High levels of technical knowledge and education are also required to reap the technology and efficiency spillover benefits of FDI inflows.

The low level of productivity reflects inefficiency in the production process, which leads to an increase in relative production costs. In turn, this leads to weak global competitiveness. For example, the Competitive Industrial Performance (CIP) index (UNIDO, 2018a) consists of three dimensions of industrial competitiveness: the first dimension expresses the country's capacity to produce and export manufactured products; the second dimension describes the country's level of technological deepening and upgrading; and the third dimension covers the competitiveness of the country's impact on world manufacturing. Due to the high export performance of the readymade garments industry, manufacturing export intensity has increased in Bangladesh; however, Bangladesh's position in global industrial competitiveness is unsatisfactory. Bangladesh ranked 77 out of 148 countries as per the Competitive Industrial Performance (CIP) index of 2018. Bangladesh is also ranked lower than its neighbouring South Asian countries in most of the components of the Competitive Industrial Performance (CIP) index (as shown in Table 4.16).

Table 4.16: Selected indicators of industrial competitiveness for selected South Asian countries

	CIP Indicators in 2015				CIP Ranking and index 2015	
Country	**MVA per capita at constant 2010 $**	**Manufactured exports per capita (current $)**	**Impact of the country on World MVA (%)**	**Impact of the country on World manufacture trade (%)**	**Rank (out of 148)**	**Index**
Bangladesh	182	152	0.24	0.18	77	0.031
India	298	168	3.25	1.83	80	0.026
Pakistan	146	94	0.23	0.15	75	0.031
Sri Lanka	598	376	0.10	0.06	39	0.086

Source: UNIDO Industrial Report 2018, (UNIDO, 2018a)

The world is changing rapidly and becoming more competitive with innovation or the creation of new technology the key to a country's competiveness. Innovation is also crucial for sustainability, as it not only brings sophistication in product and production process, but it also saves waste and input consumption in the production process. In terms of innovation, Bangladesh's performance is also very poor. In the Global Innovation Index, Bangladesh ranked 117 out of 128 in 2018; the positions of India and Sri Lanka are 66 and 91 respectively (see Table 4.17)

Table 4.17: Global Innovation Index, 2018 for selected South Asian countries

Global Innovation Index, 2018	Bangladesh	India	Pakistan	Nepal	Sri Lanka
Rank (out of 126)	116	57	109	108	88
Score (0-100)	23.06	35.18	24.12	24.17	28.66

Source: Global Innovation Index 2018 (Cornell University et al., 2018)

The Bangladesh manufacturing sector is also far behind its Asian neighbours in terms of technological advancement. For the last few decades, the export intensity of the manufacturing sector has increased, but a significant portion of the manufacturing sector belongs to low value-added technological products. The medium and high-tech manufacturing value addition share in total manufacturing was only 17.5 percent in 2008, which decreased to 9.45 percent in 2015. The medium and high-tech manufactured exports share in total exports is also very low and decreased from 2.8 percent in 2008 to 2.03 percent in 2015 (UNIDO, 2018a). The situation is even worse in the case of the high-end technology exports (see Table 4.18).

Table 4.18: High- end technology exports (% of manufactured exports) in selected South Asian countries from 1994- 2016

	High- end technology exports (% of manufactured exports)				
Country/year	**1994**	**2000**	**2003**	**2011**	**2016**
Bangladesh	0.06	0.21	0.25	0.17	-
India	4.78	6.26	5.95	6.87	7.52
Nepal	2.92	0.01	0.12	0.29	0.62
Sri Lanka	1.21	3.09	0.68	1.02	0.84
Pakistan	-	0.39	1.21	1.76	1.56

Source: World Development Indicators (World Bank, 2018c)

The above descriptive statistical analysis suggests that with the increased inflow of export-oriented manufacturing FDI, the contribution of the manufacturing sector to GDP has increased. Manufacture growth also accelerated over this period. However, the share of small-scale enterprises declined, and large enterprises' share in the total manufacturing sector has increased, which might create adverse impacts on the inclusive nature of growth.

FDI inflows also contributed to triggering manufacturing exports. Manufacturing exports have grown at a rapid rate for the last two decades; however, the impressive growth and export performance of the manufacturing sector might not contribute to overall economic sustainability or sustainable industrial development in the country. Sustainable development requires a diverse and inclusive development. The sources of growth and exports are highly dependent on just one industry (textiles and clothing) which is unsustainable from a macroeconomic perspective.

The increase of capital stock or production capacity is an important parameter when considering economic sustainability. FDI inflows may contribute positively to increase the production capacity by the associated 'crowding in' and backward linkages effects. In Bangladesh, gross capital formation appears to increase rises with the increased flow of FDI. However, backward linkages were established mostly in the low-value adding part of the production chain, which limits the backward linkage effects and the impact of FDI on economic sustainability.

FDI could also expand domestic productive capacity by increasing productivity and efficiency in the production process through its spillover effects. The productivity indicators demonstrate that Bangladesh fails to achieve success in increasing productivity. The technological and innovation capacity of the country is also inadequate. Bangladesh should take immediate action on diversification and technological advancement in the manufacturing sector. FDI inflows could play a supportive role in international technology diffusion to enhance spillover effects.

4.6 FDI inflows and economic sustainability in Bangladesh: an empirical analysis

The descriptive statistical analysis depicts that FDI inflows might have created some positive impact on the performance of the manufacturing sector in Bangladesh. The growth and export performances of the manufacturing sector have increased with the increased flow of FDI. The crowding-in and backward linkages effects of FDI inflows also appear positive in some areas;

positive effects are only seen in the low-value adding parts of the production process. Besides, the Bangladesh manufacturing sector has not made much improvement in productivity. The country also performs very poorly in technological advancement and innovation. Therefore, the overall impacts of FDI inflows on the sustainable growth of the manufacturing sector remain an issue. Moreover, the statistical trend analysis only indicates the likelihood of the relationships among the variables. There might be other causes which also contribute to determining the trend. As sustainable development is an inter-generational concept, determining the long-run relationship between FDI and economic growth is crucial to formulate appropriate policies. An empirical or econometric analysis assists in determining the co-integration and long-run relationship among the variables of interest.

Research on the importance and potentials of FDI and its conflicting theoretical outcomes on economic development has generated inconclusive and diverse results (see Section 3.2). Several empirical studies are also carried out to investigate the relationship between FDI inflows and economic growth in Bangladesh. Hussain and Haque (2016), for example, investigated the relationship among FDI inflows, economic growth, and trade openness in Bangladesh, covering data from 1973 to 2014. The study used the Vector Error Correction Model (VECM) and demonstrated that both FDI inflows and trade openness positively influenced economic growth in Bangladesh.

In contrast, using Multiple Regression Analyses, Rahman (2015) examined the link between economic growth and FDI inflows in Bangladesh, covering data from 1999 to 2013. The study found a significant negative correlation between FDI and economic growth, and stressed the need to make changes to policies and regulations to make FDI inflows beneficial for the country. Adhikary (2011) examined the relationship between FDI inflows, economic growth, gross capital formation and trade openness in Bangladesh covering annual time series data from 1986 to 2008. By applying the Johansen-Juselius co-integration procedure, the study found a strong, long-run co-integration among the variables. The study also revealed that FDI inflows and gross capital formation have a positive impact on economic growth in the long-run. However, the impact of trade openness on economic growth was found to be negative in Bangladesh, and the study proposed the formulation of FDI-led policies and emphasised the need for a high level of capital formation to accelerate economic growth.

Tabassum and Ahmed (2014) investigated the impact of FDI inflows on economic growth in Bangladesh, covering annual time series data from 1972 to 2011, by applying multiple regression. The results indicate that domestic investment is effective and significant in boosting economic growth in Bangladesh, while FDI inflows and trade openness are found to be less significant for influencing economic growth. Rayhan (2014) examined the contribution of FDI inflows to economic growth in Bangladesh over the period from 1975 to 2012. The study reveals that FDI inflows had a significant positive contribution to economic growth. The study also identifies bi-directional causalities between FDI inflows and economic growth. Ghosh and Sarker (2015) investigated the FDI-led economic growth hypothesis for Bangladesh covering data from 1980 to 2012 employing a Vector Error Correction Model (VECM). The results show that FDI positively impacts economic growth in Bangladesh in the long-run.

Begum *et al.* (2018) investigated the long-run co-integration among FDI inflows, economic growth, financial development, and trade openness for Bangladesh, using time series data from 1985 to 2014. By using the Dynamic Ordinary Least Squares (DOLS) method, the study found a positive and significant long-run co-integration among the variables. The study also revealed a bi-directional causality between FDI inflows and economic growth. The result of the variance decomposition analysis of the study indicated the decisive prospects of FDI inflows in growth generation in Bangladesh.

The number of studies conducted investigating the relationship between FDI and economic growth in Bangladesh is limited; yet, the results are also conflicting. Further, GDP growth just indicates the overall development of a country. It does not provide any specific information for the sectoral contribution or the degree of industrial development of a country. In this thesis I focus on the performances of the manufacturing sector in Bangladesh. No empirical study so far has been conducted that investigates the impact of FDI inflows on the performance of the manufacturing sector in Bangladesh.

4.6.1 Model specification and data sources

In the empirical analysis, I investigate the impact of FDI inflows on the advancement of the manufacturing sector in Bangladesh. I consider the share of manufacturing value-added to GDP as an indicator of the overall performance of the manufacturing sector as well as sustainable industrialisation of the country. Manufacturing value-added is the total net-output of manufacturing activities obtained by adding up outputs and subtracting intermediate inputs and

is an exclusive and exhaustive measure of the contribution of manufacturing to the economy (UNIDO, 2018b). The increased share of manufacturing value-added to GDP represents the advancement of the industrialisation of the country. The Sustainable Development Goals (SDGs) declared in Agenda 2030 focuses on promoting inclusive and sustainable industrialisation (SDG target 9.2), and the manufacturing value-added share in GDP is also considered an important indicator to assess the progress of sustainable industrialisation in a country (SDG indicator 9.2.1).

Based on the neoclassical and endogenous growth model, and FDI literature (see Section 3.2.1), the following model in Equation 4.1 is identified to examine the impact of FDI inflows on the performances of the manufacturing sector in Bangladesh. FDI inflows is the main independent variable. Gross fixed capital formation and trade openness are included as control variables. The model specified in Equation 4.1 closely follows the model used by Adhikary (2011). The basic difference between the model specified in equation 4.1 and the Adhikary (2011) model is that in Equation 4.1, I consider manufacturing value-added as the dependent variable, whereas, in the Adhikary (2011) model GDP is the dependent variable. Moreover, Adhikary (2011) include export growth as an independent variable along with FDI, gross fixed capital formation and trade openness. As export is a direct function of trade openness, therefore, in Equation 4.1, I do not include export growth to avoid the possible endogeneity problem in the model.

$$\ln MVA_t = \beta_0 + \beta_1 T + \beta_2 FDI_t + \beta_3 \ln GFCF_t + \beta_4 \ln TO_t + \sum_{t=1}^{n} \beta Break + \mu_t \quad (4.1)$$

Where,

$lnMVA =$ Logarithmic form of manufacturing value − added as a percentage of GDP

$FDI =$ FDI net inflow as a percentage of GDP

$lnGFCF =$ Logarithm form of gross fixed capital formation as a percentage of GDP

$lnTO =$ Logarithm form of total trade as a percentage of GDP, which is used as a proxy of trade openness variable.

T = Time trend

$Break$ = Dummy variables, which are incorporated to capture the effects of structural breaks arising from the series

$\mu_t =$ Stochastic error term

The variables are standardised as a percentage of GDP to overcome the problem of nominal values. The variables are also transformed into logarithm form. The log-linear functional form of the model usually provides more efficient and consistent results compared to simple linear specifications (Cameron, 1994). In addition, the logarithmic form provides the values of elasticities for interpreting the results directly. However, it is not possible to transform the variable FDI inflows into the logarithm form as the value of the net inflow of FDI is negative for a few years.

FDI can be measured by FDI inflow or FDI stock. I use net FDI inflow calculated by the World Bank using the current account of the balance of payment, which represents the net additional available foreign-owned capital stock for using production in a particular period (World Bank, 2018c). In contrast, FDI stock measures the total cumulative value of foreign capital. FDI stock does not consider the depreciation of the capital and therefore does not reflect the true value of the foreign capital stock (Iamsiraroj, 2016). I also acknowledge that the study focuses on the manufacturing sector; therefore, taking sectoral FDI inflows or manufacturing FDI inflows data would be more relevant. However, in Bangladesh, time-series data on FDI inflows by sector is not available. Further, FDI inflows in Bangladesh is highly concentrated in the manufacturing sector. Therefore, I take total FDI inflows as the main independent variable to investigate the impact of FDI inflows on the performance of the manufacturing sector in Bangladesh.

FDI inflows are likely to influence the manufacturing production positively by establishing new plants and projects, introducing and diffusing advanced technology, knowledge and management practices through its direct and indirect effects. FDI inflows also help to widen access to international markets. Therefore, the null hypothesis for FDI inflow is H_0: FDI inflows have a positive effect on manufacturing value-added in Bangladesh; thus, the coefficient of FDI is expected to be positive (H_0: $\beta_2>0$).

In equation 4.1, I use gross fixed capital formation as a control variable representing the effect of the change of domestic productive capital on manufacturing value added. Gross fixed capital formation is a key component of domestic investment, which represents the domestic productive base of the country. The expansion of the domestic production base of a country is critical for economic sustainability. Furthermore, the change of gross fixed capital formation due to FDI inflows provides information about the crowding in and crowding out effects of FDI.

The neoclassical growth theory suggests that as developing countries have a low level of capital stock, additional capital formation leads to increased productivity and efficiency of the investment (Romer, 1986). The new capital stock can intensify technological progress, and thus help to unlock the potentialities of economic growth. Therefore, the capital formation can enhance manufacturing production and growth. Therefore, the null hypothesis for the gross capital formation is H_0: gross capital formation has a positive effect on manufacturing-value added in Bangladesh; thus, the coefficient of gross capital formation is expected to be positive (H_0: $\beta_3>0$).

Trade openness is included as the proxy variable of trade liberalisation. Traditional trade theory postulates that trade liberalisation reduces the transaction costs associated with investment by reducing tariff and non-tariff barriers. The endogenous growth theory also suggests that opening up the economy to trade promotes allocative efficiency of investment and thus fosters economic growth (Balasubramanyam *et al*. 1996). Therefore, the null hypothesis for trade openness is H_0: trade openness has a positive effect on manufacturing-value added in Bangladesh or coefficient of trade openness is expected to be positive (H_0: $\beta_4>0$).

I obtain the annual time series data for Equation 4.1 from the online World Development Indicators (WDI) database for the 1980-2017 periods.

4.6.2 Estimation procedures and finding

The estimation of the model follows the following steps:

1. The general characteristics of the data distribution and the stationarity properties of the series are examined with the appropriate standardised tests.
2. The distributional and stationary properties of the series allow proceeding to the Johansen co-integration test approach to check the long-run co-integration among the variables.
3. Evidence of the existence of long-run correlation allows the application of the vector error correction model (VECM) to investigate Granger causality and short-run dynamics amongst the variables.

4.6.2.1 Data distribution

In order to check the homogeneity and normality characteristics of the series, I examine the descriptive properties of data. Table 4.19 shows the descriptive statistics of the variables.

Table 4.19: Descriptive statistics of the variables

Variables	Observations	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis	Jarque-Bera (prob.)
lnMVA	38	2.70	0.07	2.55	2.85	0.15	1.98	1.40 (0.41)
FDI	38	0.46	0.54	-0.03	1.74	0.80	2.30	0.80 (0.10)
lnGFCF	38	3.06	0.23	2.67	3.42	-0.12	1.48	3.76 (0.15)
lnTO	38	-1.69	0.65	-2.47	-0.73	0.30	1.44	0.42 (0.11)

The mean and standard deviation of the variables reveals that the variation of data distribution is not high, which implies a considerable degree of homogeneity in the data. The variation of range between the maximum and minimum value is within a reasonable limit. The numeric value of skewness of the variables is low. The values of kurtosis are below three, which confirms near normality (Bai and Ng, 2005). The Jarque-Bera test statistics and associated probabilities also accept the null hypothesis of the normal distribution for all variables (Jarque and Bera, 1987). Therefore, the normality of the data distribution is confirmed in the model and justifies proceeding to the next step of the estimation.

4.6.2.2 Stationary (unit root) test

It is essential to check the stationary properties of data for any co-integration analysis. The use of non-stationary series in the co-integration analysis provides misleading or spurious results (Granger and Newbold, 1974); therefore, I conduct unit root tests to examine the stationary properties or the order of integration of the series. The conventional unit root tests, such as the ADF (Augmented Dickey-Fuller) test developed by Dickey and Fuller (1979, 1981), and the PP (Phillips–Perron) tests developed by Phillips and Perron (1988) are applied. The tests are carried out in the presence of trend and without a trend. As the null hypothesis of the stationary tests, variables are considered non-stationary or that a unit root exists.

The general form of the test equation of the ADF test is presented in Equation 4.2:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^{m} \delta_i \, y_{t-i} + \varepsilon_t \qquad (4.2)$$

Where Δ denotes the first difference of the variables, y represents the series, t denotes linear time trend, m represents the optimum lag of the dependent variable, and ε is the random error term. The ADF unit root test assumes that error terms are not serially correlated. It assumes

error terms are statistically independent with constant variance. Phillips and Perron (1988) incorporated no autocorrelation assumption for the error terms. They used the past values of error terms as the moving average. The PP test has an advantage over traditional ADF test. Even the series suffers from serial correlation and heteroscedasticity problems, the PP test still provides robust estimates (Phillips and Perron, 1988). The PP test is conducted using Equation 4.3.

$$\Delta x_t = \alpha_0 + \beta_0 t + \gamma x_{t-1} + \mu_t \qquad (4.3)$$

Where x_t denotes time series data. For both the ADF and PP tests I choose Akaike's Information Criteria (AIC) (Akaike, 1973). The null hypothesis of non-stationary or a unit root is checked by the estimated *t* statistics with the MacKinnon critical value (MacKinnon, 1991).

Table 4.20 presents the results of the ADF and PP tests for the unit root of the series. The results of the ADF and PP tests represents that in level form, the null hypothesis for the series, *lngfcf, lnTO* and *FDI* have a unit root and cannot be rejected at 5 percent level of significance. Therefore, the variables are found to be non-stationary at their level. However, the variables become stationary after first difference I (1) in both ADF and PP test. Once the series become stationary, I can apply them in the regression estimation can be performed.

Table 4.20: The results of the ADF and PP tests for the unit root of the variables

Variables	ADF (SIC)				PP			
	Level		1st Difference		Level		1st Difference	
	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend
lnGFCF	0.529	-2.485	-7.33***	-4.04***	-0.79	-2.03	-6.71***	-6.71***
FDI	-1.406	-3.11	-3.063**	-3.295**	-1.300	-3.11	-8.00***	-7.83***
lnMVA	-1.00	-2.77	-5.02***	-4.98***	-1.19	-2.51	-4.96***	-4.90***
lnTO	-0.54	-1.77	-7.05***	-6.73***	-0.71	-4.09**	-7.05***	-6.73***

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively.*

However, the ADF and PP tests do not consider structural breaks in the series. Time series data may contain structural breaks. In the presence of a structural break, the reliability of the test results for the time series may decrease (Perron, 1989); therefore, the timing of structural breaks need to be identified for the analysis. I conduct a breakpoint unit root test applying the Innovational Outlier model proposed by Perron (1994, 1997) to identify the break date in the series. The test equation for the Innovational Outlier model is Equation 4.4:

$$y_t = \mu + \beta t + \varphi(L)(\theta DU_t(T_b) + \gamma DT_t(T_b) + \varepsilon_t \qquad (4.4)$$

Where, T_b refers to the time break, which is unknown and determined endogenously, DU_t denotes the intercept dummy, DT_t denotes the trend dummy. The null hypothesis of having unit root is tested with the minimisation of the Dickey-Fuller t-statistic. The rejection of null hypothesis identifies the break date. Table 4.21 presents the results of the breakpoint unit root test with break dates.

Table 4.21: The results of the breakpoint unit root test

Variables	ADF test statistic (probability)					
	Level			1st difference		
	Constant	Constant & Trend	Break Dates	Constant	Constant & Trend	Break Date
lnMVA	-3.43 (0.42)	-4.53 (0.12)	2000, 2005	-5.19*** (<0.1)	-5.01** (0.03)	1996, 2003
FDI	-4.10 (0.12)	-4.08 (0.10)	2002, 2006	-8.75*** (<0.01)	-4.76* (0.06)	1996, 2013
lnGFCF	-2.59*** (0.87)	-4.58 (0.18)	1992, 1995	-8.41*** (<0.01)	-7.52*** (<0.01)	1996
lnTO	-4.03 (0.19)	-4.15 (0.19)	2003	-8.93*** (<0.01)	-8.71 (0.01)	2006

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively. Probabilities represents the Vogelsang (1993) asymptotic one-sided values.*

Hence, the break dates are identified, and I conduct Chow's breakpoint test, proposed by Gregory Chow in 1960, to examine the significance of the break dates. Chow's breakpoint test considers the equation individually for each sub-sample and searches for the significant differences amongst the estimated equation. Chow's breakpoint test identifies that a break date of 1996 is significant for the model. Table 4.22 reports the results of Chow's breakpoint test for break 1996.

Table 4.22: Results of Chow's breakpoint test for break date 1996

Statistics	Value	Probability
F-statistic (F_{chow})	5.22	0.0026
Log Likelihood Ratio (LLR)	0.077	0.0005
Wald Statistics($\chi^2{}_{chow}$)	20.88	00003

The results of Chow's breakpoint test rejects the null hypothesis of no significant break in the model and confirms that the break date 1996 as the significant break. Therefore, in the model I include a break dummy ($Break_{96}$) for the year 1996. It is also noticed that FDI inflows in Bangladesh started to increase after 1996, which might be the cause for the structural break in 1996. The breakpoint unit root test results further confirm that all the series are stationary at first difference; that is, I (1), even in the presence of structural breaks. Therefore, the maximum order of the integration of the variables is one (1).

4.6.2.3 Johansen Co-integration Test

The focus of the empirical study is to determine the long-run relationship or co-integration among the variables of interests. I have applied co-integration analysis to identify the long run relationship between the variables of interest. Co-integration analysis provides information about whether two-or more non-stationary time series variables are integrated in the long run and follow an equilibrium path even if the linear relationship does not exist or is not strong in the short run (Engle and Granger, 1987). Application of appropriate co-integration analysis overcomes the problem of spurious regression. If there is spurious correlation or time series variables are correlated coincidently then simple linear regression analysis may provide misleading result. Therefore. Engle and Granger (1987) suggest the concept of the co-integration technique to overcome the problem of spurious correlation.

There are several techniques in econometrics for testing and estimating the co-integrating relationship. If all the time series are found stationary at the same order, then Johansen Co-integration provides the most efficient co-integration test (Sjö, 2008). Engle and Granger (1987) first introduced the Johansen Co-integration test; Johansen (1988) and Johansen and Juselius (1990) further improved the technique.

The Johansen Co-integration test follows Equation 4.5.

$$\Delta y_t = \mu + \pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \, y_{t-i} + \varepsilon_t \qquad (4.5)$$

Where,

$\pi = \sum_{i=1}^{p} A_i - I$ and $\Gamma_i = \sum_{j=i+1}^{p} A_j$

Here, y_t is n × 1 vectors of variables, which are integrated at order one and ε_t represents n×1 vector of innovations. π is the coefficient matrix, and its rank provides the number of existing co-integration. If the rank of the π matrix is equal to zero, then it refers to no co-integration among the variables. If it is equal to 1 then it refers to the existence of at least one co-integration relationship among the variables. Similarly, if the rank of the π matrix is >1 then it implies there is more than one co-integrating relationship existing among the variables. In Johnsen Co-integration analysis, the co-integration relationships are determined based on the trace and maximum eigenvalue statistics which are given in Equations 4.6 and 4.7 respectively.

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} ln(1-\lambda_i) \qquad (4.6)$$

$$\lambda_{max} = -Tln(1-\lambda_{r+1}) \qquad (4.7)$$

T refers to the sample size and λ_i represents the largest correlation. If the test statistics are found to be greater than trace and maximum eigenvalue statistics, the null (H_0) hypothesis can be rejected. The test statistics are checked based on the appropriate null (H_0: $r = g$ co-integrating vectors where, $g = 0, 1, 2, 3$….against the alternative H_1: $r \leq g+1$. If there is any conflict between λ_{trace} and λ_{max}, the researcher can choose either based on the characteristics of the sample (Adhikary, 2012).

It is essential to select optimum appropriate lag before running any co-integration analysis. The study applies the Akaike Information Criterion (AIC) to select the optimum lag for the model. The lowest value of AIC offers the best model, and based on AIC, the optimum lag is determined as 2 for the model.

In the Co-integration test, I include a linear deterministic trend and an exogenous time dummy variable for the year 1996 in the model. Table 4.23 presents the results of the Johansen Co-integration test.

Table 4.23: Results of Johansen co-integration test

H_0	H_1	Trace test			Maximum eigenvalue test		
		λ_{trace}	Critical value (5%)	Probability	λ_{max}	Critical value (5%)	Probability
r=0	r≥1	82.66	63.88	.00006	37.51	32.12	.0099
r≤1	r≥2	45.15	42.92	0.0294	22.70	25.82	0.1227
r≤2	r≥3	22.45	25.82	0.126	11.94	19.39	0.4199

The results presented in Table 4.23 indicate that both of the trace and maximum eigenvalue statistics reject the null hypothesis of no-co-integration, which implies there is at least one co-integrating relationship amongst the variables. Therefore, there is a long-run co-integration among manufacturing value-added to GDP, gross fixed capital formation, trade openness and FDI inflows in Bangladesh. The estimated long-run co-integration relationship is presented in Table 4.24.

Table 4.24: Long-run coefficients of Equation 4.1

Variable	Value of the coefficient	Standard error	t-statistics
lnGFCF	4.103***	1.0540	3.892
FDI	0.4503*	0.2727	1.651
lnTO	0.233	0.2089	1.115
T	-0.1004***	0.01493	6.724

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively.*

The coefficient of the dependent variable, *lnMVA* is normalised to unity. Results represented in Table 4.24 reveal that the long-run coefficients of most of the independent variables have the expected relationships with manufacturing value added to GDP and support the null hypothesis. The positive and highly significant coefficient of gross fixed capital formation implies that gross fixed capital formation has a strong positive impact on manufacturing value-added in the long run. FDI inflows also have a positive estimated coefficient, and it is statistically significant at 10 percent which implies manufacturing value-added increases with increases in FDI inflows.

However, the trade openness coefficient is not statistically significant, which may arise due to the high level of imports and negative trade balance for the sample period. The coefficient of the trend variable is statistically significant, which justifies the inclusion of the trend dummy in the model.

4.6.2.4 Vector error correction model (VECM)

The Johansen Co-integration test does not provide information about the causality between the variables. In the presence of the co-integration, the causality relationship can be identified by the vector error correction model (VECM) (Engle and Granger, 1987). The evidence of a co-integrating relationship from the Johansen co-integration test allows for the development of a vector error correction model for Equation 4.1 to uncover the causal relationship amongst the variables.

The VECM also provides the speed of adjustment towards long-run convergence of the variables. The Vector error correction model constructed for Equation 4.1 is presented below with lag length p, as Equation 4.8.

$$\Delta lnMVA_t = \alpha + \beta_0 T + \sum_{i=1}^{p} \beta_{1i} \Delta\, lnMVA_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{p} \beta_{3i}\, \Delta lnGFCF_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta\, lnTO_{t-i} + \delta Break_{96} + \lambda ECT_{t-i} + \varepsilon_t \qquad (4.8)$$

Here, ECT_{t-1} is the error correction term resulting from the long-run co-integration relationship and is equivalent to

$$ECT_{t-1} = y_t - \hat{\alpha} - \widehat{\beta_0} T + \widehat{\beta_1} lnMVA - \widehat{\beta_2}\, FDI - \widehat{\beta_3} lnGFCF - \widehat{\beta_4} lnTO \qquad (4.9)$$

The coefficient of the error correction term contains information regarding to the degree to which the past values of the variables influence the current value of the variables. The value and the significance level of the coefficient of the error correction term represents the speed of adjustment or tendency of the variables to move to the equilibrium path. If the coefficient of the error correction term (λ) in Equation 4.8 is found to be negative and statistically significant, then it confirms the presence of the long-run equilibrium relationship among the variables. Table 4.25 represents the result of the VECM estimation of Equation 4.8.

Table 4.25: Results of the VEC estimation where dependent variable is *Dlnmv* with two lag period

Variable	Value	Standard error	t-statistics
DlnMVA(-1)	0.293*	0.162	1.809
DlnMVA(-2)	-0.029	0.163	-0.180
DFDI(-1)	-0.072*	0.042	1.714
DFDI(-2)	-0.038	0.035	-1.061
DlnGFCF(-1)	-0.070	0.283	-0.245
DlnGFCF(-2)	0.788***	0.205	3.827
DTO(-1)	0.026	0.057	0.447
DTO(-2)	0.067	0.041	1.626
C	-0.024*	0.013	-1.784
DBreak 96	0.025	0.017	1.472
ECT$_{t-1}$	-0.0789*	0.04118	-1.917
R^2: 0.656			
Log-likelihood: 74.28			
F statistic: 2.013			
AIC: -3.616			
SIC: -3.127			

Note: (1) D denotes first difference of the variables. (2), **, *** represent 10%, 5% and 1% levels of significance respectively.*

Table 4.25 shows that the coefficient of the error correction term (ECT_{t-1}) for Equation 4.8 is negative and significant at 10 percent level, which confirms the long-term co-integration among the variables. However, the speed of adjustment is very slow. The short-run deviation among the variables have been corrected at the speed of 8 percent and approaches to the long-run equilibrium path.

In order to check the existence and direction of short-run causality between the variables, I apply VEC Granger Causality or Block Exogeneity Wald test. Table 4.26 represents the results of the VEC Granger Causality or Block Exogeneity Wald test.

Table 4.26: Results of the VEC Granger Causality or Block Exogeneity Wald test

Dependent Variable	VEC short-run Granger Causality, Wald test χ^2 (prob.)			
	DlnMVA	***DlnGFCF***	**DFDI**	***DlnTO***
DlnMVA	-	14.908*** (0.0006)	1.446 (0.4852)	2.766(0.2507)
DlnGFCF	4.391 (0.1113)	-	1.376 (0.5026)	3.7033 (0.1570)
DFDI	1.482 (0.4766)	1.613 (0.4436)	-	0.130 (0.9373)
DlnTO	1.477 (0.4778)	1.831 (0.4003)	5.0981* (0.0782)	-

*Note: (1) D denotes first difference of the variables. (2) *, **, and *** denote rejection of the corresponding non-causality hypothesis at 10%, 5% and 1% level of significance respectively.*

The Wald (χ^2) statistics for the joint significance utilise a null hypothesis that gross capital formation does not Granger cause manufacturing value-added. The null hypothesis of no Granger causality is rejected at 1 percent significance level; this means that in the short run, increases of the gross capital formation contribute to increasing manufacturing value-added. This result supports the general economic growth theory that higher capital formation leads to higher production and value-addition.

The Wald (χ^2) statistic also confirms a short-run causality from FDI to trade openness. However, the Block Exogeneity Wald test results do not find any other short-run causality among the variables. There is no short-run causality between FDI and manufacturing value-added in any direction. In the descriptive statistic, I noted that the level of FDI inflow is low and the majority of FDI inflows are channelling to the low-value adding industries, which might be the cause for the absence of short-run causality. However, the long-run coefficient of FDI is positive and significant for manufacturing value-added, which has policy implications. The FDI

inflows need to be more targeted to be useful for the manufacturing sector in Bangladesh. As gross fixed capital formation has been found to be positive and highly significant both in the long- and short-run, more attention needs to be paid to increasing the capital formation capacity of the country through FDI. Policies, incentives and strategies for encouraging FDI should consider the prospect of generating backward linkages in the industry.

4.6.2.5 VECM model stability and diagnostic analysis

I apply AR Inverse root test to check the stability of the applied vector error correction model. Figure 4.15 displays AR inverse root plotting.

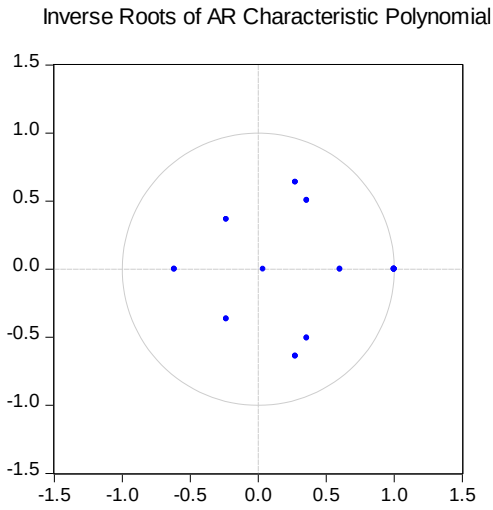

Figure 4.15: Inverse Roots of AR Characteristic Polynomial

A cursory look at the AR inverse root graph reveals that none of the polynomial roots cross the boundary of the unit circle, which indicates that the VECM model is stable and the results are consistent. I also conducted a few diagnostic tests to ascertain the validity and reliability of the estimated model. The tests include the VEC lag exclusion Wald test ($\chi^2_{lag\ exclusion}$), VEC residual serial correlation of Lagrange Multiplier (LM) test, with the null hypothesis of no serial correlations (LM_{stat}), and VEC residual heteroscedasticity test $\left(\chi^2_{HET}\right)$.

Based on skewness and kurtosis, VEC residual normality test of Cholesky-Lutkephal (Jarque-Bera) is carried out to check the normality of the model. The results of the diagnostic tests are presented in Table 4.27.

Table 4.27: Results from Diagnostic tests

Diagnostic test	Statistic	Value [prob]	Outcome
Lag exclusion Wald test	$(\chi^2_{lag\ exclusion})$(lag 2)	32.55 [0.008]	Lag selection is appropriate
Heteroscedasticity (no cross-term only level and squares)	χ^2_{HET}	189.47 [0.4972]	No heteroscedasticity
Normality	Jarque-Bera	0.6387[0.726]	Normality distributed
Serial Correlation	(LM_{stat}) (lag 1) (LM_{stat}) (lag 2)	24.9097 [0.0714] 12.65416 (0.6979)	No serial correlation

The results in Table 4.27 indicate that there is no serial correlation problem in the model. The associated probability of the LM statistic at lag 1 for the serial correlation of the Lagrange multiplier (LM) test is 0.0714, which is more than 5 percent. Therefore, the null hypothesis of no serial correlation is accepted. The associated probability at lag 2 for the LM statistic is 0.6979 which is also greater than 5 percent. Therefore, the null hypothesis of the absence of serial correlation cannot be rejected. Similarly, the null hypothesis of no heteroscedasticity is accepted at the 5 percent level of significance. The Jarque-Bera statistic and associated probability confirm the normality of the residual assumption.

4.7 Conclusion

In this chapter, I investigate the impact of manufacturing FDI inflows on economic sustainability in Bangladesh. The government of Bangladesh is promoting FDI inflows in the export-oriented manufacturing sector, intending to transform the economy from a low-value-added agrarian economy to a high value-added advanced industrial economy. The manufacturing industries may get access to advanced technology, brand names, and global markets through FDI. Therefore, the productivity and efficiency of the manufacturing sector are expected to increase with the presence of FDI. The expansion of productive capital stock and the increase in productivity and efficiency are essential for the economic sustainability of a country.

The descriptive statistical analysis reveals that manufacturing FDI inflows may assist in the promotion of economic growth and exports. Manufacturing FDI inflows also may contribute to the expansion of the domestic production base by creating backward linkages and increasing gross capital formation. However, the backward linkages are established only in the low value-

adding parts of the production process, which restricts the generation of sufficient spillover effects of FDI inflows. The productivity, efficiency and innovation indicators also show that Bangladesh may not be exploiting the productivity and efficiency spillover effects of FDI inflows.

The empirical analysis investigates the long-run relationship, and short-run causality among manufacturing value-added, FDI inflows, gross fixed capital formation, and trade openness. The results exhibit a significant long-run co-integration among the variables. The results also reveal that FDI inflows exert a positive impact on manufacturing value-added in the long run. However, there is no short-run causality between FDI inflows and manufacturing value-added in any direction. The gross capital formation has a strong positive impact on manufacturing valued-added both in the short- and long-run.

Therefore, in general, FDI inflows are favourable for the economic development of the country. However, the technological spillover effects of FDI inflows are very limited. High concentration of FDI inflows to low-tech and low-value added manufacturing and the low absorptive capacity of the country are the main challenges in realising the spillover benefits of FDI inflows. Bangladesh should take the necessary initiatives to encourage high technology-based FDI inflows into the country. The country should also focus on strengthening the domestic capacity to realise the benefits of FDI inflows. The positive short- and long-run impact of gross capital formation on manufacturing valued-added indicate that, along with foreign investment, domestic investment is also vital for sustainable industrialisation of the country. Therefore, the FDI promoting strategies need to be designed in a way that it also encourages domestic investment. The technological spillover issues must be considered while dealing with foreign investment.

CHAPTER 5: MANUFACTURING FDI AND ENVIRONMENTAL SUSTAINABILITY IN BANGLADESH

5.1 Introduction

In this chapter I explore Research Question Two, which relates to the impact of manufacturing FDI inflows on environmental sustainability in Bangladesh. Like many other developing countries, Bangladesh strives for industrialisation to achieve rapid economic growth and generate employment for a huge and growing unemployed population. The expansion of export-led manufacturing is the key strategy towards the industrialisation of the country. It is believed that the industrial sector can generate a large number of high-paid jobs, contribute to scaling up production in high-value adding goods and improving productivity (UNCTAD, 2012). Moreover, the government can reinvest the foreign exchange earnings from the manufactured exports for further development initiates. It is also claimed that, in general, the productivity of the manufacturing sector is higher than the productivity of traditional agriculture and other service-oriented industries (UNCTAD, 2012).

However, environmental pollution is often a by-product of industrial intensification. Further, the protection of the environment and natural resources has unfortunately been neglected for many years by policy planners in Bangladesh (Gain *et al.*, 2002; Khan, 2017). As a result, rapid population growth, coupled with increased economic activity, unplanned urbanisation, industrial intensification, and improper management has led to serious environmental degradation in the country. The country ranked amongst the lowest in the global Environmental Performance Index (Index, 2018)[13] and environmental degradation places pressure on the life and livelihood of vulnerable poor communities more severely than others (GOB, 2011). The profound environmental degradation puts at the sustainability of recent development efforts at risk.

[13]Environmental Performance Index is estimated by Columbia University and Yale University in collaboration with the World Economic Forum. They quantify and measure the environmental performance of State policies based on selected indicators. In 2018, Bangladesh was positioned 179 out of 180 countries in the Environmental Performance Index (Index, 2018).

Considering the severity of the consequences of environmental degradation, Bangladesh has paid attention to environmental protection issues and taken initiatives to safeguard the environment from further deterioration, at least at the policy level. The current 7th Plan document of the Government of Bangladesh acknowledges that:

> *...Bangladesh faces a growing number of diverse environmental problems ... which severely affect not only the economy and ecosystem but also the well-being of people, especially the poor ... Pollution issues are most critical in urban and industrial areas* (GOB, 2015a, p. 422).

Recently, the government embraced the need for sustainability in its development strategies and approved the National Sustainable Development Strategy (NSDS) (GOB, 2013). The 7th Plan (2015-2020) document also emphasises the need for green growth or environmentally friendly growth. However, a limited natural resource base, outdated technology, weak institutions, poor enforcement of environmental policies and regulations and, above all, tremendous pressure for intensification of economic activities to meet the demand for a huge growing population are major challenges towards the achievement of green growth or environmental sustainability in Bangladesh.

The government of Bangladesh is trying to attract more FDI inflows in the country with various incentives to foster the industrialisation process, bring technological advancement and sophistication in the production system and accelerate economic growth. In general, environmental improvement is not the prime goal either for the host country or the investing enterprises for channelling FDI. However, by transferring and diffusing advanced environmental technology and adopting better environmental management system in the production process, FDI can potentially contribute to promoting green growth or ecological friendly development in the host country. In contrast, taking advantage of less stringent environmental regulations of the host country, dirty or polluting industries can be relocated from developed economies to developing economies (such as Bangladesh) through FDI inflows. Therefore, the environmental situation could deteriorate further in the host economy.

Section 5.2 briefly describes the major environmental pollutions that arise from industrial intensification in Bangladesh. Section 5.3 discusses the policies relating to the regulation and environmental protection in Bangladesh. By analysing available information and statistics, Section 5.4 investigates the concern that high-polluting or dirty industries are relocating in Bangladesh due to FDI inflows (the pollution haven hypothesis).

To check for the presence of the pollution halo hypothesis, Section 5.5 empirically examines the short-run and long-run impacts of FDI inflows on the renewable energy consumption in Bangladesh. Section 5.5 also conducts an empirical analysis to check the validity of the inverse U-patterned Environmental Kuznets curve relationship and pollution haven hypothesis for CO_2 emissions in Bangladesh. Section 5.6 describes the major challenges towards environmental sustainability in Bangladesh and Section 5.7 concludes the chapter.

5.2 Major environmental pollution arising from industrial intensification in Bangladesh

Bangladesh is facing multifarious environmental problems, like many other overpopulated developing countries. Environmental conditions are unsustainable due to development activities, and particularly unplanned industrialisation, urbanisation and anthropogenic activities of the huge population (GOB, 2017). The current population is 160 million, with a population density amongst the highest in the world. At the current growth rate, the population is expected to reach 270 million by 2050. The capital city Dhaka would itself be home to 50 million people by 2050. Population pressures lead to more intensive land use and agricultural land is becoming scarcer due to the need for new dwelling settlements.

The country also faces tremendous pressure for employment generation. For these reasons, policy makers are promoting industrialisation; however, the industrialisation process has occurred, to date, in a very unplanned and unsustainable way (GOB, 2017). The unplanned industrialisation, weak enforcement of law and poor corporate responsibility have caused serious environmental problems in Bangladesh. The three basic elements of the environment (air, water and soil) are severely polluted due to industrialisation as discussed in this section.

5.2.1 Air pollution

Air pollution occurs due to the introduction of various and harmful metallic, biological and gas particulates into the atmosphere. The particulates alter the standard composition of air. Industrial emissions and vehicular emissions are the two major causes of air pollution in Bangladesh (Banglapedia, 2015). Industries and vehicles produce fumes, smokes, and dust and this causes severe air pollution in the country by increasing carbon gases (CO, CO_2), sulphur dioxide (SO_2), nitrogen gases and metallic particulates (such as lead and nickel) into the air (Pavel, 2016). The industries that are mostly responsible for air pollution include cement, brick

kilns, chemical and pharmaceuticals, food processing, textiles and spinning mills, fertiliser factories and construction industries. Rasul *et al.* (2006) estimated the total air pollution load generated from major process industries in Bangladesh. The total emissions load was calculated based on the emissions of selected air pollutant particulates (CO, SO_2, NO_2, volatile organic compounds and total suspended particles) by industry. Table 5.1 lists the top five air polluting industries and their relative share of the air pollution generated by industries in Bangladesh. Food, cement, paper, textiles and tobacco industries together are responsible for 84.0 percent of air pollution generated by processing industries in Bangladesh.

Table 5.1: Top five air polluting industries in Bangladesh

Industry	Emission (tons/year)	Share of the air pollution (as % of total air pollution generated by processing industries)
Food Industry	146356	38.7
Cement	62726	16.6
Pulp and Paper	51964	13.7
Textiles	39831	10.5
Tobacco	16992	4.5

Source: (Rasul *et al*., 2006)

Bangladesh is one of the worst 'victims' of climate change and global warming due to its location, high density of population and poverty level. The low-lying delta region and general lack of altitude above sea level means that the country is very vulnerable to climate events (GOB, 2015a). In the past, the country faced several catastrophic climate events, including floods, which killed millions of people and impeded development efforts. Bangladesh ranked sixth amongst the ten most climate-affected countries as per the average annual losses related to climate change events (see Table 5.2). In addition, it is reported that an extra 14 percent of the country will be extremely exposed to floods, due to sea level rising by 2050 (MOFAON, 2018).

Table 5.2: The long-run Climate Risk Index (CRI): the most affected 10 countries from 1997-2016 (annual averages)

Climate Risk Index (CRI)	Country	Death toll	Total losses in million USD (PPP)	Losses as a percentage of GDP	Total number of events (1997-2016)
1	Honduras	301.65	561.11	1.97	62
2	Haiti	280.40	418.77	2.73	72
3	Myanmar	7097.75	1277.86	0.70	43
4	Nicaragua	162	234.60	1.13	44
5	Philippines	859.55	2893.41	0.61	289
6	Bangladesh	641.55	2311.04	0.68	187
7	Pakistan	523.10	3816.82	0.61	141
8	Vietnam	312.60	2029.80	0.55	216
9	Thailand	139.60	7696.59	0.97	137
10	Dominican Republic	210.90	243.53	0.26	49

Source: Global Climate Risk Index 2018 (Eckstein *et al*., 2017)

Greenhouse gases are largely responsible for global warming. Greenhouse gases work as a temperature insulator device, which entangles heat in the earth and results in the gradual rise of temperature level. Although climate change and global warming are the outcomes of global activities and developed countries are mostly held responsible for global warming, developing countries are also causing global warming at a significant level. Wei et al. (2016) show that around 58 percent of the rising global temperature is caused by developed economies, while developing economies are responsible for 45 percent of that, on an average.

In Bangladesh, vehicular and industrial emissions are the main sources of the rising level of carbon or greenhouse gases in the air. Table 5.3 indicates that CO_2 and greenhouse gas emissions in the country have been increasing rapidly. Relative to 1990, total greenhouse gases emissions had increased by 44 percent by 2012. The manufacturing sector alone caused nearly 18 percent of the total emission. The transportation and manufacturing sector together produce more than 35 percent of total CO_2 emissions of the country.

Table 5.3: Total Green House Gas and CO2 gas emissions from transport and manufacturing industries in Bangladesh from 1990 to 2014

Year	CO2 emissions from transport (% of total fuel combustion)	CO2 emissions from manufacturing industries and construction (% of total fuel combustion)	Total greenhouse gas emissions (% change from 1990)
1990	14.62	20.23	-
1992	17.97	12.70	1.519
1996	17.64	17.76	9.71
2000	14.47	19.15	7.35
2004	15.27	13.86	16.31
2008	14.73	17.18	29.99
2012	15.11	17.91	44.67
2013	13.72	17.79	-
2014	14.20	16.35	-

Source: Compiled from the World Development Indicators database (World Bank, 2018c)

The intensity and severity of other types of air pollutants are higher in major industrial cities (such as Dhaka and Chittagong) than other areas in Bangladesh. Compared with the standard value determined by the World Health Organization (WHO), the level of harmful metallic particulates in the air (such as nickel or lead) is more than double acceptable levels in the industrial areas in Bangladesh (Pavel, 2016). In 2011, the Norwegian Institute for Air Research (NILU) scientist Randall (2011) estimated and projected the major components of air pollution emissions in Dhaka city using the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model. The author found that industry, transportation, and residential activities are the primary causes of air pollution in Dhaka and estimates that the industrial sector tops the list for greenhouse gas emissions and fossil fuel burning. The transport sector also contributes significantly to air pollution in Dhaka. Light, medium and heavy vehicles burn gasoline and distillates, which severely pollutes the air. Table 5.4 shows the major components and sources of air pollution in Dhaka.

Table 5.4: Major components and sources of air pollution in Dhaka City

Emissions components	Total Emissions (tons/year)	Top Sector	Sector emissions	% of Top Sector emissions over total emissions
$PM_{2.5}$	35000	Industry	19000	54.29
PM_{10}	45000	Industry	27000	60.00
SO_2	34000	Industry	28000	82.35
NO_x	30000	Industry	20000	66.67
GHG_s	23000000	Industry	14000000	60.87

Source: (Randall, 2011)

Randall (2011) also projected the emissions level of the major pollutants in Dhaka city, which is presented in Table 5.5. As per Randall's (2011) prediction, the emissions level of Dhaka city will increase rapidly over time due to the increase of specific pollutants and specifically due to the industrial sector. Sulphur dioxide (SO_2) and greenhouse gas emissions will increase at the higher rate through the industry sector's activities.

Table 5.5: Estimated and projected emissions (kilotons) from major sectors during 2010 and 2030 in Dhaka and percent difference

Emiss-ions comp-onents	Top Sectors						Total		
	Industry			Transport					
	2010	2030	Diff (%)	2010	2030	Diff (%)	2010	2030	Diff (%)
$PM_{2.5}$	19.5	36.45	+87	1.36	1.29	-5	35.2	48.70	+38
PM_{10}	27.1	49.71	+83	1.50	1.47	-2	44.9	64.02	+42
SO_2	27.8	103.7	+273	2.50	3.84	+53	34.2	113.4	+231
NO_x	20.3	36.57	+80	9.38	18.9	+102	32.8	60.05	+83
GHGs	13.8	30.18	+117	0.97	1.66	+71	22.7	42.17	+86

Source: (Randall, 2011)

Increasing air pollution is causing serious damage to the life, livelihood and development efforts in the country. As per the World Bank Report, due to air pollution, the total welfare losses of Bangladesh amount to $USD27.5 billion from 1990 to 2013, which is equivalent to 6.5 percent of GDP. High levels of air pollution also cause a notable number of air pollution-related deaths, human suffering and threaten sustainable development. In 2013, the estimated death cost of air pollution was around $USD2.6 billion in Bangladesh (World Bank, 2016). The popular newspaper, *The Daily Star*, reports that on average, more than 37,000 Bangladesh nationals die

each year due to air pollution-related diseases. Ischemic heart disease, heart attack and stroke account for 60 percent of air-related deaths. Respiratory and lung infections and pulmonary disorders are mostly responsible for the rest of the air pollution-related deaths in Bangladesh (*The Daily Star*, 28 September, 2016).

5.2.2 Water pollution

Untreated industrial effluents are the key source of water pollution in Bangladesh (MOF, 2016). Water pollution levels are particularly high in industrial belts and urban areas. Major cities and industrial areas are located along the major rivers in Bangladesh and large, medium and small enterprises discharge effluents directly into the rivers, creating severe river water pollution. The textile and dyeing, leather and tannery, pharmaceuticals, metal processing, and fertiliser industries are mostly responsible for water pollution in Bangladesh (Kabir, 2014).

A huge amount of industrial waste and effluents are discharged directly and indirectly into 200 rivers in Bangladesh. More than 700 leather processing industries are located near Dhaka, and these discharge around 16,000 cubic metres of contaminated wastes directly into the river systems. All of the rivers near the three major industrial areas (Dhaka, Chittagong, and Khulna) are highly polluted. According to the list of the Department of Environment (DOE), around 1,200 industrial plants are causing serious water pollution nationally (Bhuyan *et al*., 2017).

Dhaka is located on the bank of the Buriganga River, the water of which has reached a state such that hardly any aquatic life can survive in the water (GOB, 2013). The World Bank (2007) reports that more than 7,000 industrial plants located around Dhaka city are discharging nearly 1.5 million cubic metres of contaminated water daily into the four major rivers: the Shitalakhkha, Buriganga, Balu, and Turag. The dyeing and textiles industry is identified as the primary source of water pollution of the Buriganga River. Dyeing and textiles industries discharge various poisonous chemicals and substances, such as chromium, cadmium and mercury to the water; these toxic chemicals also drain to the groundwater. Therefore, groundwater is being contaminated, causing a severe threat to overall wellbeing and public health (GOB, 2013).

Textile mills and fertiliser industries are mostly responsible for polluting the Sitalakhya river water. Untreated effluents from textiles, pharmaceuticals, paints, iron, and steel industries are causing severe pollution of the Balu River, which flows beside the Tongi Industrial area of Dhaka. Human health, aquatic life, marine ecosystems, and livelihoods such as agriculture and

fishing are directly impacted as a result of this water pollution and waterborne diseases, such as cholera, typhoid and Hepatitis-B are increasing at an alarming rate (GOB, 2017; World Bank, 2018a).

5.2.3 Soil pollution

Soil pollution also threatens ecosystems and human health in Bangladesh. The untreated discharge of industrial effluents, inadequate, unplanned and non-scientific solid waste management, and unsustainable agricultural practices are the main causes of soil pollution in Bangladesh. The concentration of heavy metals, chemicals, lead and arsenic seriously degrade soil quality. Land contamination is severe in Dhaka and surrounding areas where industries are clustered (World Bank, 2018a).

A massive amount of solid waste is produced by the major administrative and industrial cities of Bangladesh. The major six cities generate around 8,000 tons of solid waste per day, of which Dhaka city accounts for nearly 70 percent (Abedin and Jahiruddin, 2015). The waste disposal systems in Bangladesh is insufficient and inefficient. There is a lack of proper recycling, minimal formal collection and poor transportation and treatment facilities in the waste disposal system, which causes various forms of environmental degradation (ADB, 2004).

It is essential to introduce and implement pollution prevention measures to control industrial pollution in Bangladesh; however, most industrial plants do not have an effective pollution prevention system in Bangladesh (Hoque and Clarke, 2013). Most recycling is only done if it is a part of a manufacturing process (Nishat, 2001), and most of the industries do not have any treatment plants to neutralise hazardous compounds, although it is mandatory by the law (World Bank, 2014). Section 5.3 describes the core rules, regulations, and policies for preventing environmental pollution in Bangladesh.

5.3 Legal context of preventing environmental pollution in Bangladesh

For many years, policy planners ignored the environmental implications of industrial activities in Bangladesh (Alam, 2007; Gain *et al*., 2002; Haque, 2013). At the global level, environmental issues were receiving attention after the Rio Summit in 1992 and Bangladesh made some progress in formulating environmental policies and strategies after the Rio Summit. Bangladesh signed several environmentally-related international treaties and agreements; notably, 35

International Conventions, Treaties and Protocols (ICTPs). The most notable ICTPs which receive the highest attention are reported in Table 5.6.

Table 5.6: Major International Conventions, Treaties and Protocols (ICTPs) signed or ratified by Bangladesh

Convention/treaty/protocol	Year	Signed/Ratified
Convention Concerning Occupational Safety and Health and the Working Environment	1981	Signed
Convention Concerning Safety in the Use of Chemical Works	1990	Signed
Vienna Convention for The Protection of Ozone Layer	1985	Ratified
Montreal Protocol on Substances That Deplete the Ozone Layer	1987	Ratified
Agenda 21, UNCED	1992	Signed
International Convention on Combat Desertification	1994	Ratified
Un Framework Convention on Climate Change (UNFCCC)	1992	Ratified
Kyoto Protocol to the UN Framework Convention Climate Change	1997	Signed
Cartagena Protocol on Biosafety to the Convention on Biological Diversity	2000	Signed
SDGs, UN	2016	Signed

Source: Perspective plan of Bangladesh 2010-2021, (GOB, 2012)

Although Bangladesh signed the treaties, compliance and enforcement is unsatisfactory (Alam, 2007). In addition to the international treaties, the government also formulated national policies, regulations, and Acts to prevent environmental pollution. Key environmental policies, regulations, laws and Acts are: National Environmental Policy (NEP) of 1992; *Environmental Conservation Act, 1995* (revised in 2012); Environmental Conservation Rules of 1997; *Environmental Court Act, 2000* and *Environmental Court Act, 2010*.

The National Environmental Policy (NEP) (1992) is the first environmental policy adopted by the government of Bangladesh. The main objective of the policy is to prevent environmental degradation and promote sustainable environmental management: it focusses on the prevention of pollution, maintaining ecological balance, reducing environmental degradation, protecting the country from various types of natural disasters and promoting environmental friendly development activities (Khan, 2009). NEP embraces 15 broad sectors, including industry; fisheries; agriculture; marine; health; education; power; and science and technology. However, the objectives outlined in the NEP were too broad and had no prioritise or indicators for

implementation (Khan, 2009). Followed by NEP, the Government formulated the National Environmental Management Plan (NEMAP) as the guideline of implementing NEP.

The government approved the *Environmental Conservation Act 1995* to implement the National Environmental Policy, with an aim to conserve the natural environment, reduce environmental pollution levels and improve overall environmental conditions in the country. This Act replaced the earlier environmental rules and ordinances. The Department of Environment (DOE) of Bangladesh has the foremost authority to enforce this Act. Under the Act, the respective authority can impose fines and penalties if environmental obligations and compliances are violated.

The government adopted the Environmental Conservation Rules in 1997 to provide support for and facilitate the enforcement of the *Environmental Conservation Act 1995*. The most notable outcome of the 1997 Environmental Conservation Rules is the categorisation of the industries and projects based on their likely adverse effects on the environment. It also specifies the procedure and management for establishing and operating different types of projects and industries.

The types and major requirements of projects and industries outlined in Environmental Conservation Rules, 1997 are summarised in Table 5.7.

Table 5. 7: Categories and major requirements of industries/projects by pollution levels

Category	Nature of the project/industry	Example of the projects/industries	Major requirements
Green	With positive or negligible negative environmental impacts	Plantation, TV/radio assembling, book-binding, tea packing	General description of the project or plants and obtain clearance from the local authority.
Orange A	With temporary, marginal impacts on the environment which can be removed with mitigation measures	Poultry, dairy, sawmill, printing, restaurants	In addition to the requirement of the Green category project, orange A category projects have to submit waste disposal, effluent treatment, and rehabilitation process.
Orange B	With widespread effects on the environment but could be mitigated by taking proper measures	Glass factory, jute mill, coal tar, hotel, multi-storied apartment, PVC products, synthetic fibre	In addition to the requirement of Orange A category projects, orange B category projects have to submit a feasibility study report, environmental treatment plant, and an Initial Environmental Examination Report. The existing plan should also submit the Environmental Management Plan (EMP) with the project proposal.
Red	With the high possibility of serious environmental impacts	Textiles, tannery, fertiliser, power plants, chemical dye, cement, iron, and steel	In addition to the requirement of Orange A category projects, Red category projects should submit an Environmental Impact Assessment following the DOE guideline.

Source: Environmental Conservation Rules of 1997

The government of Bangladesh enacted the first *Environmental Court Act 2000* intending to dispose of the environmental-related cases and complaints quickly. Later, the government enacted the new *Environmental Act 2010* and repealed the earlier Act. The *Environmental Act 2010* provides a provision to establish environmental courts in each administrative district in Bangladesh.

Any activity related to the economic and social sectors involve some degree of environmental impact. Therefore, all economic and social policies must pay attention to environmental aspects. In Bangladesh, in addition to the environmental policy acts discussed above, other sectoral policies that embrace environmental issues, include: National Forest Policy (1994); Wetland Policy (1998); Fisheries policy (1998); Tourism Policy (1992); Land Use Policy (2001); National Water Policy (2012); Coastal Zone Policy (2005); Industrial Policy (2010); National Energy Policy (1995); and National Agricultural Policy (1999).

In Bangladesh, the Environment and Forests Ministry is the key government organisation for formulating, coordinating, and monitoring environmental policies, and planning. The Department of Environment (DOE) is the focal technical institution that works under the Ministry of Environment and Forests and implements the policies. As noted, the environment is interlinked with all other sectors; therefore, almost all ministries and institution are involved with environmental issues. An integrated, holistic approach is crucial to control and mitigate environmental pollution problems. Civil society, NGOs and private sectors also need to be involved with this process.

FDI could be a possible channel to diffuse environmentally-friendly technology and better environmental management systems to Bangladesh; however, the impact of FDI inflows on the host country's environmental situation depends on the enforcement and types of environmental policies and regulations, the sectors where FDI is occurring, technological diffusion and the corporate social responsibility of the MNEs.

5.4 The nexus between FDI inflows and environmental sustainability: the presence of pollution havens or pollution halos in Bangladesh manufacturing

The discussion in Section 5.2 demonstrates that industrial intensification and, particularly the growth of the manufacturing sector, adversely impacts the state of the environment in Bangladesh. Environmental degradation is likely fuelled by the increased growth of the manufacturing sector. This study aims to determine the environmental consequences of FDI inflows in the manufacturing sector in Bangladesh. The FDI-environment relationship is viewed mainly from the perspective of two opposing hypotheses: the pollution haven hypothesis (or race to the bottom); and the pollution halo hypothesis.

The pollution haven hypothesis postulates that the industries that generate high pollution tend to move from developed economies towards developing economies. Over the last two decades, environmental protection is highly important at the global level, and a number of international agreements have been signed. The commitment to these agreements leads to the adoption of increasingly strict environmental regulations. More advanced economies usually practice stricter environmental laws and regulations. Therefore, manufacturing costs are relatively high, especially for pollution-intensive industries. Developing countries are competing with each other to attract FDI and tend to undermine their environmental laws as a result. Therefore,

industries that have a high environmental impact may shift their production plants to countries with less strict environmental regulations, and thus worsen the environmental quality in the host country (Cole and Elliott; 2005, Hassaballa, 2014; Levinson, 1996; Zarsky, 1999). Thus, the pollution haven hypothesis stipulates a positive relationship between the pollution level and FDI inflows.

The pollution halo hypothesis stipulates that FDI causes a positive effect on the environmental quality in the host country (Atici, 2012; Colen *et al*., 2008; Eskeland and Harrison, 2003; Lee, 2013; Zarsky, 1999). The pollution halo hypothesis assumes that MNEs generally use advanced, cleaner technologies and practice more sophisticated environmental management systems compared with the local firms of the less developed countries. MNEs also try to motivate and force affiliated enterprises to adopt the same technologies to meet the environmental compliance requirements of the parent country. Developed country's consumers are more sensitive to environmental protection, compared with the developing countries. Thus, FDI inflows can contribute to improving the environmental conditions of the host country.

There is a lack of reliable data and information to assess the environmental performance of foreign firms in Bangladesh, or if the presence of foreign firms in the manufacturing sector helps to promote environmentally friendly technology and management systems. Further it is not known if foreign firms use better environmentally-friendly technology and management systems than the local firms. However, based on the available information, I discuss the presence of the pollution haven and pollution halo hypothesis in Bangladesh by examining the concentration of FDI inflows in the polluting industries, the stringency of environmental regulations of Bangladesh and the status of technological diffusions from FDI inflows.

The nexus between FDI and pollution depend on the industries FDI is concentrated. As per the Department of Environment (DOE), the Bangladesh manufacturing industries primarily responsible for pollutions are textiles, leather, and tannery, fertilisers, cement and chemical (DOE, 2010). Table 5.8 and Table 5.9 exhibit the share of FDI inflows and exports of the most polluting industries in the total manufacturing sector in Bangladesh, respectively.

Table 5.8: Share of FDI inflows of the five 'dirtiest' industries in Bangladesh

	Fiscal Year				
	2003	2009	2013	2015	2016
FDI inflows in the five 'dirtiest' industries (in million USD)	161.23	154.2	521.9	479.57	501.28
The share of FDI inflows of the five 'dirtiest' industries* as % of total manufacturing FDI inflows	82.17	83.82	68.94	88.93	60.70

**Industries include textiles, leather, cement, fertiliser and pharmaceuticals*
Source: Economic data, Bangladesh Bank (Bangladesh Bank, n.d,)

Table 5.9: Export share of the top three dirtiest industries in Bangladesh

	Fiscal year					
	2003	2006	2011	2014	2015	2016
Total export of top three 'dirtiest' industries*	5249.82	8459.09	18614.85	25263	26191	28715
The share of the top three 'dirtiest'* manufacturing export in total export	80.17	80.36	81.20	83.69	83.92	83.82

Note: *Industries include textiles, chemical, and leather.

Source: Various years of Economic Review, Ministry of Finance, Government of Bangladesh (MOF, n.d.).

Table 5.8 and Table 5.9 depicts that the share of 'dirty' industries, in terms of both FDI inflows and exports, are very high in Bangladesh. More than 80 percent of FDI inflows and exports are clustered into the top three to five 'dirtiest' industries in Bangladesh and the rate of the concentration is also increasing over time. Therefore, it seems that 'dirty' industries are flocking to Bangladesh through export-oriented FDI inflows.

The pollution haven hypothesis implies that the environmental regulation standard and enforcement is low in the host country and foreign firms take advantage. Sections 5.2 and Section 5.3 show that Bangladesh has historically neglected environmental consequences, particularly in terms of formulating industrialisation strategies. The government has recently adopted a number of policies and regulations, but the stringency of environmental rules and regulations is still very low.

Table 5.10: Stringency and enforcement of environmental regulation in selected South Asian Countries in (2011-12 weighted average)

Country	The stringency of environmental regulation		Enforcement of environmental regulation	
	Value (1=very lax; 7= world's most stringent)	Rank (out of 140)	Value (1=very lax; 7= world's most rigorous)	Rank (out of 140)
India	3.9	69	3.5	80
Sri Lanka	3.9	73	3.9	56
Nepal	3.2	107	3.1	100
Pakistan	3.1	116	2.8	116
Bangladesh	3.2	110	2.7	126

Source: World Economic Forum, Executive Opinion Survey. The Travel and Tourism Competitiveness Report 2013, World Economic Forum (WEF, 2013).

Table 5.10 shows that Bangladesh ranked 110 among 140 countries, as per the lack of enforcement of environmental regulations. Bangladesh scored the lowest among the selected South Asian countries in the enforcement of environmental regulations. Although the government might not encourage the polluting industries in the country directly, polluting industries might take advantage of the weak enforcement of environmental laws. However, the government is offering various fiscal and financial incentives to attract FDI in Bangladesh. Special incentives are provided for priority or 'thrust' sectors. Some of the industries in the list of thrust sectors, such as pharmaceuticals, chemicals or dyes and fertilisers, are highly polluting industries. By encouraging FDI in these industries, pollution havens are encouraged.

Due to the comparative advantages (such as low labour cost for textiles and leather industries, and patent-free production rights under the TRIPS facility for pharmaceuticals industries) local industries also flourish in Bangladesh. Local firms also contribute to the increasing pollution level. Therefore, if FDI inflows have taken place in the polluting industries, technology spillover effects may help to improve the environmental conditions. The use of outdated technology is one of the many causes of industrial pollution in Bangladesh. If foreign-owned firm's production processes and management systems are more environmentally-friendly than local firms, there is a scope for diffusing environmentally-friendly practices. The environmental spillover effects of FDI mostly depend on the scale of technology diffusion by the FDI inflows. Figure 5.1 presents the technology transfer level by FDI inflows, in five selected South Asian countries, including Bangladesh.

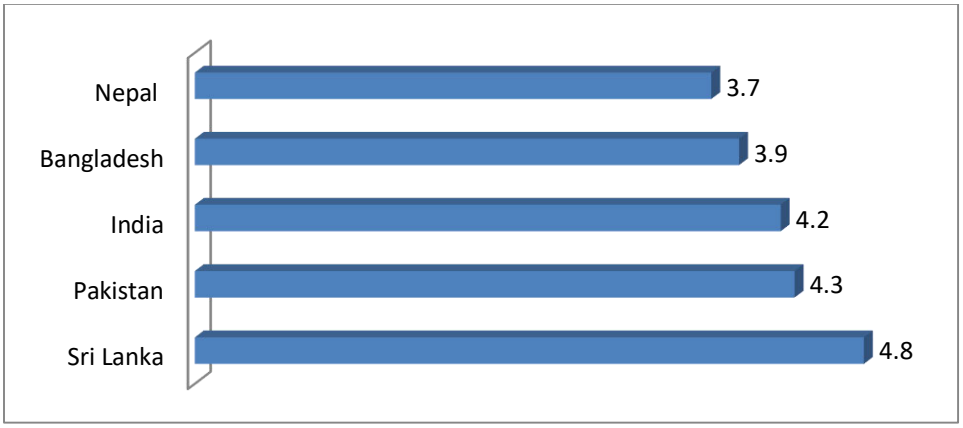

Figure 5.1: FDI and new technology transfer in the selected South Asian Countries (1= not at all and 7= to a great extent)

Source: The Global Competitiveness Report 2014-15 (WEF, 2014)

The state of new technology diffusion by FDI inflows in Bangladesh is low. Figure 5.1 shows that Bangladesh performs poorly in gaining advanced technology transfer by FDI flows even compare to other selected Asian countries. Therefore, in general, the sectoral composition of FDI inflows, low level of enforcement of environmental regulations and low technology diffusion by FDI inflows indicate the presence of the pollution haven hypothesis in the Bangladesh manufacturing sector.

The textile industry, which includes knitwear and readymade garments (RMG), is a major driver of the Bangladesh economy and holds a majority share of the manufacturing FDI inflows in Bangladesh. The RMG industry is also a huge cause of industrial pollution, and water pollution in particular. The rest of the parts of this section briefly discuss the major environmental concerns related to the textiles industries and the role of MNEs in this respect.

In Bangladesh, the RMG industry comprises more than 80 percent of manufacturing value-added and accounts for 10 percent of the country's GDP (MOF, 2017). Bangladesh is positioned second in the world for textiles exporting and holds 5 percent of the global share in textiles exports (Moazzem and Chowdhury, 2016). The sector holds a significant share of FDI inflows of the country and local investment has increased. Currently, nearly 80 percent of the industries are locally owned (Hossain *et al.*, 2018). While the RMG industry makes a significant contribution to the Bangladesh economy, it also severely damages water resources.

The textiles industries discharge 72 types of toxic and hazardous chemicals, and is responsible for one-fifth of global industrial pollution (World Bank, 2014). During the manufacturing process, textile firms use a large amount of freshwater in production, and discharge extremely polluted toxic wastewater into inland waterways, sewers and drains without proper treatment (Sagris and Abbott, 2015). Textile wet processing is also extremely water-intensive. Moreover, textile industries use water inefficiently. The average Bangladeshi textile production consumes 250-300 litres of water per kilogram of fabric production, which is five times higher than international best practice (Sagris and Abbott, 2015). The industry, in general, does not pay fees or taxes to extract and use water, which also results in depletion of the natural aquifer.

The textile manufacturing process generates a huge amount of wastewater daily. Approximately 80-85 percent of the total water consumption of this industry is generally discharged as wastewater (Sagris and Abbott, 2015), and this is heavily polluted and contains hazardous toxic compounds, which enters the water system, creates risk to public health and damages ecosystems (Sagris and Abbott, 2015). At the end of the dyeing process, an estimated 10-20 percent of the dye typically remains in the wastewater (see Figure 5.2). Wet processing wastewater contains dyes, bleach, detergent, and other processing chemicals and requires treatment before disposal (Haque, 2017).

Figure 5.2: Untreated effluents from the textiles industry in Bangladesh

Source: Wastewater management in the garment industry (Water Integrity Network, 27 July 2017)

According to the 1997 Environment Conservation Rules (ECR), washing, dyeing, and finishing processing industries are categorised as 'Red Industries' which pose the highest environmental threat. All dyeing, washing, and finishing related textile industries must have Effluent Treatment Plants (ETP) to treat wastewater. However, wastewater and industrial effluents are discharged without any or inadequate treatment. Rarely does any textile factory maintain wastewater treatment processes at a level to meet the Government discharge standards (Haque, 2017). Nearly 50 percent of factories have Effluent Treatment Plants (ETPs), but most of these plants are not appropriately designed and they do not operate effectively (Haque, 2017). As a result, untreated and poorly treated effluents from the textile industry alter the physical, chemical, and biological properties of the aquatic environment of the rivers and water bodies in Bangladesh. High levels of PH, temperature, odour, toxicants, and turbidity are having harmful effects on public health, as well as to livestock, wildlife, fish and biodiversity in general.

The environmental performances of MNEs in the textile industry is unsatisfactory. The foreign-owned firms might be relatively efficient as they typically use advanced, environment-friendly technology and management systems compared to the local firms (Wallace, 2017; Zarsky, 1999). Foreign firms also contribute to transferring environment-friendly technology and management systems to domestic firms by establishing linkages and creating pressure on their affiliates and subsidiaries. However, there is a lack of reliable and sufficient data and information about the environmental performance of foreign-owned firms in Bangladesh. Foreign and joint venture firms are mostly located in the Export Processing Zones (EPZs) in Bangladesh where pollution levels are high. Khan *et al*. (2011) claim that a vast amount of industrial waste and effluents are discharged from Dhaka EPZs, severely polluting the surface and groundwater. The study analysed physicochemical properties and major anionic contaminants of the wastewater from Dhaka EPZs and found that effluents from Dhaka EPZ contain hazardous pollutants, which are destroying the geo-environment and ecosystem of the surrounding area. The wastewater contains a higher concentrations of Cl-, SO_4, SO_2 and NO_3 than the acceptable level set by the DOE.

Akter *et al*. (2014) tested the water quality in the aquatic body of Dhaka EPZ area, based on some physicochemical parameters and heavy metal concentrations. The study also noted that concentrations of heavy particulates, such as cadmium, lead, iron, mercury and manganese exceeded the acceptable limits. The study notes that only a few industries installed Effluent Treatment Plants (ETPs) to treat the wastewater they generate. Further, the firms which installed ETPs also do not operate the ETPs regularly; they only operate the ETPS at the time of

inspection and at other times keep the ETPs switched off to save on operating costs. Most of the industries discharge their effluents (containing heavy metals) without any prior treatment into open drains; this then contaminates the water, soil, aquifers and environment of the surrounding areas.

There is great potential to reduce the harmful environmental effects of textiles and RMG industries. Introduction of environmentally-friendly technology and management systems in the production process can reduce waste and use of energy, water, and harmful chemicals. For example, if Bangladesh textiles mills could implement ten cleaner, best-practice production techniques, as used in a few pilot Chinese textiles mills, they would save water use by 25 percent, energy use by 30 percent and chemicals by up to 10 percent (World Bank, 2014). Lack of technical expertise, high initial investment costs and lack of initiative are the primary barriers to introducing advanced techniques and technology such as this.

Multinational firms could make a positive role in initiating new environmentally-friendly technology in the textiles sector. Multinational corporations have considerable influence over the supply chain of textiles and apparel production in Bangladesh; they also control the operational decisions of locally-owned individual firms and mills. Most textiles factories in Bangladesh are locally owned, but local factories largely depend on subcontracting for multinational firms. Multinational firms could preference local suppliers who adopt particular environmental practices. MNEs can provide technical and financial support to their subsidiaries to adopt environment-friendly technology; However, Belal *et al.*, (2015) note that companies are reluctant to take pro-environment action in developing countries. In contrast, multinationals taking advantage of the lack of enforcement of environmental rules and regulations (Jamali, 2010).

Recently, in response to compliance with their home country's regulations, country's buyer preferences and other strategic reasons, MNEs in Bangladesh started collaborating with government and other parties for greening the apparel and textile production process. For example, the Zero Discharge of Hazardous Chemicals (ZDCH) program gained momentum in Bangladesh, and Partnership for Cleaner Textiles (PaCT) has been initiated with the major buyers, and the main local textiles and apparel industries association, BGMEA (Hasan and Leonas, 2018; Textiles Today, 2018). However, progress has not been satisfactory due to the lack of enforcement of environmental regulations, corruption, and high installation costs of environmentally-friendly technology.

5.5 FDI and environmental sustainability in Bangladesh the empirical analysis

The descriptive statistical analysis in Section 5.4 shows that polluting or dirty international companies are coming to Bangladesh through export-oriented manufacturing FDI inflows. The share of top polluting industries in the total manufacturing FDI inflows and export is high in Bangladesh. The enforcement of environmental regulation strategy is weak, compared with other South Asian countries. The textiles and RMG industry, which comprises a significant share of manufacturing FDI inflows, is causing severe water pollution in Bangladesh; all these features indicate the existence of the pollution haven hypothesis in Bangladesh.

However, the existence of the pollution haven hypothesis does not necessarily imply that foreign direct investment inflows are negatively contributing to the environmental sustainability of the country. If foreign-owned firms use advanced, environmentally-friendly technology and practice better environmental management than the locally owned industries the hope is that the advanced technology and management systems will spill over to the local industries; then FDI inflows can make a positive contribution to the host country environment, even though FDI has taken place in polluting industries. No substantive research so far has been done that explores whether foreign-owned firms in Bangladesh use greener technology than locally-owned firms or if there is any evidence that the environmental performances of locally-owned firms become greener following exposure to foreign-owned firms and their positive practices. There is an acute shortage of data to carry out any rigorous econometric study in this area. While water pollution is the primary aspect of industrial pollution in Bangladesh, unfortunately, time-series data on water pollution in the country is not available.

In addition to the pollution haven hypothesis, investigating the presence of a pollution halo is essential to determine the impact of FDI inflows on environmental sustainability. The existence of the pollution halo hypothesis indicates that a host country gains environmental benefits from FDI inflows; however, no study has so far examined the pollution halo hypothesis in Bangladesh. In the empirical analysis, I examine the validity of pollution halo hypothesis for renewable energy use in Bangladesh. I also conduct an empirical analysis to check the validity of pollution havens and the EKC relationships for CO_2 emissions in Bangladesh.

5.5.1 Pollution halo hypothesis for renewable energy consumption in Bangladesh

5.5.1.1 Model specification, hypothesis and data sources

In the empirical analysis of the pollution halo hypothesis, I consider renewable energy consumption as an indicator of environmental sustainability. There is a worldwide growing concern about the use of finite non-renewable energy resources and the urgent need to increase the use and production of renewable energy resources, such as solar, geothermal, energy entail biofuel, tidal, wind power, biomass, hydropower, and wave (IEA, 2010). The targets of SD Goal 7 of the 2030 Agenda for Sustainable Development (that is, ensure access to affordable, reliable, sustainable, and modern energy for all) (See Table 2.1) clearly acknowledges the importance of renewable energy resources. The targets related to SDG 7 emphasise the adoption of renewable energy, improving energy efficiency, and extending international co-operation in clean and renewable energy production and consumption.

Bangladesh suffers from insufficient energy security and industries mostly depend on fossil-based energy power. Electricity is the key source of energy supply in Bangladesh; however, nearly half of the population in Bangladesh lives in rural areas, without access to electricity. The energy consumption of the country has increased rapidly over the past two decades, due to industrialisation, urbanisation, modernisation of agricultural production and transformation of the rural economy (Halder *et al.*, 2015). The increasing trend of energy use will only intensify in the coming years.

Power plants for electricity generation use non-renewable fossil fuels. Domestic natural gas is the main fuel for electricity generation, accounting for 72.42 percent. Other sources of power generation are furnace oil (15.44 percent), diesel 2.91 percent, and coal 2.54 percent. It is estimated that energy consumption will increase threefold from 27,500-kiloton in 2015 to 71,600 kilotons in 2030 (SREDA, 2016). Due to the excessive use of natural gas, the natural gas reserve is gradually decreasing, and the country will face a severe energy crisis. Globally, reserves of fossil fuels are also being rapidly depleted; therefore, most countries face the same concerns about methods of alternative renewable energy production.

In terms of the future energy security, the Bangladesh government has paid due consideration to renewable energy. Recently, the government initiated the Renewable Energy Policy 2009, which set a target to meet 20 percent of the power demand from renewable energy by 2020.

Apart from the Renewable Energy Policy, the government also passed the Sustainable and Renewable Energy Development Authority (SREDA) Act, in December 2012. Bangladesh has a geographical advantage and potential to utilise solar power, and also has the potential for generating biogas and harnessing wind power.

FDI could be an important catalyst in promoting renewable energy use in developing economies. As FDI generally flows from developed economy to developing economies; developed economies follow the higher standards and more stringent environmental regulations than developing countries. Therefore, MNEs are expected to practice green technology in their production systems and contribute to reducing the level of non-renewable energy use in the host economy (Mabey and McNally, 1999). Green production technology and management systems can also spillover from the foreign-owned industries to local industries.

There are few empirical studies on the relationship between renewable energy consumption and foreign direct investment inflows. Doytch and Narayan (2016) investigated the impact of foreign direct investment in renewable energy use for 74 countries covering data from 1985 to 2012. The study employed Blundell-Bond dynamic panel estimation and found that foreign direct investment has a positive influence on renewable energy consumption in moderately high-income economies, but this positive effect is very low in low-income economies. The study also found that the scale and significance of the impacts differ by the sectors where FDI inflows are channelled. Marton and Hagert (2017) examined the effects of FDI on renewable energy consumption for middle-income countries. Their research shows a negative relationship between energy consumption and foreign direct investment inflows.

Based on the pollution halo hypothesis and earlier research, I specify the following model in Equation 5.1 to examine the pollution halo hypothesis for renewable energy use in Bangladesh. The model is influenced by the study of Doytch and Narayan (2016) which is among the few studies to investigate a similar question. Doytch and Narayan (2016) consider renewable energy consumption as a function of FDI inflows, per capita GDP, and an energy price index. In Equation 5.1, I replace per capita GDP with the share of manufacturing value-added to examine the effects of industrialisation on renewable energy consumption. I also include patent applications as a control variable in the model to capture the effects of research and innovation activities.

The model specified in Equation 5.1 also differs from Doytch and Narayan (2016) by the estimation technique. Doytch and Narayan (2016) applied panel data estimation technique. In my study, I examine the country specific effect; therefore, I apply time series analysis technique.

$$ln\ REC_t = \beta_0 + \beta_1\ lnFDI_t + \beta_2\ lnMVA_t + \beta_3\ lnPatent + \mu_t \qquad (5.1)$$

Where,

lnREC = logarithm form of renewable energy consumption as a percentage of total final energy consumption

lnFDI = Logarithm form of FDI net inflow as a percentage of GDP

lnMVA = Logarithm form of manufacturing value-added as a percentage of GDP

lnPatent = Logarithm form of patent applications by the residents

μ_t = Stochastic error term

In Equation 5.1, FDI inflows are included as the main independent variable to determine the validity of the pollution halo hypothesis in Bangladesh. Manufacturing value added is included as a control variable in order to discover the contribution of the manufacturing sector to renewable energy consumption in Bangladesh. The research and development (R&D) expenditure, patent applications by origin, and the number of scientific workers and projects are considered important determinants for innovation and the technological capacity of a country. Time series data on research and development expenditure is not available in Bangladesh; therefore, patent applications by Bangladeshi residents are taken as a proxy variable for the innovation and technological capacity in the model. The enforcement of environmental regulations is critical for the pollution halo effects of FDI; however, due to the unavailability of time-series data on enforcement of environmental regulations for Bangladesh, the model could not incorporate this variable. The model also does not include the per capita GDP income, to avoid the possible endogeneity problem between manufacturing value-added and GDP.

The study assumes that FDI inflows promote environment-friendly technology in Bangladesh, or that a pollution halo hypothesis exists in Bangladesh. Therefore, the null hypothesis for FDI inflows is H_0: FDI inflows have a positive effect on renewable energy consumption in Bangladesh; thus, the coefficient of FDI is anticipated to be positive (H_0: $\beta_1 > 0$).

Electricity is the major source of energy supply to the manufacturing or industrial sector in Bangladesh. The renewable energy share as a percentage of total energy generation is very low (<2 percent) in Bangladesh (Islam and Khan, 2017). Existing power plants are fossil fuel-based, mostly using natural gas. Bangladesh has adopted some policy measures to promote renewable energy generation and use: solar plants and biogas facilities are becoming popular. However, the use of solar plants is mostly limited to household consumption (Sharif *et al*., 2018). The industrial uses of renewable energy consumption are still very low. The manufacturing sector might not contribute positively to promote renewable energy consumption in Bangladesh. Therefore, the null hypothesis for manufacturing value-added is H_0: manufacturing value-added has a negative impact on renewable energy consumption in Bangladesh; thus, the coefficient of manufacturing value-added is anticipated to be negative (H_0: $\beta_2 < 0$).

The technological and innovation capacity of the country is the key tool for promoting sustainable energy production and consumption (Cornell University *et al*., 2018). Therefore, the null hypothesis for patent application is H_0: the number of patent application has a positive impact on renewable energy consumption in Bangladesh; thus, the coefficient of the patent application is anticipated to be positive (H_0: $\beta_3 > 0$)

Time series data on renewable energy consumption in Bangladesh is only available from 1990. The annual time series data used in the study are derived from World Development Indicators (WDI), the online database of the World Bank over the period from 1990 to 2017. There are no negative values for the FDI net inflows series from 1990 to 2017. Therefore, the logarithm form of FDI net inflows is used in equation 5.1.

The estimation process of Equation 5.1 takes the following steps:

1. The distributional characteristics and stationary properties of the series are examined with appropriate standardised tests.
2. The stationarity properties of the series and the small sample size (less than 30) suggest applying the Autoregressive Distributed Lag Model (ARDL) approach to discover the long-run co-integration among the variables. Using the ARDL model within the framework of the Unrestricted Error Correction Model (UCEM), the long-run coefficients and short-run dynamics are also estimated.

3. Finally, the robustness of the findings obtained from the ARDL model is verified with the alternative co-integration procedure of Fully Modified Ordinary Least Square (FMOLS) method.

5.5.1.2 Data Distribution

In order to check the homogeneity and normality properties of data distribution, I examine the standard descriptive statistics of the series. Table 5.11 presents the descriptive statistics of the series, which demonstrates that data are distributed around their mean value, having a considerable degree of homogeneity. The variation of range between minimum and the maximum value is within the reasonable limit. The numeric of skewness of the variables is low. The values of kurtosis are below three (3), which confirms near normality. The Jarque-Bera test statistics and associated probabilities accept the null hypothesis of the normal distribution for the variables. Therefore, normality of the data distribution is also confirmed and justifies proceeding to the next step of the estimation.

Table 5.11: Descriptive statistics of the variables

Variables	Observation	Mean	Std.Dev.	Min	Max	Skewness	Kurtosis	Jarque-Bera (prob.)
$lnMVA$	28	2.72	0.07	2.58	2.85	-0.02	1.77	1.77 (0.41)
$lnFDI$	28	-1.36	1.88	-5.40	0.55	-0.97	2.54	4.03 (0.16)
$lnREC$	28	3.93	0.24	3.53	4.29	-0.17	1.78	1.87(0.36)
$lnPatent$	28	3.84	0.35	3.09	4.34	-0.57	2.54	1.77(0.41)

5.5.1.3 Stationary (unit root) test

I examined the long-run co-integration and short-run dynamics among the variables in Equation 5.1 to investigate the presence of a pollution halo for renewable energy consumption in Bangladesh. As noted, the time-series data on renewable energy consumption in Bangladesh is only available from 1990. Therefore, the sample size of the study is small; fewer than thirty. The small sample size suggests applying the Autoregressive Distributed Lag (ARDL) model developed by Pesaran and Shin (1997) to determine the long-run relationships and short-run dynamics among the variables. The co-integration estimation by ARDL method does not require checking the order of integration of the series (Pesaran *et al.*, 2001). The ARDL

technique can apply in case of I (0) (integrated at level), I (1) (integrated at first difference) or mixed order of integration. However, the ARDL model cannot apply if any of the series exceeds the order of integration of I (1). Therefore, the study conducts stationary tests to confirm that none of the series is stationary at I (2).

In the stationary test, I apply the conventional ADF (Augmented Dickey-Fuller) test developed by Dickey and Fuller (1979, 1981). I also conduct PP (Phillips-Perron) test developed by Phillips and Perron (1988) to check the stationary properties of the series. The stationary tests are conducted with the trend and without a trend. Table 5.12 reports the results of the ADF and PP unit root tests for the series.

Table 5.12: The results of the ADF and PP tests for the unit root of the variables

Variables	ADF (SIC)				PP			
	Level		1st Difference		Level		1st Difference	
	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend
lnREC	0.52	-2.83	-4.17***	-4.04**	0.67	-3.22*	-5.21***	-4.80***
lnFDI	-4.65***	-3.19	-4.86***	-5.63***	-1.97	-1.98	-5.40***	-11.40***
lnMVA	-1.51	-2.15	-3.59**	-3.88**	-1.51	-2.14	-4.41***	-4.40***
lnPatent	-5.21***	-5.44***	-4.39***	-4.20**	-5.22***	-5.46***	-24.83***	-24.26***

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively.*

The results of the ADF and PP tests show that the series $lnREC$ and $lnMVA$ are not stationary at level. The results cannot reject the null hypothesis of having a unit root at a 5 percent significance level; however, the variables become stationary after the first difference in both ADF and PP tests. On the other hand, the series $lnFDI$ *and* $lnPatent$ are stationary at the level or the order of integration is I (0). Therefore, the stationary tests confirm that none of the series exceeds the order of integration of I (1). The presence of a mixed order of integration further justifies applying ARDL technique to check the co-integration among the variables for Equation 5.1.

Time series data might contain a structural break. I apply Bai and Perron's (1998) multiple breakpoint test to identify the structural breaks in the model. The breakpoint test does not find any significant break in the model; therefore, the model does not include any structural break variable.

5.5.1.4 ARDL Bounds Testing Approach

ARDL bound testing approach is applied to find out the long-run co-integration among the variables ($REC,\ FDI, MVA$, and $patent$). Testing co-integration is necessary to explore the meaningful long-run relationship among the variables (Nkoro and Uko, 2016). The ARDL model offers a number of advantages over other conventional co-integration approaches such as Engle and Granger (1987) and Johansen and Juselius (1990) tests. The ARDL model also provides valid estimates for small sample sizes (Pesaran *et al*., 2001). The model can also apply in the case of a mixed order of integration of the variables; moreover, within the Unrestricted Error Correction Model (UECM), ARDL can estimate short- and long-run effects concurrently. Additionally, by incorporating different lags, the ARDL model provides efficient estimates, even when the model suffers from an endogeneity problem (Harris and Sollis, 2003).

The general ARDL model (Equation 5.2) is as follows:

$$\Delta yi = \beta_0 + \pi_{yy} y_{t-1} + \pi_{yx} x_{t-1} + \sum_{i=1}^{p} \delta_i \Delta y_{t-i} + \sum_{j=0}^{m-1} \varphi \Delta x_{t-j} + \varepsilon_t \qquad (5.2)$$

Here, π_{yy} and π_{yx} represents long-run effects. β_0 represents the intercept, and the lagged values of Δx_t captures short-run dynamics in the system. ε_t represents the disturbance term.

Therefore, for Equation 5.1, the following ARDL models are specified:

$$\begin{aligned}\Delta\, lnREC_t = {} & a_{01} + b_{11}\, lnREC_{t-1} + b_{21} ln\, FDI_{t-1} + b_{31}\, lnMVA_{t-1} + b_{41}\, lnPatent_{t-1} \\ & + \sum_{i=1}^{p} \delta_i\, \Delta\, lnREC_{t-i} + \sum_{j=0}^{q_1} \varphi \Delta\, lnFDI_{t-j} + \sum_{k=0}^{q_2} \varphi\, \Delta lnMVA_{t-k} \\ & + \sum_{l=0}^{q_3} \varphi\, \Delta lnPatent_{t-l} + \varepsilon_{1t} \qquad (5.3)\end{aligned}$$

$$\begin{aligned}\Delta\, lnFDI_t = {} & a_{02} + b_{12} lnREC_{t-1} + b_{22} lnFDI_{t-1} + b_{32} lnMVA_{t-1} + b_{42} lnPatent_{t-1} \\ & + \sum_{i=1}^{p} \delta_{2i}\, \Delta lnFDI_{t-i} + \sum_{j=0}^{q_1} \varphi\, \Delta lnREC_{t-j} + \sum_{k=0}^{q_2} \varphi \Delta\, lnMVA_{t-k} \\ & + \sum_{l=0}^{q_3} \varphi\, \Delta lnPatent_{t-l} + \varepsilon_{2t} \qquad (5.4)\end{aligned}$$

$$\Delta ln\ MVA_t = a_{03} + b_{13} lnREC_{t-1} + b_{23} lnFDI_{t-1} + b_{33} lnMVA_{t-1} + b_{43} lnPatent_{t-1} + \sum_{i=1}^{p} \delta_{3i}\, \Delta lnMVA_{t-i} + \sum_{j=0}^{q_1} \varphi\, \Delta lnREC_{t-j} + \sum_{k=0}^{q_2} \varphi \Delta\, lnFDI_{t-k} + \sum_{l=0}^{q_3} \varphi\, \Delta lnPatent_{t-l} + \varepsilon_{3t} \qquad (5.5)$$

$$\Delta ln\ Patent_t = a_{04} + b_{14} lnPatent_{t-1} + b_{24} lnFDI_{t-1} + b_{34} lnMVA_{t-1} + b_{44} lnREC_{t-1} + \sum_{i=1}^{p} \delta_{4i}\, \Delta lnPatent_{t-i} + \sum_{j=0}^{q_1} \varphi\, \Delta lnREC_{t-j} + \sum_{k=0}^{q_2} \varphi \Delta\, lnFDI_{t-k} + \sum_{l=0}^{q_3} \varphi\, \Delta lnMVA_{t-l} + \varepsilon_{4t} \qquad (5.6)$$

Before estimating the above equations, the optimum maximum lag is identified based on the Akaike Information Criterion (AIC). The lowest value of AIC suggests the best model. Based on the lowest value of AIC, the maximum optimum lag is selected as 3. The optimum lags for the model are (1, 3, 2, 3), which is also determined based on the AIC leg length selection criteria.

The ARDL bounds testing approach uses a joint F-statistic for identifying the co-integration relationship among the variables. The null hypothesis H_0: $b_{1i}= b_{2i}=b_{3i}= b_{4i}=0$ explains the existence of no co-integration, while the alternative hypothesis H_1: $b_{1i}\neq b_{2i} \neq b_{3i} \neq b_{4i} \neq 0$ explains the presence of co-integration relationship among the variables. To check the existence of co-integration, the calculated F statistics from the bounds testing requires comparison to the upper and lower values of Pesaran (Pesaran *et al*., 2001). If the estimated F statistic is found to be higher than the upper critical value of Pesaran, then I cannot accept the null hypothesis of no integration, which implies the presence of co-integration of variables. If the calculated F statistics exist between lower critical value and upper critical value, then it provides inconclusive result about co-integration.

Table 5.13 presents the calculated F statistics found from bounds testing for Equations 5.3, 5.4, 5.5 and 5.6, where all variables are normalised as the dependent variable. The results demonstrate that there is a long-run co-integration among the variables for Equation 5.3, where renewable energy consumption is normalised.

Table 5.13: Results from the Bound test

Dep. Var	AIC lag	F-stat	Outcome
$F_{REC}(ln\ REC \parallel\ lnFDI, lnMVA, lnPatent)$	3	13.75***	Co-integration
$F_{FDI}(\ lnFDI \parallel\ lnREC, lnMVA, lnPatent)$	3	3.01	No co-integration
$F_{MVA}(\ lnMVA \parallel\ lnFDI, ln\ REC, ln\ Patent)$	3	2.71	No co-integration
$F_{Patent}(\ lnPatent \parallel lnFDI, ln\ REC, ln\ MVA)$	3	1.05	No co-integration
Critical value	I (0)	I (1)	
at 1% level of significance	2.37	5	
at 5% level of significance	2.79	3.87	
at 10% level of significance	3.65	3.35	

*Note: *** denotes significance at 1% level*

The calculated F-statistic for Equation 5.3 is 13.75, which is greater than the upper bound critical value (4.66) at 1 percent significance level, which rejects the null hypothesis of no co-integration for Equation 5.3. Therefore, there is evidence of long-run co-integration among renewable energy consumption, FDI inflows, and manufacturing value added at the 1 percent level of significance in Bangladesh when renewable energy consumption is normalised as regressive. However, for Equations 5.4, 5.5 and 5.6, the null hypothesis of no-co-integration is accepted. Therefore, it is proven that there is only one co-integrating relationship among the variables, which further justifies applying the ARDL model. In the presence of multiple long-run relationships, the ARDL model does not provide efficient results and is more likely to have an endogeneity problem (Nkoro and Uko, 2016).

After identifying the co-integration relationship, the conditional ARDL long-run model for renewable energy consumption (*REC*) can be estimated as:

$$lnREC = a_0 + \sum_{i=1}^{p} a_{1i} lnREC_{t-i} + \sum_{i=0}^{q_1} a_{2i}\, lnFDI_{t-i} + \sum_{i=0}^{q_2} a_{3i} ln\, MVA_{t-i} + \sum_{i=0}^{q_3} a_{4i}\, lnPatent_{t-i} + \varepsilon_t \qquad (5.7)$$

I estimate the long-run coefficient for Equation 5.3 with the ARDL specifications (1, 3, 2, 3). Table 5.14 presents the estimated long-run coefficients.

Table 5. 14: The long-run coefficients for Equation 5.3 using ARDL specification (1, 3, 2, 2) based on AIC where REC is normalised as the dependent variable

Regressor	Coefficient	t-ratio [Prob]
lnFDI	-0.084***	-6.883 [0.000]
lnMVA	-1.884***	-5.969 [0.000]
lnPatent	-0.179	-1.544 [0.1485]
Constant	9.528***	10.02[0.000]

*Note: *** represent, 1% levels of significance.*

The estimated long-run coefficient of *FDI* is negative and statistically significant, which does not support the associated null hypothesis and implies that FDI inflows are not contributing to renewable energy consumption in Bangladesh. In other words, FDI inflows in Bangladesh do not promote environmentally-friendly energy use or a pollution halo in Bangladesh.

The finding of the inverse relationship between foreign direct investment and renewable energy use is found to be in line with other studies for developing and poor middle-income countries (Marton and Hagert, 2017). The estimated long-run coefficient of manufacturing value-added is negative and statistically significant, which indicates the manufacturing sector discourages renewable energy use in Bangladesh. The coefficient of patent applications is not significant. The low innovation and technological capacity may be the cause for the insignificant impact of patent applications on renewable energy use in Bangladesh.

To determine the short-run dynamics of the variables and the speed of the short-run adjustment toward long-run equilibrium, the following error correction model for Equation 5.3 has been estimated within the ARDL framework.

$$\Delta ln\, REC_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta\, ln\, REC_{t-i} + \sum_{i=1}^{q} \alpha_{2i} \Delta\ lnFDI_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta\ lnMVA_{t-i} + \sum_{i=1}^{s} \alpha_{4i} \Delta\, lnPatent_{t-i} + \alpha ECT_{t-1} + \varepsilon_t \quad (5.8)$$

Where, $\alpha_{1i}, \alpha_{2i}, \alpha_{3i}, \alpha_{4i}$ represents the coefficients of short-run dynamics of the model and α represents the speed of adjustment.

Table 5.15 shows the short-run effects of FDI inflows and manufacturing value-added on renewable energy use. The coefficients of differenced explanatory variables refer to the short-run effects.

Table 5.15: Error Correction Representation of ARDL (1, 3, 2, 3) based on AIC where the dependent variable is DREC

Regressor	Coefficient	t-ratio [Prob]
lnDFDI	-0.001	-0.224 [0.825]
***lnDFDI*(-1)**	0.014**	2.185[0.0495]
***lnDFDI*(-2)**	0.009	1.690[0.1167]
lnDMVA	-0.175	-1.143 [0.275]
***lnDMVA*(-1)**	0.326**	2.249[0.044]
***DlnPatent* (-1)**	0.045***	3.994[0.001]
***DlnPatent* (-2)**	0.021**	2.179[0.049]
ECT(-1)	-0.276***	--9.577 [0.000]

*Note: (1) D denotes first difference of the variables. (2) *, **, *** represent 10%, 5% and 1% levels of significance respectively*

The estimated coefficient of the error correction term in Equation 5.8 is negative (-0.276) and statistically significant at 1 percent level. The result indicates that the deviation from the long-run equilibrium path has been corrected and variables are converging towards equilibrium at the speed of 27 percent. The coefficients of differenced explanatory variables provide the short-run effects. The findings indicate that in the shortrun, manufacturing value-added exerts a negative impact on renewable energy consumption, which is significant at the 10 percent level. Foreign direct investment does not have any significant impact on renewable energy use in the short run. However, for a one period lag FDI inflows and manufacturing value added both have positive significant effects on renewable energy consumption in Bangladesh. The number of patent applications also exerts a positive impact on renewable energy use in Bangladesh.

5.5.1.5 Validity of the model

In the bound testing model, the value of R^2 and adjusted R^2 are 60 percent and 51 percent respectively, which indicates the model is well fitted. Table 5.16 reports other diagnostic tests which include: Lagrange multiplier (LM) residual serial correlation test with no serial correlations (χ^2_{LM}); Ramsey's RESET test for functional form (F_{RESET}); Jarque-Bera test for normality or goodness-of-fit and a heteroscedasticity test $\left(\chi^2_{HET}\right)$.

Table 5.16: Results from Diagnostic tests

Diagnostic test	Statistic	Value [prob]	Outcome
Serial Correlation	$\chi^2_{LM}(2)$	2.861[0.239]	No serial correlation
Heteroscedasticity	χ^2_{HET}	11.165[0.515]	No Heteroscedasticity
Normality	Jarque-Bera	0.283[0.868]	Normality distributed
Functional Form	$F_{RESET}(1)$	1.206[0.296]	Well fitted
R^2: 0.608			
Adjusted R^2: 0.517			

The cumulative sum (CUSUM) plots and the square cumulative sum from a recursive estimation of the model are presented in Figure 5.3, which represents the recursive residuals exist inside the critical areas at 5 percent level of significance. Therefore, the model is stable.

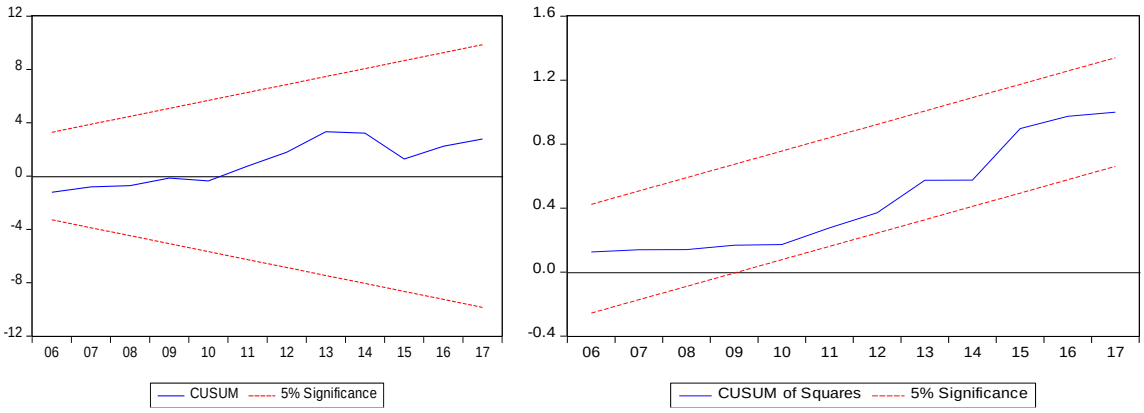

Figure 5.3: Plot of the cumulative sum and square cumulative sum of recursive residuals

5.5.1.6 Robustness analysis with Dynamic Ordinary Least Square (DOLS) estimation

In order to test the robustness of the results obtained from ARDL method, I apply an alternative approach – the Fully Modified Ordinary Least Square (FMOLS) model. The FOMLS also provides consistent estimates for small samples. It also efficiently controls for the problem of endogeneity. The FMOLS technique is preferred when explanatory variables are assumed to be endogenous as FMOLS provides robust estimation under such conditions (Kostakis *et al.*, 2016).

Table 5.17: Results from Fully Modified Least Square (FMOLS) estimation

Regressor	Coefficient	Robust Std. Err.	P-value
lnFDI	--0.085***	0.015	0.000
lnMVA	-1.725***	0.380	0.004
lnPatent	-0.062	0.068	0.374
Constant	8.749	1.039	0.000
R^2: 0.83			

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively*

Table 5.17 depicts that the long-run coefficients of *FDI*, *MVA* and *Patent* from FMOLS method are consistent with the ARDL results in terms of sign and significance. The results of FMOLS depict that FDI inflows and manufacturing valued-added exert a significant negative impact on renewable energy use in Bangladesh. The coefficient of the patent application is also not significant in the FMOLS estimation; therefore, the results of the ARDL model are robust.

5.5.1.7 Analysis of the empirical results

The empirical results indicate that FDI inflows are negatively contributing to renewable energy consumption in Bangladesh or not supporting the pollution halo hypothesis. Multinational companies are usually large. The available technology for energy generation from renewable resources is only suitable for small-scale industries, which might discourage the MNEs from using renewable energy. Another challenge for promoting renewable energy in the manufacturing sector is its high initial installation cost. The initial cost of installing a renewable energy plant is comparatively more expensive than traditional energy sources. In the available existing technology, the cost of electricity generation from natural gas is BDT 4 to 5, and the cost of the solar system is BDT 210 to 300 (IFC, 2012). The high cost associated with renewable energy projects compared to the traditional sources discourages the local manufactures and MNEs from using renewable energy.

However, the manufacturing sector has huge potential for renewable energy use. IRENA reported that renewables could grow to around 27 percent of total final energy consumption for global manufacturing by 2030 (IRENA, 2014). In Bangladesh, the industrial sector is the largest consumer of energy supply using around 50 percent of national primary energy. Other than electricity consumption, the industrial sector also consumes 18 percent of the natural gas supply of the country.

The forecasted primary energy consumption by sector also indicates that the industrial sector will be the largest user of energy supply in Bangladesh for years to come (Figure 5.4).

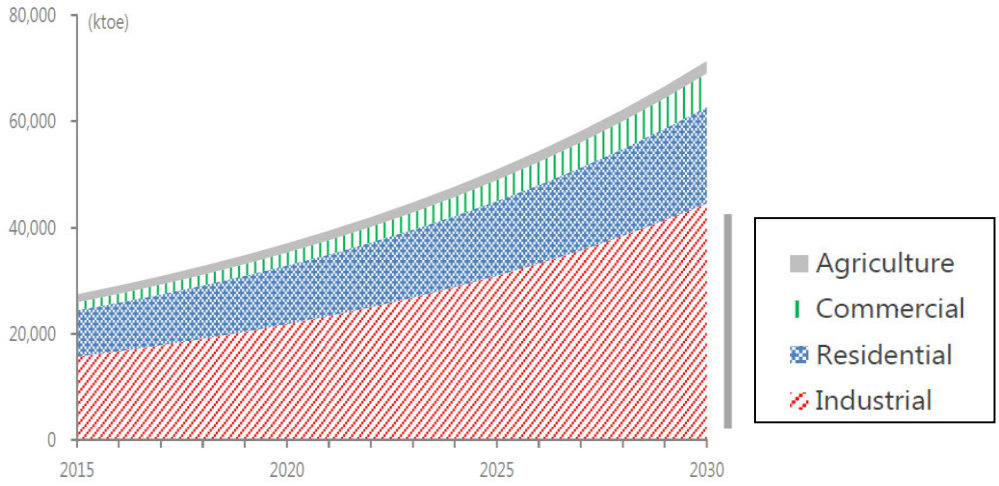

Figure 5.4: Forecasted primary energy consumption in 2030 by sectors in Bangladesh

Source: Energy Efficiency and Conservation Master Plan up to 2030 (SREDA, 2016)

The shortage of power supply is a key obstacle to industrialisation in Bangladesh; therefore, the government allowed the industries to generate their own power supply. Unfortunately, natural gas is also used for captive power generation due to the subsidised, low prices of natural gas. The IFC (2012) indicated that the total captive electricity generation capacity is about 1,100 megawatts in the manufacturing sector, which consumes 128 million cubic feet of gas per day.

There are more than 1,200 megawatts of gas engine-based captive generator used in the industries. If the gas-based captive generators can possibly be replaced by renewable energy, Bangladesh can save a considerable amount of non-renewable natural gas, which will be highly valued from a sustainability perspective. The government should take necessary initiatives to encourage renewable energy use in the industrial sector in Bangladesh. More research, technological development, fiscal and financial incentives are required for promoting the efficient use of renewable energy in the country and multinational firms can help in this area. As Bangladesh is abundant with renewable energy sources (such as solar, wind and biogas), the energy sector itself is a potential sector for foreign and joint venture investment. The government is encouraging FDI inflows in this sector, but the response is minimal. The positive environmental contribution of FDI inflows in the host country depends mainly on effective environmental regulations and enforcement. Poor enforcement of environmental regulations may be another reason for the negative relationship between FDI inflows and renewable energy

use in Bangladesh. FDI can also help in gaining energy efficiency in the manufacturing sector. Better energy efficiency measures can save up to 25 percent to 30 percent energy, as compared with the present consumption (SREDA, 2016).

5.5.2 FDI, pollution haven and Environmental Kuznets Curve (EKC) hypothesis for CO_2 emissions in Bangladesh

5.5.2.1 Model specification, hypothesis and data sources

Several studies empirically investigated the existence of the pollution haven hypothesis and Environmental Kuznets Curve (EKC) in the presence of foreign direct investment flows for CO_2 emissions for different countries. The inverted U-patterned EKC argues that as FDI inflows induce economic growth, the intensification of economic activities leads to an increase of environmental pollution in the short-run due to its scale effect. When the economy reaches a certain level of per capita income, it creates demand for an environment-friendly economy, stringent regulations, efficient use of resources and technology, and changes in the structure of the industry, which leads to an improvement in the environmental outcomes, due to composition effects. However, the results of the empirical studies are mixed and inconclusive (see Section 3.3.2).

Few studies investigate the existence of the EKC relationship in Bangladesh for CO_2 emissions, and when they do they provide inconclusive results. For example, Rayhan *et al.* (2018) investigated the impact of urbanisation and energy consumption on CO_2 emissions in Bangladesh. They also examined the EKC relationship, including FDI inflows as a controlled variable, and employed the Autoregressive Distributed Lag (ARDL) model. They found the existence of the EKC relationship in Bangladesh in the long-run. However, the impact of FDI on CO_2 emissions were found to be statistically insignificant in both the short- and long-run. Husain (2016) empirically investigated the EKC for India and Bangladesh by applying the Instrumental Variable method. The results of the study did not support any robust EKC relationship for CO_2 in Bangladesh; however, the study supported the EKC hypothesis in India. Islam *et al.* (2013) examined the EKC hypothesis in Bangladesh for CO_2 emissions applying ARDL model. The result confirmed the presence of inverted U-patterned EKC in Bangladesh in the long-run. Doytch and Uctum (2016) tested the pollution haven or halo hypothesis for different income-group countries, and found evidence of the pollution haven hypothesis and EKC relationship for poor and middle-income countries.

The descriptive analysis in Section 5.4 describes water pollution as the major concern for industrialisation and FDI inflows in Bangladesh. However, due to the lack of data in water pollution, I am unable to test the EKC relationship for water pollution in Bangladesh. Considering the importance of the pollution haven hypothesis and EKC relationship for adopting and promoting FDI and growth policies (and the inconclusive results of the earlier studies) this study also revisits the EKC relationship for CO_2 emission in Bangladesh.

Based on the Environmental Kuznets Curve (EKC) literature and pollution haven hypothesis, and earlier research, Equation 5.9 is identified to examine the pollution haven hypothesis and the existence of Environmental Kuznets Curve (EKC) relationship for CO_2 emissions in Bangladesh. Equation 5.9 closely follows Ang (2007), Ang (2008), Islam *et al.*, (2013), Jalil and Mahmud (2009), Rayhan *et al.*, (2018) and Shahbaz *et al.*, (2015). However, I apply the most recent co-integration techniques in the form of the Nonlinear Auto-Regressive Distributed Lag (NARDL) model developed by (Shin *et al.*, 2014) to estimate Equation 5.9.

$$\ln CO_{2_t} = \beta_0 + \beta_1 FDI_t + \beta_2 \ln GDP_t + \beta_3 (lnGDP_t)^2 + \beta_4 \ln EC_t + \beta \sum Break + \mu_t \quad (5.9)$$

Where,

$\ln CO_2$ = Logarithm form of per capita CO_2 emissions (metric tons per capita)

FDI = FDI net inflow as a percentage of GDP

ln GDP_t = Logarithm form of per capita GDP (constant in US$)

(ln GDP_t)^2 = Squared per capita GDP in logarithm form

$\ln EC_t$ = Logarithm form of per capita energy consumption (kg of oil equivalent)

Break = Dummy variables for the structural break

μ_t = Stochastic error term

The FDI-pollution theory postulates that the scale effect of foreign direct investment on environmental pollutions is to be positive as it intensifies economic activities. On the other hand, the composition effects of FDI on environmental pollution are supposed to be negative due to the introduction of advanced technology. Therefore, the impact of FDI inflows on CO2 emissions could be both positive and negative, which depends on the net effects of scale and composition effects. However, in the case of developing countries, FDI tends to shift 'dirty' industries (Grossman and Krueger, 1995; Zarsky, 2005). Therefore, the null hypothesis for FDI inflows is H_0: FDI inflows have a positive effect on CO_2 emissions in Bangladesh; thus the coefficient of FDI is expected to be positive (H_0: $\beta_1 > 0$) in Equation 5.9.

Under the EKC hypothesis, the impact of per capita GDP and squared form of per capita GDP are expected to be positive and negative respectively. Therefore, null hypothesis for per capita GDP is H_0: per capita GDP has a positive impact on CO_2 emissions in Bangladesh. The null hypothesis for the squared form of per capita GDP is H_0: the squared form of per capita GDP has a negative effect on CO_2 emissions in Bangladesh. Thus, the coefficient of per capita GDP and the squared form of per capita GDP are expected to be positive and negative respectively (H_0: $\beta_2 > 0$ and $\beta_3 < 0$).

In general, a high level of energy consumption represents a high level of economic activities, which can intensify CO_2 emissions. Therefore, the null hypothesis for energy consumption is H_0: energy consumption has a positive impact on CO_2 emissions in Bangladesh; thus, the coefficient of energy consumption is expected to be positive (H_0: $\beta_4 > 0$).

In this study, I use annual time series data from 1972 to 2014 for Bangladesh, which is derived from the online World Development Indicators (WDI) dataset.

The estimation of the model takes the following steps:

1. The distributional characteristics and stationary properties of the time series data are examined with appropriate standardised tests.
2. The study applies the Nonlinear Auto-Regressive Distributed Lag (NARDL) model developed by (Shin *et al.*, 2014) to detect the long-run co-integration among the variables specified in Equation 5.9. The NARDL model works within the framework of the linear ARDL model but captures long- and short-run asymmetric effects of the independent variables on the dependent variable in a coherent way (Ucal *et al.*, 2016).
3. Finally, the robustness of the results obtained from the NARDL technique is verified with the Fully Modified Ordinary Least Square (FMOLS) procedure.

5.5.2.2 Data Distribution

The descriptive statistics reported in Table 5.18 demonstrates the presence of considerable homogeneity and normality in the data distribution.

Table 5.18: Descriptive statistics of the variables

Variables	Observation	Mean	Std.Dev.	Min	Max	Skewness	Kurtosis	Jarque-Bera (prob.)
$lnCO_2$	43	-1.82	0.61	-2.96	-0.78	0.05	1.93	2.08 (0.35)
$lnGDP$	43	6.15	0.30	5.76	6.83	0.75	2.40	4.68 (0.10)
$(lnGDP)^2$	43	37.87	3.81	33.19	46.60	0.81	2.51	5.15 (0.08)
FDI	43	0.34	0.49	-0.05	1.74	0.96	2.58	3.47 (0.09)
$lnEC$	43	4.87	0.26	4.46	5.40	0.52	2.17	3.14 (0.20)

5.5.2.3 Stationary (Unit root) test

The conventional unit root tests such as ADF and PP tests are conducted to check the unit root of the series. The results for the unit root of the series are shown in Table 5.19.

Table 5.19: The results of the ADF and PP tests for the unit root of the variables

Variables	ADF (SIC)				PP			
	Level		1st Difference		Level		1st Difference	
	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend
$lnCO_2$	1.107	-5.246***	-5.642***	-6.016***	-1.553	-5.292***	-17.158***	-19.024***
$lnGDP$	4.038	0.589	-1.391	-9.514***	7.204	1.685	-6.563***	-9.684***
$(lnGDP)^2$	4.788	0.992	-2.78	-9.028***	8.221	2.235	-5.966***	-9.067***
FDI	3.193	2.914	0.231	-4.940***	-0.263	2.155	-9.524***	-27.328***
$lnEC$	2.331	-0.940	-8.250***	-9.120***	2.225	-0.613	-8.240***	-11.632***

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively.*

The results of the ADF and PP tests indicate that the series of $lnGDP$, $(lnGDP)^2$, $lnEC$, and FDI are not stationary at their level, but they are stationary at first difference form I (1). However, it is noticed that the series of $lnCO_2$ is stationary at their level or I (0) in both ADF and PP test. Therefore, a mixed order of the integration of the variables I (0) and I (1) exists, which suggests applying the ARDL or NARDL techniques to explore the long-run co-integration relationship among the variables. I apply Bai and Perron's (1998) multiple breakpoint test to identify structural breaks in the model. The result of the breakpoint test identifies 1987 as the breakpoint in the model. In 1987, Bangladesh experienced serious

political crisis. A series of strikes were called against the army ruler and declared a state of emergency. Bangladesh also suffered from catastrophic flood and cyclones in 1987, which may cause the structural break in 1987. Therefore, to capture the structural change in the model, one dummy variable $Break_{87}$ is included.

5.5.2.4 The Nonlinear ARDL (NARDL) Bound Testing Approach

I prefer to apply NARDL model to estimate Equation 5.9. The NARDL model has all the advantages of the linear ARDL model. Additionally, NARDL allows asymmetric effects and includes the effects of the positive and negative change of the independent variables to the dependent variable (Shin *et al*., 2014). The EKC hypothesis or the inverted U-shaped relationship of GDP with CO_2 emissions indicates asymmetric effects of GDP to CO_2 emissions. Therefore, instead of linear ARDL, the nonlinear ARDL (NARDL) model will be more appropriate for Equation 5.9. Moreover, NARDL can also apply in the case of a mixed order of integration. Further, the NARDL model efficiently solves the multicollinearity issue between the variables by choosing the appropriate lag order (Shin *et al*., 2014)

Shin and Greenwood (2014) specify the general NARDL Equation 5.10 in the following way.

$$\Delta y_i = \alpha_0 + \pi_{yy} y_{t-1} + \pi^{+}_{yx} x^{+}_{t-1} + \pi^{-}_{yx} x^{-}_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta y_{t-i} + \sum_{j=0}^{m-1} (\emptyset^{+} \Delta x^{+}_{t-j} + \emptyset^{+} \Delta x^{-}_{t-j}) + \epsilon_t \qquad (5.10)$$

Equation 5.10 is the extended version of Equation 5.2, which includes the positive and negative movement and effects of the independent variables on the dependent variable.

The first step of the NARDL procedure is choosing an appropriate lag for the model. The appropriate lag for the co-integration test is determined based on the Akaike's Information Criterion (AIC). The lowest value of the AIC will provide the best model. Based on that, the optimum lag length for the ARDL test has been determined as 2. The optimum lags for the model are identified as (2, 0, 0, 0, 2, 0).

In the next step, I estimate the ARDL model for Equation 5.9 with a time dummy variable for a breakpoint at 1987. In order to find the co-integration relationship, the study calculates the F statistic by bound testing. The results of the ARDL bound test is reported in Table 5.20.

Table 5.20: Results of the ARDL Bounds Test when dependent variable is DCO2

Test statistic	Value	Outcome
F statistic	4.66	Long-run co-integration exist
Critical value	Upper value	Lower value
At 10 % significance level	2.08	3
At 5 % significance level	2.39	3.38
At 1 % significance level	3.06	4.15

Table 5.20 shows that the calculated F statistic for the equation is 4.66, which is greater than the upper bound critical value (4.15) at the 1 percent significance level. The results demonstrate there is a long-run co-integration among the variables where the CO_2 emissions series is normalised as regressive.

Table 5.21: The estimated short-run coefficients and error correction representation and the long-run coefficients of the NARDL specifications (2, 0, 0, 0, 2, 0) based on AIC criteria

Regressor	Coefficient	t-ratio [Prob]
Error correction representation and short effects where the dependent variable is DCO_2		
$DlnGDP^+$	-0.002	-0.029 [0.977]
$DlnGDP^-$	0.67	1.306 [0.201]
$D(lnGDP)^2$	0.002*	1.933 [0.063]
$DlnEC$	1.167 ***	4.502 [0.000]
$DFDI$	-0.037	-1.106 [0.277]
$DBreak_{87}$	-0.812***	-4.418 [0.000]
ECT(-1)	-0.812***	-4.418 [0.00]
Long-run Coefficient where the dependent variable is CO_2		
$lnGDP^+$	8.455***	5.935 [0.000]
$lnGDP^-$	6.062***	3.697 [0.009]
$(lnGDP)^2$	-0.659***	-5.870 [0.000]
$lnEC$	1.961***	3.840 [0.006]
FDI	-0.052	-1.256 [0.218]
$Break_{87}$	0.067*	1.893 [0.068]
Constant	10.147**	2.455 [0.02]

*Note: (1) D denotes first difference of the variables. (2) *** represent, 1% levels of significance.*

Table 5.21 represents the estimated short-run coefficients, error correction representation and the long-run coefficients of the NARDL specifications (2, 0, 0, 0, 2, 0). In Table 5.21, the coefficients of differenced explanatory variables provide the short-run effects of the variables. In the short-run, per capita GDP has asymmetric effects on CO_2 emissions in Bangladesh, but

the effects are not significant. The squared form of per capita GDP positively influenced CO_2 emissions, which is significant at the 10 percent level. The energy consumption exerts a significant positive impact on CO_2 emissions in the short-run. The break dummy is also significant in both the short- and long-run. The estimated coefficient of error correction term is negative (-0.81) and statistically significant at 1 percent level. The result indicates that the deviation from the long-run equilibrium has been corrected and variables are converging towards the equilibrium path at the speed of 81 percent.

In the long-run, per capita GDP also has asymmetric effects on CO_2 emissions in Bangladesh and the effects are highly significant. The estimated long-run coefficient for positive changes in per capita GDP is positive and statistically significant at the 1 percent level of significance. The coefficient implies that if per capita GDP increased by 1 percent, CO_2 emissions increase by 8.4 percent in any year. The estimated long-run coefficient of negative changes in per capita GDP is also positive and statistically significant at 1 percent level of significance. The coefficient implies that if per capita GDP decreased by 1 percent, then CO_2 emissions will reduce by 6.06 percent. However, the magnitude of the impact is larger for positive changes in per capita GDP.

The statistically significant negative sign of the quadratic form of per capita GDP confirms the existence of EKC relationship for CO_2 emissions in Bangladesh. Therefore, the level of CO_2 emissions initially increases with income; but if income increases beyond a certain point, it contributes to reducing CO_2 emissions in Bangladesh. The point of inflection of the EKC curve is calculated as $Y^* = \exp -\widehat{\beta_2}/2\widehat{\beta_3}$, where $\widehat{\beta_2}$ (= 8.455) is the estimated coefficient of per capita GDP and $\widehat{\beta_3}$(= -0.659) is the estimated coefficient of squared per capita GDP (Akbota and Baek, 2018). Therefore, the threshold point of the EKC relationship for Bangladesh is US$61,095. Thus, when per capita GDP reaches US$61,095 pollution will start decreasing with growth in per capita income.

The coefficient of per capita energy consumption is positive and statistically significant at the 1 percent level of significance, which also supports the associated null hypothesis. A one percent increase in per capita energy consumption leads to a 1.96 percent increase of CO_2 emissions in the long-run. The positive and significant coefficient of energy consumption is theoretically expected and consistent with other studies such as Islam *et al*., (2013), Jalil and Mahmud (2009), Rayhan *et al.*, (2018) and Shahbaz *et al*., (2015).

However, the coefficient of FDI inflows is not statistically significant, which implies that FDI inflows do not exert any significant impact on the CO_2 emissions in Bangladesh, in the long-run. The net effects of FDI inflows depend on the scale and composition effects. Moreover, the amount of net FDI inflows in Bangladesh is low, which may cause the insignificant effects of FDI inflows on the level of CO_2 emissions. The results are consistent with the study by Rayhan *et al.*, (2018), which found the presence of an EKC relationship and insignificant impacts of FDI for CO_2 emissions in Bangladesh. In my study, I apply the more advanced econometric technique and recent data set compared to the Rayhan *et al.*, (2018) study. Moreover, I also check the robustness of the results by applying alternative estimation techniques.

5.5.2.5 Validity of the model

Table 5.22 reports the diagnostic tests for the model, which confirm the absence of serial correlations, homoscedasticity, normality and correct functional forms of the model.

Table 5.22: Results from Diagnostic tests

Diagnostic test	Statistic	Value [prob]	Outcome
Serial Correlation	$\chi^2_{LM}(2)$	0.337[0.844]	No serial correlation
Heteroscedasticity	χ^2_{HET}	16.449[0.087]	No Heteroscedasticity
Normality	Jarque-Bera	1.872[0.391]	Normality distributed
Functional Form	$F_{RESET}(2)$	2.901[0.071]	Well fitted

The cumulative sum (CUSUM) plots and the square cumulative sum of the model are presented in Figure 5.5, which shows that the recursive residuals exist inside the critical areas at 5 percent level of significance. Therefore, the model is stable.

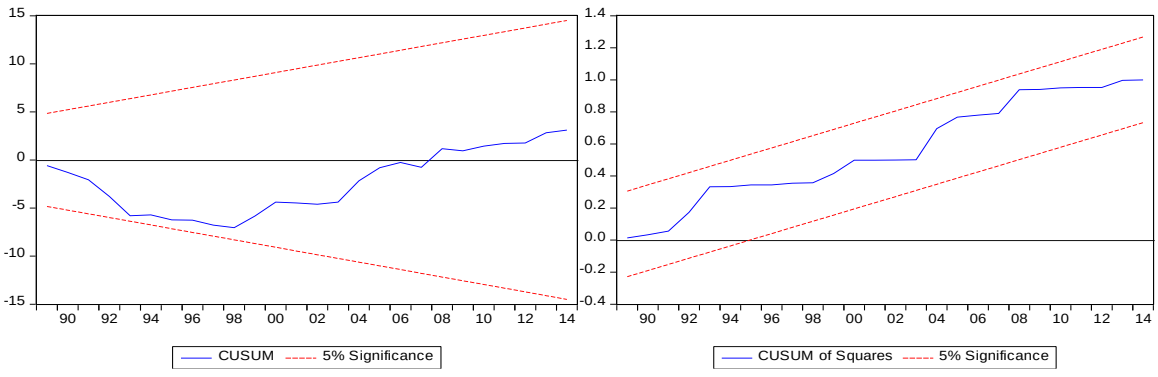

Figure 5.5: Plot of the cumulative sum and square cumulative sum of recursive residuals

5.5.2.6 Robustness analysis with Fully Modified Least Square (FMOLS) estimation

I apply alternative co-integration analysis of Fully Modified OLS (FMOLS) to check the robustness of the findings obtained from ARDL approach. Table 5.23 reports the long-run coefficient from FMOLS. The long-run coefficients of FMOLS are consistent in runs of sign and significance with the long-run coefficients of NARDL. Therefore, the results obtained from NARDL model are robust.

Table 5.23: Results from Fully Modified Least Square (FMOLS) estimation

Regressor	Coefficient	Robust Std.Err.	P-value
$lnGDP$	9.489***	1.874	0.000
$(lnGDP)^2$	-0.765***	-5.242	0.000
FDI	-0.079	-1.485	0.1463
$lnEC$	2.395***	5.502	0.000
Constant	-44.799***	-7.481	0.000
$Break_{87}$	0.041	0.999	0.324

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively*

5.6 Challenges towards environmental sustainability in Bangladesh

Bangladesh needs industrialisation to maintain its current development achievement and reach its economic and social goals. The country also needs foreign investment to accelerate the pace of industrialisation and to introduce advanced technology and increase productivity. However, the industrialisation or channelling of FDI must not come at the price of environmental destruction. FDI inflows have the potential to contribute positively to the host country's environmental condition; however, positive environmental effects are not automatically generated (Araya, 2005). The environmental improvement by FDI inflows is subject to the institutional structure of the host country, environmental regulations, the quality of the implementation of the regulations and the adoption and implementation of corporate environmental responsibility by MNEs.

Like many other developing countries, Bangladesh suffers from a lack of capacity to enforce regulations and provide oversight on the environmental activities of industries. In this case, MNEs have four options: follow local practice; comply with local regulation; adopt parent country's standard; or adopt international best practice standard. Descriptive and empirical analyses demonstrate that MNEs in Bangladesh are not following the international best practice

or their parent country's environmental standards. In most cases, MNEs are simply following local practices. Therefore, adopting appropriate environmental policies and regulations, and their strict enforcement, is vital for environmental sustainability in Bangladesh.

Several policies and laws embrace environmental protection in Bangladesh (see Section 5.3); however, the implementation and enforcement of the environmental policies and laws in Bangladesh are limited (Belal and Roberts, 2010). The lack of will or capacity by the relevant authorities is a key obstacle in implementing environmental laws and regulations in Bangladesh (Belal and Roberts, 2010). The main challenges towards environmental sustainability and the compliance to environmental regulations in Bangladesh are discussed as follows.

Lack of resources and technical expertise obstruct the proper monitoring and enforcement of environmental rules and regulations in Bangladesh. The Department of Environment (as the national regulatory agency) is responsible for monitoring the implementation of environmental laws and regulations in Bangladesh. However, due to an acute shortage of human resources and other technical facilities, DOE fails to perform its duties properly (Haque, 2017). It is supposed to organise regular inspections of the implementation status of environmental compliances of the industries; however, again, the shortage of a trained workforce restricts DOE from regular inspections. Even when inspections are carried out, and a factory is found to violate the rules and regulations, the DOE is rarely able to manage a follow-up inspection to see if the factory has complied with the directives.

Further, Bangladesh established an environmental court to speedily address environmental offences; however, the court is overburdened and faces limited resource capacity. The judges of the environmental court not only deal with the environmental cases, but they also have to deal with general civil and criminal cases. Therefore, a huge backlog of cases occurs (Miah, 2015). Moreover, the environmental cases often require expert scientific and technical knowledge to determine the level or presence of pollution. Due to the shortage of technical expertise and facilities, DOE often delays in submitting the investigation report, which is another obstacle to proper enforcement of the laws.

The lack of an effective Environmental Impact Assessment (EIA) system is a challenge in promoting environmentally friendly development in Bangladesh. EIA helps to identify the possible adverse environmental impact of a proposed project or investment. In Bangladesh, the industries that are responsible for high pollution (such as textiles, dyeing, and finishing

industries) need an Environmental Clearance Certificate (ECC) from DOE prior to the establishment of the enterprise. To obtain an ECC, the company must conduct an Environmental Impact Assessment (EIA); however, there are no statutory EIA guidelines. Without a proper EIA system, compliance with environmental laws and its enforcement are compromised (Haque, 2017). Further, the consultants who prepare EIA reports are not expert or sufficiently professional: they simply reproduce the previous EIA report for each new client (Haque, 2017).

Low penalties for violations of environmental law and regulations often discourage investors from complying with the environmental rules and regulation in Bangladesh. Based on the Environment Conservation Rules 1997, the DOE has the authority to issue penalties to industry for violating emissions standards. The penalty amount is supposed to be determined by the 'polluter pays' principle[14]. The DOE may issue warnings and directives to mitigate the problem within a stipulated time and can initiate legal proceedings in case of failure to comply; however, the likelihood of imposing a penalty for non-compliance with environmental regulations is very low (Sagris and Abbott, 2015). The environmental act allows both physical and financial punishment for violating environmental law, regulations, ordinance, and compliances obligations. As per the Environmental Acts 1995 and 2010, the respective authority can impose a maximum BDT 10 lac (= $USD14,000). The amount of penalties is very negligible compared with the gravity of the polluting offences. Often, the amount of penalty imposed is significantly low compared with the cost of operating the compliance measures. For example, the average cost of operating an ETP is 23.85 percent higher than the penalties or surcharges imposed (Haque, 2015).

Inefficient natural resource use in the industries also cause environmental degradation in Bangladesh. For example, the textile industry in Bangladesh has been excessively extracting and using groundwater in Bangladesh (see Section 5.3). Water use efficiency is essential to make the textiles industries competitive and sustainable. Efficiency in raw material consumption, including water consumption, can also reduce effluent volume. Technological advancement and the adoption of 3R strategy (reduces, reuse and recycle) is needed. Cleaner production is central to efforts to prevent pollution. The elimination or reduction of wastewater and chemicals is the key to water management for the textile industry.

[14] The 'polluter pays' principle is the commonly held practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment.

Corruption, unlawful influence and poor corporate attitude are also responsible for environmental degradation in Bangladesh. For example, in the 2014-15 fiscal year budget, one percent of the Environmental Protection Surcharge, or 'green tax', was imposed (on an *ad valorem* basis) on all kinds of manufactured products of the polluting industries in Bangladesh. The DOE initially made a list of 2,500 industries to be surcharged; however, due to lobbying, especially from export-oriented manufacturing companies, the list is not yet finalised (Asif, 2017). It is reported that more than 30 RMG industry owners are parliamentary members of Bangladesh, representing ten percent of total parliament members. Therefore, RMG industry owners account for ten percent of Bangladeshi lawmakers. Moreover, half of the parliament members who are involved in different businesses in Bangladesh take illegal advantages; this hinders the effective enforcement of rules and regulations (Reuters, 2013).

Weak, corrupt and inefficient regulatory regimes is often an incentive for the poor corporate attitudes of the companies. Many companies in Bangladesh choose to simply ignore the problem, take a short-cut solution or bypass the rules. For example, although all manufacturing industries must have ETP facilities, only five percent of companies listed on the Dhaka Stock exchange actually have them (Belal *et al.*, 2015).

Insufficient research and development activities by the government and private enterprises also represents a key challenge towards promoting environmentally friendly technology in Bangladesh. Sustainable development demands changes to the nature of economic growth, instead of limiting economic activities. The aim of introducing new technology is to find the balance between economic growth and environmental protection. For example, new technology can contribute, in the production process, to waste reduction, recycling, pollution control, and efficient resource use (Beder, 1994).

Intensification of research and development activities is needed urgently for technological change and innovation. As noted, Bangladesh’s status in the research and innovation area is very low, compared with many developing countries. The government expenditure on research and development data for Bangladesh is not available. The private sector in Bangladesh also takes a very casual approach to research and development activities (Arfanuzzaman, 2018). Joint venture activities with large multinational enterprises could be very effective. Local entrepreneurs also should contribute to, initiate and fund environmental research and development activities.

5.7 Conclusion

The unplanned industrialisation and the ignorance of the environmental consequences of industrialisation have severely damaged the natural resources and environment of Bangladesh. The Bangladesh government has only recently started to pay attention to sustainable industrialisation or green growth. The Agenda 2030 or Sustainable Development Goals (SDGs), and particularly SDG 9 and SDG 12 emphasise the integration of environmental protection issues in all economic development activities.

Various policies, laws, ordinances, and regulations are now in place to protect the natural environment in Bangladesh. However, the limited capacity to enforce environmental regulations and laws, unlawful intervention and corruption, and a poor corporate attitude of the entrepreneurs limit the prospects of environmental sustainability in Bangladesh. The regulatory authorities need to be equipped with sufficient facilities and fully trained technical personnel to monitor, coordinate, assess and enforce pollution-related activities. Environmental laws and policies in Bangladesh also do not offer sufficient incentives (or penalties) to prevent pollutions (SAHA, 2014). Lack of inadequate environmental pollution-related data and an effective system of disclosure of pollution information is an impediment in the process of preparation and enforcement of environmental laws and regulations.

Technological advancement or introducing efficient, eco-friendly technology, is crucial to preventing, preserving and reducing the use of unrenewable natural resources. Standard Environmental management systems need to be implemented and practised by the enterprises to prevent pollution. FDI can be a vehicle for promoting environmentally-friendly technology and management systems in developing countries. The composition of FDI inflows and the status of enforcement of environmental regulations indicates that polluting industries are coming to Bangladesh, or the scale effects of environmental pollution of FDI inflows are positive for water pollution in Bangladesh. Due to the shortage of sufficient data on water pollution, I could not perform an empirical investigation of this aspect.

I conducted an empirical investigation to validate the pollution haven and EKC hypothesis for CO_2 emissions in Bangladesh. The study finds that FDI inflows are not contributing to the increase of CO_2 emissions in Bangladesh; therefore, the pollution haven hypothesis is not valid for CO_2 emissions in Bangladesh. However, the existence of the EKC relationship in both the

short- and long-run is a positive indication of that pollution levels will decrease in future when income levels increase.

However, the pollution emission levels in Bangladesh are already at alarming levels. The empirical results show a positive impact of energy consumption on CO_2 emissions, in both the short- and long-run. The acceleration of economic growth intensifies energy consumptions. In Bangladesh, fossil fuels are the main sources of energy production; these produce a huge amount of carbon and greenhouse gases. Therefore, Bangladesh should move towards renewable energy sources and introduce energy efficiency in the production process.

The pollution halo hypothesis suggests that FDI could make a significant contribution to promoting advanced, efficient, environmentally-friendly technology in the host country. However, empirical evidence in this chapter rejects the pollution halo hypothesis for renewable energy consumption in Bangladesh. Therefore, Bangladesh needs to pay more attention to environmental sustainability issues in promoting FDI. FDI inflows need to be encouraged in the environmentally-friendly technology sectors, such as renewable energy generation and recycling. Considering the economic contribution of the textile and readymade garment industries, and the importance of promoting green technology in this industry, Bangladesh should only allow highly ranked environmentally-friendly multinationals into its textile industry.

Local and multinational firms should take corporate environmental responsibilities seriously and adhere to all policies and regulations in Bangladesh. The role of multinational enterprises needs to be strengthened, as they have considerable soft power in influencing the local factories via their prequalification inspection and supplier-buyer relationships.

CHAPTER 6: MANUFACTURING FDI AND SOCIAL SUSTAINABILITY IN BANGLADESH

6.1 Introduction

In this chapter, I investigate research question three, which focuses on the impact of manufacturing FDI inflows on social improvement in Bangladesh. Sustainable development requires an equitable, inclusive development with the establishment of justice and peace for all. In addition to the natural and physical capital stock, the maintenance of social capital stock is critical for sustainability. Dasgupta and Serageldin (1999) note that society's needs are not homogeneous, and social cohesion is essential to meet the necessary conditions for achieving social sustainability. Agenda 2030, or the Sustainable Development Goals (SDGs), also places the social aspects of sustainable development at the heart of its development agenda. Within the social dimension is poverty reduction and food security, overall wellbeing and human development, decent working conditions, and reduced inequalities; strong institutions or corporate governance and partnerships are also considered important.

The theoretical and empirical literature suggests that FDI inflows can generate both positive and negative effects on the social aspects of sustainable development. For instance, FDI inflows can reduce the poverty level of the host country by creating income-generating activities. On the other hand, FDI inflows may 'crowd out' domestic investment, negatively affect employment generation and worsen inequality (Kurtishi-Kastrati, 2013). The corporate social responsibility (CSR) of MNEs can also help to improve the social and working conditions of the host country; however, CSR is a voluntary initiative, and MNEs may not practice the same CSR practices in the host country as they do in their parent country.

Bangladesh has some improved in some macroeconomic and social conditions; however, the problems of rising income inequality, high unemployment rates, and widespread poverty remain major challenges for achieving the social goals of sustainable development in Bangladesh. Research question three asks if FDI inflows in the manufacturing sector can help to meet the social challenges of sustainable development in Bangladesh.

The chapter is structured as follows: Section 6.2 narrates the general socio-economic progress of Bangladesh for the last three decades; Section 6.3 provides a descriptive analysis of the impacts of manufacturing FDI inflows on the major social areas in Bangladesh, based on the available information and statistics; Section 6.4 describes the procedure and findings of the empirical analysis to discuss the nexus between FDI inflows and income inequality in Bangladesh; Section 6.5 discusses the current corporate social responsibilities practised by multinational enterprises in Bangladesh; and Section 6.6 provides conclusions with policy implications in regards to social sustainability and the role of manufacturing FDI in Bangladesh.

6.2 General socio-economic conditions in Bangladesh

Since the 1990s Bangladesh has been able to achieve a degree of economic progress and maintain macroeconomic stability in terms of GDP growth, inflation management, and export performance. The country has also progressed in several major social indicators, such as life expectancy, literacy, sanitation facilities, immunisation coverage, and empowerment of women. Table 6.1 represents the progress of major social indicators in Bangladesh. The steady rise in GDP growth, along with the fall of population growth, led to steady growth in per capita income in Bangladesh. As shown in Table 6.1, the per capita income in Bangladesh has more than doubled from 1990 to 2017 in real terms. Despite GDP growing at over 6 percent per annum, inflation has been maintained below 7 percent in recent times. Bangladesh also progressed in the health and education indicators. The adult literacy rate increased to 72.76 in 2016 from 35.32 percent in 1991. The average life expectancy was 59 years in 1991; this increased to 72 years in 2016. According to the World Economic Forum, Bangladesh ranked first in achieving gender parity in the South Asia region (WEF, 2016).

Table 6.1: The progress of major social indicators in Bangladesh during 1991-2017

Indicators	1991	2001	2005	2010	2016	2017
GNI per capita (Constant 2010 USD)	421.8	541.5	626.2	819	1088.21	1140.16
Literacy rate, adult total (% of people aged 15 and above)	35.32	47.48	47	47.07	72.76	-
Improved sanitation facilities (% of the population with access)	35.6	46.5	50.7	55.8	61	-
Improved water source (% of the population with access)	68.9	76.7	79.8	83.5	87	-
Life expectancy at birth, total (years)	59.04	65.9	67.94	70.24	72.22	
Inflation, GDP deflator (annual %)	6.35	2	7.04	7.14	5.7	6.3
Population growth (annual %)	2.4	1.9	1.5	1.1	1.1	1.04
Employment to population ratio, 15+, total (%) (modelled ILO estimate)	73.9	67.4	63.6	59.5	59.6	54.03
Unemployment, total (% of the total labour force) (modelled ILO estimate)	2.2	3.3	4.2	4.5	4.2	4.38
Employment in industry (% of total employment) (modelled ILO estimate)	12.3	11.3	14.5	17.6	18.9	21.09
Poverty headcount ratio (% of population)	-	33.41	33.2	31.5	24.3	-
HDI index (value)	0.386	0.46	0.506	0.546	0.579	-
Gini Coefficient	0.39	0.45	0.47	0.46	0.48	-

Source: Compiled from the World Development Indicator database (World Bank, 2018c) and Household Income and Expenditure Survey Report 2016, Bangladesh Bureaue of Statistics (BBS, 2017)

Bangladesh ranked 135th out of 188 countries in the Global Human Development Index (HDI)[15] in 2018 and was placed in the list of medium human development category country (UNDP, 2019). Table 6.2 reports the HDI score and rank in selected South Asian countries.

[15] Human Development Index (HDI) calculated by UNDP is a widely accepted indicator to assess overall progress in human development in a country. HDI calculates average progress of human development of a country based on three core parameters: long and healthy life, knowledge, and a decent standard of living. The long and healthy life aspect is calculated using life expectancy at birth. Knowledge is calculated with the adult literacy rate and years of schooling for children. Per capita, Gross National Income (GNI) is used as the indicator of a decent living standard.

Table 6.2: HDI score and rank of selected South Asian Countries during 1990-2018

	HDI score					HDI rank out of 188 countries in 2018
	1990	**2000**	**2010**	**2015**	**2018**	
Bangladesh	0.388	0.470	0.549	0.588	0.614	135
India	0.431	0.497	0.581	0.627	0.647	129
Nepal	0.380	0.446	0.527	0.568	0.579	147
Pakistan	0.404	0.449	0.524	0.550	0.560	152
Sri Lanka	0.625	0.687	0.750	0.772	0.780	71

Source: Human Development Report 2019, (UNDP, 2019)

As shown in Table 6.2, Bangladesh maintained an average annual HDI growth rate of 1.65 percent from 1990 to 2018, and the HDI score increased by 50 percent from 1990 to 2018. However, the trend in the HDI scores is almost stagnant after 2010 (as shown in Figure 6.1). Table 6.2 also depicts that the country is still behind many developing countries in terms of HDI rankings.

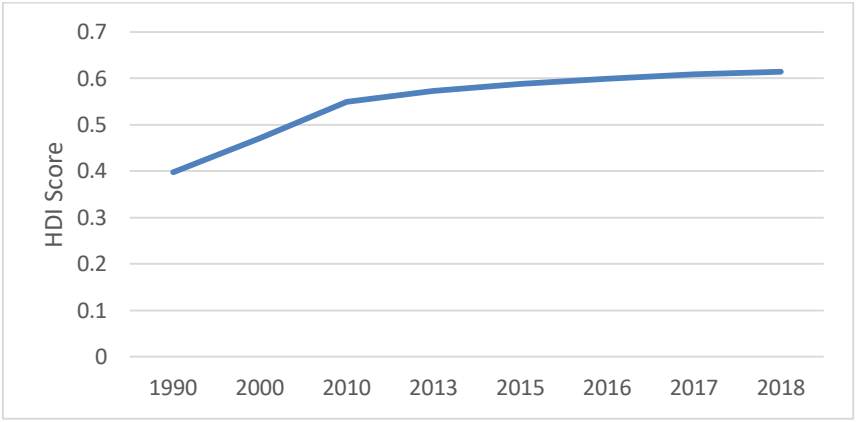

Figure 6.1: HDI trend in Bangladesh

Source: Human Development Report 2019, (UNDP, 2019)

Table 6.1 also shows that the Gini Coefficient is increasing over the respective period. Thus, while the poverty situation is improving, a large proportion of the population (more than 45 million) are under the poverty line, inequality has worsened. The rate of unemployment is not that high at below 5 percent but around 40 percent of the population is underemployed, which means people counted as employed work only a few hours a week or at a low-wage compared to their skills and they are still searching for suitable jobs (CIA, The World Factbook, n.d). Massive underemployment is also a big challenge for socio-economic improvement.

6.3 Manufacturing FDI inflows and its impact on the major social areas of sustainable development in Bangladesh

This section provides an overview of the broad trends and descriptive statistics in relation to FDI and the major social challenges for sustainable development in Bangladesh. The descriptive analysis is followed by an econometric study of the FDI inflows and income inequality relationship in Section 6.4.

6.3.1 Impact on employment generation

Employment generation is considered as an indicator of social development. Employment provides income to households and thus increases the capability of the households to access various social facilities, such as education, health and housing. FDI creates employment opportunities through direct investments and also generates jobs indirectly through expanding or stimulating domestic investment through backward and forward linkage effects. The indirect effects of FDI inflows for employment creation are considered more effective than the direct effects (IFC, 2013, p. 49); therefore, policymakers in Bangladesh are increasingly promoting FDI in the manufacturing sector where indirect effects should be strong. The young and working-age population has been expanding more rapidly than the total population in Bangladesh. One-third of the total population is between 0 and 14 years. The percentage of the very young population (32.4 percent) is also higher than the percentage of those aged 65 or older (4.9 percent) (BBS, 2017). The rapid increase of a young and working-age population creates opportunities for income generation and growth. However, high population growth also poses a significant challenge for the labour market to absorb new entrants. Since 1990, employment has increased at a rate of 1.6 percent per annum on average, which is low compared with the growth rate of GDP (6%), while unemployment as a percentage of the total labour force increased from 2.2 in 1991 to 4.2 in 2016 (World Bank, 2018c).

FDI inflows are mostly concentrated in the manufacturing sector in Bangladesh, but it is still low compared with the total investment of this sector. Therefore, employment directly created by MNEs is also low compared with the total employment in the manufacturing sector. Total employment created by foreign and joint venture investment was 377,241 jobs, which is only 7.5 percent of total employment of the manufacturing sector (BBS, 2012). Although direct job creation from FDI is low, its 'crowding in' effect for domestic industries, especially in the textile and apparel industry, may have a positive contribution to employment generation in the

manufacturing sector. For example, the five key FDI dominating industries comprise more than 80 percent of the employment share in the manufacturing sector. Table 6.3 and Figure 6.2 describe the employment share of the top five industries and the trend of the employment share of manufacturing industries in Bangladesh, respectively.

Table 6.3: Employment share of the top five industries in the manufacturing sector in Bangladesh

Major manufacturing industries	Employment (No.)	Employment share (as % of total employment in the manufacturing sector)
Food products	280257	5.59
Textiles and apparel	3567843	71.13
Leather and related products	75524	1.51
Chemical and chemical products	52598	1.05
Pharmaceuticals	71380	1.42

Source: Survey of Manufacturing Industries 2012, BBS, Bangladesh

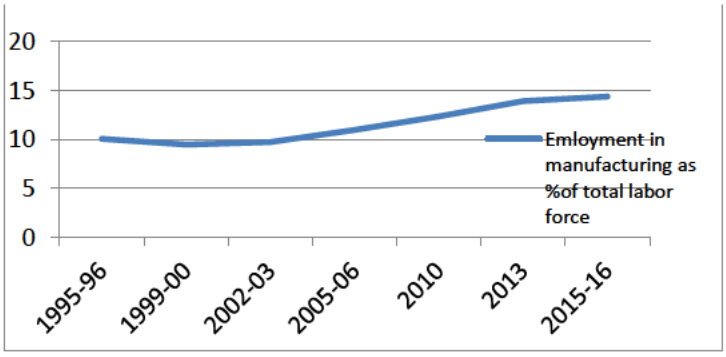

Figure 6.2: Employment in manufacturing as a % of total labour force

Source: Based on the various years Labour Force Survey, Bangladesh Bureaue of Statistics (BBS, n.d)

Table 6.3 shows that the textile and apparel industry alone has more than 70 percent of employment in the manufacturing sector. The discussion in Section 4.5.2 demonstrates that FDI inflows help to expand local industries in the textiles and apparel industries in Bangladesh. The textiles and apparel industries is also a labour-intensive industry. Due to the growth in the labour-intensive textile and apparel industry, employment in the manufacturing sector, as a percentage of the total labour force, has been increasing (as shown in Figure 6.2). Therefore, manufacturing FDI inflows in Bangladesh may indirectly generate employment through 'crowding in' effects.

6.3.2 Impact on poverty reduction

Poverty is the primary social challenge in most developing countries, as it leads to malnutrition, low life expectancy, childhood labour, and a low standard of living. Therefore, poverty reduction is the central goal of almost all development strategies and Bangladesh has made some significant progress in poverty reduction during the period 2000-2016. At the national level, the incidence of poverty in Bangladesh is measured by the Household Income and Expenditure Survey (HIES). Based on the Cost of Basic Needs (CBN)[16] method, the BBS estimates the Headcount Rate (HCR) to determine the percentage of people living below the poverty line. Based on the Upper Poverty Line, the Headcount Rates of incidence of poverty at the national level has decreased to 24.3 percent, from 31.5 percent in 2010. Poverty in rural areas fell at a faster pace compared with urban areas. In rural areas, the poverty reduction was 3.7 times higher than in urban areas, as shown in Figure 6.3.

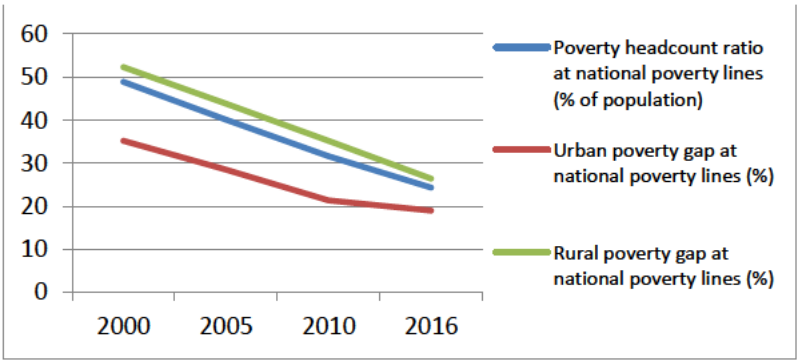

Figure 6.3: Poverty reduction trend in Bangladesh

Source: Household Income and Expenditure Survey (HIES) 2010 and 2016, BBS

The HIES-2016 also estimated the depth of poverty using the Poverty Gap and the severity of poverty by the Squared Poverty Gap measures. Table 6.4 demonstrates the poverty gap and the squared poverty gap in Bangladesh in 2010 and 2016. The results in Table 6.4 indicate that the poverty gap and poverty severity are gradually falling in Bangladesh; however, the incidence of poverty and the severity of poverty are higher in rural areas than in urban areas in Bangladesh.

[16]The Cost of Basic Needs (CBN) is a widely popular method of estimating poverty prescribed by the World Bank. It estimates two types of poverty lines: Upper Poverty line and Lower Poverty Line. First the food-poverty line is calculated based on the cost of a bundle of basic food items which contains the basic nutritional requirement of 2,122 kilocalorie per day a person. The non-food-poverty line is based on the cost of non-food items consumed by households living at the poverty line. The households whose total expenditure is close to the poverty line are specified as extreme poor households. Once the food-poverty line is calculated, upper and lower non-food-allowances. Finally, the upper poverty line and lower poverty line are calculated by adding upper food-allowances and lower food-allowances to the food poverty line respectively.

Table 6.4: The Poverty Gap and the Squared Poverty Gap (in percentage) in Bangladesh

	Poverty Gap		Squared Poverty Gap	
	2010	**2016**	**2010**	**2016**
As per the Upper Poverty Line				
National	6.5	5.0	2.0	1.5
Rural	7.4	5.4	2.2	1.7
Urban	4.3	3.9	1.3	1.2
As per the Lower Poverty Line				
National	3.1	2.3	0.8	0.6
Rural	3.7	2.6	1.0	0.7
Urban	1.3	1.3	0.4	0.4

Source: Household Income and Expenditure Survey (HIES) 2010 and 2016, BBS

FDI might not create any direct impact on poverty reduction in the host country, but FDI can indirectly contribute to poverty reduction through employment generation, boosting growth, revenue generation and through the practice of corporate social responsibility (see Section 3.4.2).

It is claimed that the labour-intensive textiles and apparel industries contribute the most to poverty reduction in Bangladesh (UNDP, 2018). At the time of writing, over four million people are working in the textiles and apparel industries in Bangladesh (MOF, 2017) and, as mentioned, the industry receives the majority of FDI inflows. The textiles and readymade industry is also the main source of export earning in Bangladesh. The export earnings from this sector was $USD 28.14 billion in 2017, which was 80.7 percent of export earnings in total exports and 12.36 percent of the country GDP (MOF, 2017). The government also earns significant revenue from the textiles and apparel industries from export duties; therefore, the textiles and apparel industries help to increase the government's capacity to undertake various poverty alleviation programs.

In 2017, the Bangladesh government allocated $USD 5837 million to the government's social safety net program (MOF, 2017) and poverty alleviation programs include Vulnerable Group Feeding (VGF), allowances for widows, old aged and physically challenged insolvent citizens, food for works, and Test Relief for ultra-poor communities (MOF, 2017). Along with NGOs, the government is also operating the microcredit program for the social and economic empowerment of poor people: all these efforts together contribute to poverty reduction in Bangladesh. Therefore, FDI inflow in Bangladesh may indirectly contribute to the poverty

alleviation efforts of Bangladesh through its contribution to GDP growth, providing government revenue and through indirect employment creation.

6.3.3 Impact on decent wage and working conditions

Decent wage and working conditions are also crucial for social sustainability, with respect to earnings, purchasing power and human rights. FDI inflows can help to increase the productivity of the labour force through training activities and deploying new management and production systems. The increased productivity can lead to increased wages; therefore, FDI inflows can contribute to improved wage levels and working conditions in the host country. However, manufacturing FDI inflows in Bangladesh fail to increase the wage level and working conditions in Bangladesh.

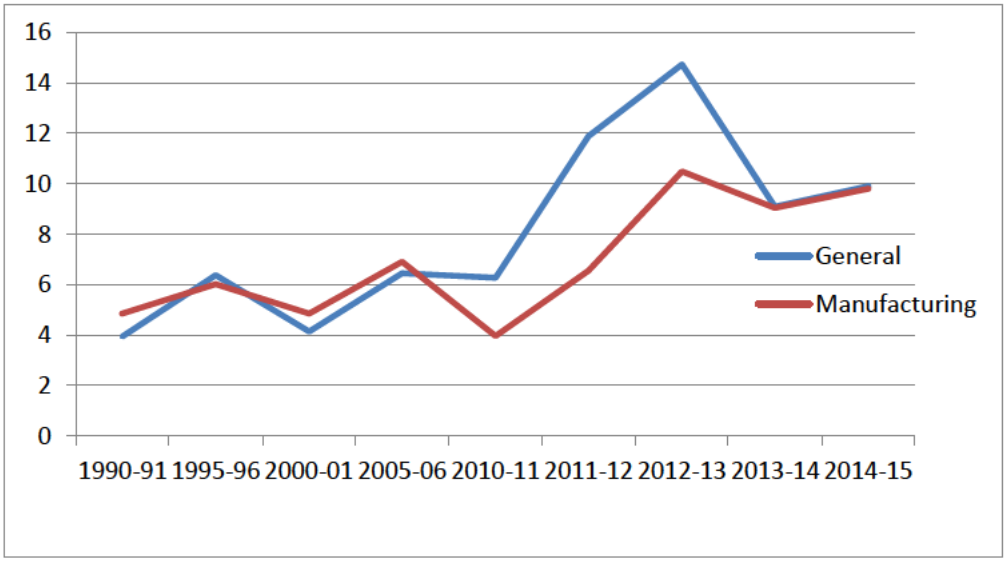

Figure 6.4: Growth of wage rate in Bangladesh

Source: Based on the Statistical Year Book 2016, BBS

Figure 6.4 indicates a rising trend in the overall wage rate in Bangladesh. However, until 2005-06, the growth of the wage rate in the manufacturing sector was higher than the average wage growth of the country. Since that time, the wage growth of the manufacturing sector was lower than the general wage growth in the country.

Many of the jobs created by the manufacturing industries are poor quality and poorly-paid positions. The highly labour-intensive readymade garments industry has primarily driven the growth in the manufacturing sector in Bangladesh since the 1990s. Cheap labour is the key reason for such a boost in the readymade garments sector; for example, Bangladesh ranked last

in minimum wages for garment workers in the top 20 apparel exporting countries (ILO, 2016). China has the highest minimum wage (USD 297) in Asia and the Pacific region among major garments exporters. The minimum wage of Bangladesh (USD 68 per month) is 4.5 times lower than in China. Bangladesh leads the global race to the bottom, in terms of cheap labour.

Figure 6.5 demonstrates that the minimum wage rate of the readymade garments sector is increasing substantially in the major garment exporting countries. In real terms, the minimum wage increased by 21 percent from January 2014 to January 2015 in Cambodia. In India and China, real wages of the RMG sector increased by 9 percent and 5 percent respectively. In contrast, the real minimum wage in RMG sector decreased by 2 percent in Bangladesh.

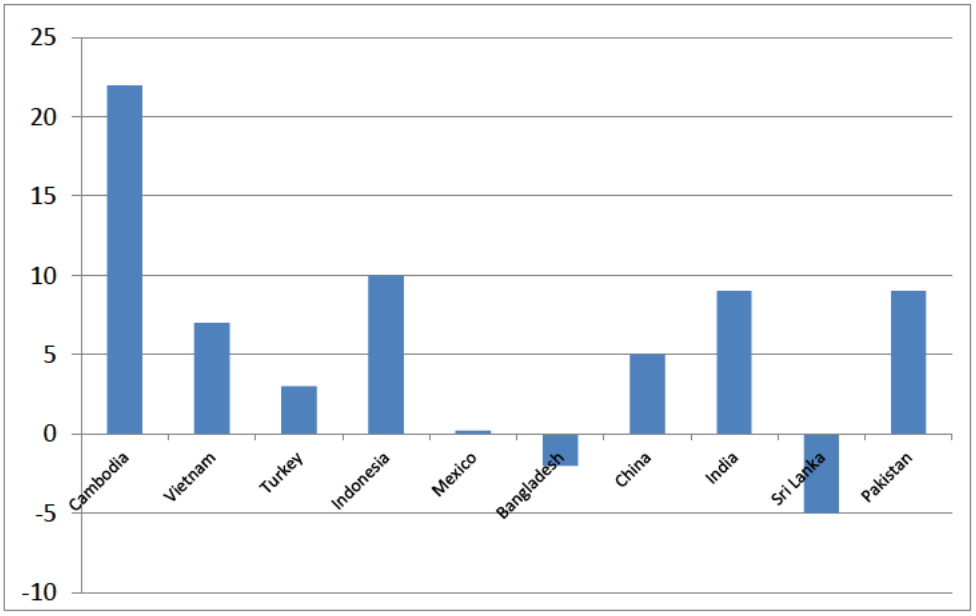

Figure 6.5: Change in minimum wage between Jan 2014 to Jan 2015, real terms in local currency unit (%)

Source: (Cowgill *et al*., 2015)

In addition to the low wage levels, working conditions in the FDI-led manufacturing industries in Bangladesh provide a depressing picture. Tragic accidents in recent years in the readymade garments industry raise questions about labour rights, health, safety and overall working condition in this industry, and casualties from any accidents are high. The working environment in most of the factories is unhygienic; factories do not have proper ventilation, safety and evacuation systems (Bearnot, 2013). In the Tazreen Fashion Factory fire incident on 24 November 2012, at least 117 people died, and more than 200 were severely injured. Just six months after the tragic event of Tazreen Fashion Factory fire, another deadly accident occurred

when the eight-story Rana Plaza factory collapsed in Savar (near Dhaka) killing 1,129 workers, with more than 2,500 others seriously wounded (ILO, Employment injury, n.d.).

FDI inflows might not be directly responsible for the low wage levels, and poor working conditions in the readymade garments industry in Bangladesh. The wage levels and working conditions of foreign firms are better than locally-owned firms. There is evidence that the foreign-owned and joint-venture companies maintain higher minimum wage policy compared with locally-owned enterprises. Most of the foreign-owned and joint-venture companies in Bangladesh are located in the eight Export Processing Zones (BEPZA, 2016). The EPZs are controlled and administered by the Bangladesh Export Processing Authority (BEPZA). The BEPZA has a minimum wage policy, and the wages offered in the EPZs are higher than the statutory minimum wage elsewhere. The average wage of a worker in EPZs is 18.5 percent higher than the wage of a worker in non-EPZ (Moazzem *et al*., 2018). Important non-wage conditions, such as a 10 percent annual increment in basic wages, free medical, food and transport facilities, overtime and night allowances, maternity and holiday leave payment, are also offered by the enterprises located inside the EPZ (Bhattacharya, 1998; BEPZA, 2016).

The physical facilities are also better in factories located in the EPZs area. BEPZA also regularly monitors the Workplace safety issues, and representatives of the well-known brands frequently visit the factories in the EPZs. The Engineering Department of the BEZA ensures maintenance and compliances of the building codes (Moazzem *et al*., 2018; BEPZA, 2016). Therefore, it can be said that foreign and joint venture firm's working conditions and welfare issues are often better than most of the locally owned factories in Bangladesh.

However, the corporate social responsibility practice of MNEs operating in Bangladesh is very limited and piecemeal, and often does not focus on sustainability outcomes (Masud *et al*., 2013, Momin, 2006, Moyeen and Huq, 2010). MNEs also have a weak relationship with the local firms, which reduces spillover effects on the wage and working conditions in the sector. As noted, the working conditions of the subsidiaries of the MNEs in Bangladesh are better compared with most of the locally owned industries; however, often subsidiaries give subcontracts to the local industries, and none of the subsidiaries or their parent companies supervise or monitor the environmental and working conditions of these subcontracting companies (Yasmin, 2014; Haque, 2018). The companies are only concerned about the quality of the products, which are marketed by the big brands. For instance, at the time of the Tazreen factory (locally owned) fire in Nov 2012, a local journalist found labels, order forms, and design

drawings from many global brands including Disney andWalmart. Walmart later admitted that a supplier illegally subcontracted to Tazreen factory without its knowledge (Yasmin, 2014).

Recently, after the two deadly incidents, the government, international agencies, and multinational companies took initiatives to improve the working and safety conditions in the textiles and apparel industries. A multi-stakeholder agreement named 'The Accord on Fire and Building Safety in Bangladesh' was signed by 180 apparel corporations, two international union associations and local trade unions of Bangladesh. The government initiated the National Tripartite Plan of Action (NTPA) to oversee the reliability of the building construction and fire safety issues. The government also amended the Labour law (2006); however, working conditions and wage payment in the textiles and apparel industries in Bangladesh are still unsatisfactory (Khan and Wichterich, 2015).

6.3.4 Impact on income inequality

Fair distribution of income is one of the principal values underlying sustainable development, where inclusiveness is recognised as a central issue. Income distribution describes how the total income of a country is shared among the entire population. The theory contends that if FDI is directed to the labour-intensive sector, it will create demand for low-skilled labourers,increase wage levels, and contribute to reducing income inequality (Mihaylova, 2015). On the other hand, as MNEs are more sophisticated and advanced in the technology they use than local enterprises, FDI inflows are likely to increase the demand for only skilled labour, which leads to increases income inequality in the host country (Lee and Vivarelli, 2006).

In addition, as per the Kuznets inverted-U curve hypothesis, if FDI inflows generate economic growth, income inequality will increase until the per capita income of the country reaches a certain level (Kuznets, 1955). In line with the Kuznets hypothesis, the benefits of FDI induced growth will be limited to sectors where workers receive higher wages at the initial stages; at a later stage, high wages will stimulate other sectors, and wages of other sectors will increase as well. As a result, overall inequality will reduce in the country in the long run (Pan-Long, 1995).

Income inequality in Bangladesh has worsened since the 1990s. The trend of the Gini Coefficient[17] (shown in Figure 6.6) indicates income inequality is on an upward trend at all

[17] The Gini Coefficient is a popular indicator of income inequality. It calculates inequality based on the Lorene Curve, which plots the combination of cumulative percentage of the population and the cumulative percentage of income they receive. The diagonal or 45^0 line presents perfect equality of income distribution. The Gini Coefficient represents the ratio of the area

levels: national, rural and urban. At the national level, the Gini Coefficient has increased from 0.39 in 1991, to 0.48 in 2016, indicating a large increase in national income inequality. Both urban and rural income inequalities have increased. The values of the Gini Coefficient are higher in the urban areas, compared with their corresponding values in the rural areas. In the rural areas, the value of the Gini Coefficient has increased from 0.36 in 1991, to 0.46 in 2016; the value of the Gini Coefficient has increased from 0.40 in 1991, to 0.50 in 2016 in the urban areas with a sharp increase in urban income inequality during 2010-2016.

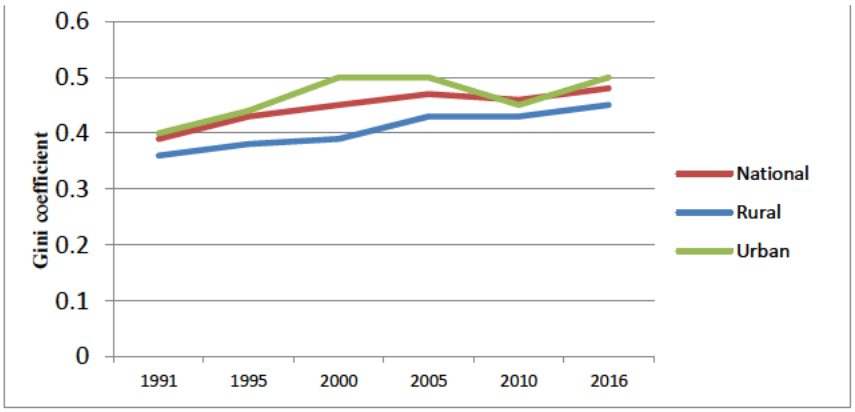

Figure 6.6: Trend in income inequality

Source: Household Income and Expenditure Survey (HIES) Report 2016, Bangladesh Bureaue of Statistics (BBS, 2017)

The decile distribution of income share also provides a depressing perspective on inequalities. Figure 6.7 shows that the lowest five deciles (income group), covering 50 percent of the total population, hold only 19.2 percent of the income share and this has fallen from 20.3 percent in 2010, indicating rising inequality over time. The income share of the top 5 percent of households increased to 27.9 percent in 2016 from 24.6 percent in 2010. In contrast, the lowest 5 percent of the household's income share has declined to 0.23 percent from 0.78 percent in 2010. Simultaneously, the income share of the households of decile-10 has also increased to 38.16 percent in 2016, from 35.8 percent in 2010.

between the Lorenz curve and the equality line over the total area under the Lorenz Curve. The value of the Gini-Coefficient lies between o (zero) to 1 (one). Zero refers to perfect equality, while one refers to perfect inequality in income distribution.

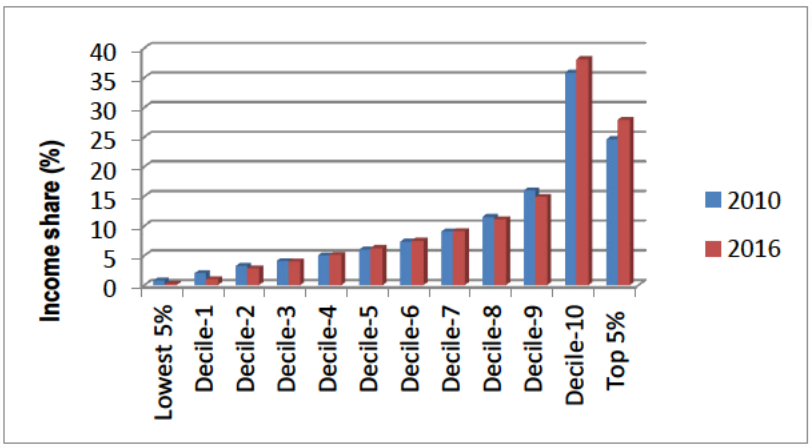

Figure 6.7: Percentage Distribution of Income Share to different income groups

Source: Household Income and Expenditure Survey 2016, (BBS, 2017)

The Bangladesh economy has experienced a structural shift over the last few decades; the share of agriculture in GDP has declined, and the share of industry in GDP, especially the manufacturing sector, has increased. Most of the industrial development is urban-based, which leads to one of the highest rates of urbanisation in Bangladesh. The urban population more than doubled from around 21 million in 1990, to 46 million in 2010, and reached around 57 million in 2017 (World Bank, 2018c). Rapid urbanisation may create adverse implications for urban income inequality. FDI activities are also urban-based, which might also impact on urban income inequalities in Bangladesh.

However, it is unlikely that FDI inflows are driving inequality. In Bangladesh, manufacturing FDI inflow is mostly channelled to the low skilled labour-intensive sector. Therefore, FDI inflows should increase the demand for unskilled low-waged labour and wages of unskilled labour should increase. Therefore, by lowering the wage gap, FDI inflows may reduce income inequality in Bangladesh. It is also evident that foreign-owned firms and their subsidiaries provide better wages, but the job creation by the foreign and joint-venture firms is small compared with the locally-owned enterprises. Therefore, FDI inflows may not be directly responsible for increasing income inequalities.

Aside from FDI, the export competitiveness of local firms, manufacturing profit margins, and unemployment might be possible sources for the income inequality in the manufacturing sector in Bangladesh. For example, the textiles and readymade garments exports are buyer-driven. Most of the exports go to the EU market (nearly 80 percent) and a small number of brands dominate the local market. On the other hand, the number of supplying firms is large. Therefore, retailers and brands control the price of the readymade garment products. Parry (2016) notes

that buyers want quality products at a cheap rate and suppliers will accept a low price. Muhammad (2014) estimates that if a garment product is sold at USD14 in a developed market, the buyers and brand retailers get 60 percent of the value. Another 35 percent of the value goes to the intermediate products (imported and local materials). The establishment costs and the workers, the bottom of the supply chain, receive less than 1 percent. The unequal distribution of income throughout this supply chain results in a narrow profit margin for manufacturers, which decreases wage levels in the industry. Moreover, local subcontracting firms are very competitive with each other over contracts. The supplying firms want to secure profit margins and consider labour costs to be flexible, which may further boost the existing income inequality in the sector.

The next section conducts an econometric analysis to explore the nexus between FDI inflows and income inequality in Bangladesh. There are three main reasons why this study only considers income inequality, and does not include poverty reduction, employment generation and working conditions in the empirical analysis. Firstly, inclusiveness is the core element in the social dimensions of sustainable development, and income inequality represents the the degree to which the benefits of FDI are inclusive. Secondly, the descriptive analysis shows that along with the increased inflow of FDI, Bangladesh has progressed in a few social areas, including poverty reduction, over the last two decades; however, income inequality is increasing and is a big challenge for sustainable development in Bangladesh. Thirdly, the data on employment generation and working conditions are not available in Bangladesh for any rigorous econometric analysis.

6.4 The FDI inflow and the income inequality nexus in Bangladesh: an empirical analysis

6.4.1 Model specification and data sources

Based on the theoretical arguments outlined in Section 3.4.1 regarding the relationship between FDI inflows and income inequalities and the Kuznets hypothesis of income inequalities, the study specifies Equation 6.1 to examine the impact of FDI inflows on income inequality in Bangladesh. Earlier studies, such as Pan-Long (1995) for Least Developped Countries (LDCs), Ridzuan *et al.* (2017) for Singapore and Ucal *et al.* (2016) for Turkey also used a similar equation to investigate the relationship between FDI inflows and income inequality.

$$lnGini_t = \beta_0 + \beta_1 FDI_t + \beta_2 lnGDP_t + \beta_3 (lnGDP_t)^2 + \beta_4 Inf_t + + \mu_t \quad (6.1)$$

Where,

$lnGini_t =$ Logarithm form of the Gini index

$FDI_t =$ FDI net inflow as a percentage of GDP

$lnGDP_t =$ Logarithm form of per capita GDP (constant in USD)

$(lnGDP_t)^2 =$ Square form of the log of per capita GDP

$Inf_t =$ Inflation rate , GDP deflator (annual in percent)

$\mu_t =$ Stochastic error term

In the model, I use the Gini Index as an indicator of income inequality, and FDI inflow is the main independent variable. Per capita GDP and the quadratic form of per capita GDP are included in the model as control variables to test the Kuznets hypothesis, following the earlier study of Pan-Long (1995). The annual inflation rate is included as it is likely to impact income inequality. The impact of inflation on income inequality could be both positive and negative. As per the Phillips curve, if unemployment is high then inflation stimulates investment and growth and helps to reduce unemployment. Thus, inflation reduces income inequality. The impact of inflation on income inequality also varies by the source of income (such as labour income or capital income). Poor households mostly rely on wage income and have little access to assets and equities. Inflation widens income inequality by lowering the value of nominal wages and raising the asset prices, benefiting the rich who usually hold these assets and receive capital gains (Albanesi, 2007; Saiki and Frost, 2014). Ucal *et al*. (2016) also included inflation as a control variable in their model to examine the nexus between FDI inflows and income inequality.

FDI inflows in Bangladesh are mostly clustered in the low-skilled labour-intensive readymade garments sector in Bangladesh. FDI inflows are expected to increase the wages of low-skilled labour and contribute to reducing the wage dispersion between the skilled and unskilled labour. Therefore, the null hypothesis for FDI inflows is H_0: FDI inflows have a negative affect on the Gini coefficient in Bangladesh or improves the income distribution situation in Bangladesh; thus, the coefficient of FDI is expected to be negative (H_0: $\beta_1 < 0$).

Under the Kuznets hypothesis of income inequality, if per capita income increases, income inequality will also increase, until some threshold level of per capita income is reached. After

the threshold level of income, inequality begins to decline. Therefore, the null hypothesis for per capita GDP is H_0: per capita GDP has a positive effect on the Gini coefficient in Bangladesh. The null hypothesis for the squared form of per capita GDP is H_0: the squared form of per capita GDP has a negative effect on Gini coefficient in Bangladesh. Thus, the coefficients of per capita GDP and the squared of per capita GDP are expected to be positive and negative respectively (H_0: $\beta_3>0$ and H_0: $\beta_4<0$).

The impact of inflation on income inequality is expected to be positive in Bangladesh. The labour income or wage is the main income source of poor households. Therefore, due to inflation, the purchasing power of the poor reduces at a higher rate than that of the poor (Mushtaq *et al*., 2014). As a result, income inequality is likely to increase with the increase in inflation. Therefore, the null hypothesis for inflation is H_0: inflation has positive impact on the Gini coefficient in Bangladesh; thus, the coefficient of the inflation rate is expected to be positive (H_0: $\beta_5>0$). To estimate Equation 6.1, I obtained annual time series data from the World Development Indicators (WDI) online database from 1980 to 2016.

6.4.2 Estimation procedures and findings

The estimation of the model is as follows:

1. The nature of the data distribution and the stationarity properties (unit root) of the time series data are examined with appropriate standardised tests.
2. The endogeneity issue among the explanatory variables suggests applying a Simultaneous Equation Approach or Instrumental Variable (IV) approach.
3. I apply Two-Stage Least Square (2SLS) to detect the causal effects of the variables.
4. Finally, the validity of using the 2SLS method is checked by the endogeneity and instrument identification tests.

6.4.2.1 Data Distribution

In order to check the homogeneity and normality characteristics of the data distribution, I examine the standard descriptive statistics of the series, such as mean, standard deviation, skewness, and kurtosis. The descriptive statistics of the variables presented in Table 6.5 show that the data are not widely spread and distributed around the mean value, which indicates the homogeneity of the data distribution.

Table 6.5: Descriptive statistics of the variables

Variables	Observation	Mean	Std.Dev.	Min	Max	Skewness	Kurtosis	Jar_Bera (Prob)
$lnGini$	37	3.42	0.09	3.25	3.51	-0.71	1.87	3.62 (0.16)
FDI	37	0.46	0.54	-0.03	1.74	0.85	2.36	3.80 (0.15)
$lnGDP$	37	6.26	0.32	5.86	6.94	0.63	2.13	3.61 (0.16)
$(lnGDP)^2$	37	39.26	4.10	34.36	48.12	0.68	2.22	3.84 (0.15)
Inf	37	7.19	2.93	2.01	14.40	0.32	2.99	0.64 (0.73)

Table 6.5 also shows that the skewness and kurtosis are not high for the series. The numeric value of skewness of the variables is low. The values of kurtosis are below three, which confirms near normality (Bai and Ng, 2005). The Jarque-Bera test statistics and associated probabilities also accept the null hypothesis of the normal distribution for all variables (Jarque and Bera, 1980; Jarque and Bera, 1987). Therefore, the normality of the data distribution is confirmed and allow proceeding to the next step of the estimation process.

6.4.2.2 Stationary (Unit root) test

Time series analysis requires checking the stationary properties of data to avoid spurious results. I apply the conventional unit root tests, such as the ADF (Augmented Dickey-Fuller) test and PP (Phillips–Perron), to check the stationary properties of the series. Table 6.6 shows the results of the unit root tests.

Table 6.6: The results of the ADF and PP tests for the unit root of the variables

Variables	ADF (SIC)				PP			
	Level		1st Difference		Level		1st Difference	
	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend
$lnGini$	-2.091	-1.801	-2.721*	-4.464***	-1.760	-0.461	-3 55**	-2.599
$lnGDP$	8.142	0.862	-1.122	-7.644***	8.058	0.902	-3 56**	-7.435***
$(lnGDP)^2$	9.474	1.430	-0.833	-7.229***	9.280	1.458	-1.534	-7.064***
FDI	-1.255	-3.10	-5.206***	-3.661**	-1.105	-3.00	-9.146***	-12.765***
Inf	-1.615	-3.021	-7.213***	-7.351***	-2.060	-3.001	-8.347***	-10.564***

*Note: *, **, *** represent 10%, 5% and 1% levels of significance respectively.*

The results of the ADF and PP tests show that in level form, the null hypothesis for the series $lnGini, lnnGDP, (lnGDP)^2, FDI$ and Inf have a unit root and cannot be rejected at 5 percent level of significance. Therefore, the variables are non-stationary in level from. The series becomes stationary after first difference I (1) in both ADF and PP test. The stationary tests confirm that all the variables are stationary at the same level.

6.4.2.3 Two-Stage Least Square (Instrumental Variable) Approach

Most of the macroeconometric analyses based on Ordinary Least Square (OLS) suffers from the endogeneity problem, which arises when one or more explanatory variables are correlated with the error term. For example, I consider the linear equation model of $y = \beta X + \mu$,where y is the dependent variable and X is the vector of explanatory variables. If the $\text{cov}(X, \mu) \neq 0$ then there is a problem of endogeneity and in this case the estimated OLS coefficients will be inconsistent (Wooldridge, 2015). Instrumental Variable (IV) analysis, such as Two-stage Least Square (2SLS) or Three-Stage Least Square can efficiently solve the endogeneity problem through Simultaneous Equation Modelling.

The Two-stage Least Square (2SLS) method replaces the endogenous variable with predicted values of the endogenous variable through a regression on instruments. For example, consider the following structural Equation, 6.2.

$$y_1 = \beta_1 y_2 + \alpha X + \mu \qquad (6.2)$$

Where, y_1 is the dependent variable, y_2 is the endogenous variable and X is the vector of exogenous variables. β_1 and α are the parameters of the endogeneous and exogeneous variables. In Equation 6.2 $cov\ (y_2, \mu) \neq 0$ and explanatory variables comprise both endogenous variable and exogenous variables. In the 2SLS procedure, the first stage identifies the potential instruments for the endogeneous variable. The instruments should satisfy the following conditions:

i. The instruments must be correlated with the regressor. If z is an instrument then $\text{cov}(z, x) \neq 0$
ii. The instruments have to be uncorrelated with the residuals, that is $cov(z, \mu) = 0$
iii. The instruments must not directly cause the dependent variable, that is $cov\ (y_1, z \mid x) = 0$

After selecting the appropriate instruments, the predicted value of the endogeneous variable ($\hat{y}_2$) is estimated using the following reduced form Equation 6.3.

$$\hat{y}_2 = \delta Z + \gamma X + \varepsilon \qquad (6.3)$$

In Equation 6.3, *Z* represents the vector of instruments. The predicted value of the endogeneous variable ($\hat{y}_2$) obtained from Equation 6.3 will be placed in structural Equation 6.2 to replace y_2. By replacing y_2 with $\hat{y}_2$ we will get the final structural Equation (6.4) as follows:

$$y_1 = \beta_2 \hat{y}_2 + \beta_3 X + \mu \qquad (6.4)$$

To test the Kuznets hypothesis, I include the per capita GDP and squared form of per capita GDP as explanatory variables with other control explanatory variables FDI inflows and inflation in Equation 6.1. However, there is the possibility of the endogeneity problem of per capita GDP. Per capita GDP might be influenced by the squared form of per capita GDP, FDI inflows and inflation; therefore, the error term will not be uncorrelated with the explanatory variables.

The result of the endogeneity test reported in Table 6.9 depicts the presence of endogeneity in the model specified in Equation 6.1. In this case, the OLS based estimation procedure will provide inconsistent estimators; therefore, I prefer to use Instrumental Variable analysis or Two-Stage Least Square estimation to detect the causal effects among the variables of interest.

However, the choice of appropriate instruments is very important to get the efficient estimates, and finding a reliable instrument is the main challenge in the Two-Stage Least Square method. The instrument needs to be good enough to predict the replaced variable, but must not directly link with the dependent variable. In consideration of the availability of data, I select manufacturing export as percentage of GDP (*Mx*) as an instrumental variable to correct the endogeneity of per capita GDP. The standard macroeconomic theories note that GDP is a function of exports. Moreover, it is noticed that the manufacturing exports contribute strongly to the GDP in Bangladesh. Thus, through induced GDP growth, manufacturing export can indirectly influence the income inequality of the country. Therefore, manufacturing exports could be a good instrument.

In addition, lag values of the explanatory variables could be used as instruments as they are mostly uncorrelated with the disturbance term (Dizaji, 2016). In this context, a one period lag for the squared form of GDP is also chosen as additional instrument variables. Therefore, the

chosen instruments are realistically credible instruments of GDP for this model. The instruments are correlated with GDP, but do not correlate with income inequality directly unless through GDP. The results of the instrument identification tests are reported in Table 6.9.

In the first stage of the Two-Stage Least Square process, I predicted the value of per capita GDP using the instrument and Equation 6.5 as follows:

$$lnGDP = \alpha_0 + \alpha_1 (lnGDP)^2 + \alpha_2 Infl + \alpha_3 FDI + \alpha_4 (lnGDP)^2 (-1) + lnMx + \epsilon \qquad (6.5)$$

The result of the first stage equation is reported in Table 6.7.

Table 6.7: Result of the first stage regression where the dependent variable is *GDP*

Variable	Co-efficient	Standard error	t-statistics	Probability
(lnGDP)²	.0748946***	.0033803	22.16	0.000
Infl	.0001634	.0002102	0.78	0.443
FDI	.0023141	.0028107	0.82	0.417
(lnGDP)²(-1)	.000335	.0034676	0.10	0.924
lnMx	.0204247***	.0019915	10.26	0.000
C	3.26107***	.0141639	230.24	0.000
Partial R^2: 0.823 **F(2,30): 60.742 (P=0.000)**				

*Note: *** represents 1% levels of significance respectively*

I replaced the per capita GDP in Equation 6.1 with the predicted value of per capita GDP. The results of the 2SLS estimation of Equation 6.1 are presented in Table 6.8, where per capita GDP is considered as endogenous.

Table 6.8: Estimated coefficients using Two-Stage Least Square Regression

Regressor	Coefficient	Robust Std. error [Prob]
$\boldsymbol{lnGDP}$	9.329***	1.264 [0.000]
$(\boldsymbol{lnGDP})^2$	-0.7111***	0.098 [0.000]
$\boldsymbol{FDI}$	-0.057*	0.033 [0.085]
$\boldsymbol{Inf}$	-0.003	0.002 [0.295]
$\boldsymbol{R^2 = 0.86}$ $\boldsymbol{\chi^2_{wald}(4)=527.70(0.000)}$ **Root MSE=0.33**		

*Note: * and *** represent, 10% and 1% levels of significance respectively*

The results in Table 6.8 show that the estimated coefficients derived from the 2SLS process satisfy most of the theoretical expectations in terms of their sign and significance. Under the Kuznets hypothesis of income inequality, the coefficients of income inequality, concerning per

capita GDP and the square of per capita GDP, are expected to be positive and negative, respectively. In 2SLS estimation, I found the coefficient of per capita GDP is positive at 1 percent significance level, and the coefficient of the square of per capita GDP is negative and also significance at 1 percent level. The results support the existence of the Kuznets hypothesis in the Bangladesh economy, which implies that GDP growth is not fairly distributed to the different income groups in the early stage of development. However, at the higher stage of development, GDP growth will contribute to reducing the income inequalities. The point of inflection of the Kuznets hypothesis of income inequality is calculated as $Y^* = \exp -\widehat{\beta_2}/2\widehat{\beta_3}$, where $\widehat{\beta_2}$ (= 9.329) is the estimated coefficient of per capita GDP and $\widehat{\beta_3}$(= -0.7111) is the estimated coefficient of squared per capita GDP. Therefore, the threshold point of the Kuznets hypothesis of income inequality for Bangladesh is US$4,146. Thus, when per capita GDP reaches to US$4,146 income inequality will start decreasing with growth in income per capita. The findings are consistent with the earlier studies by Islam (2009) and Mushtaq *et al*. (2014). However, I apply the instrumental variable method and control for the endogeneity problem in my estimation; therefore the estimated coefficients reported in Table 6.8 are more consistent than the earlier study.

The coefficient of FDI is found to be negative, but not highly significant. However, it is significant at the 10 percent significance level. The estimated coefficient of FDI is also very low (-0.057). The results indicate that FDI inflows have the potential to reduce income inequality in the country, but not considerably. This is supported by the descriptive analysis. While FDI should increase the wages of low-skilled labour and improve inequality, it was demonstrated that the wage level in the manufacturing sector is low and the minimum wage in the readymade garments sector is also very low. In addition, while foreign-owned firms pay higher wages, FDI inflows in Bangladesh are very low, and most of the firms in the garment sector are locally owned. All these factors might restrict FDI inflows from improving income inequalities in Bangladesh.

The coefficient of the inflation rate is negative, but statistically insignificant, which implies inflation does not cause any significant impact on income inequality in Bangladesh. As mentioned earlier, the impact of inflation on income inequality could be both positive and negative. The negative effect may be crowding out the positive effect leading to an insignificant coefficient. Bhandari (2007) (for transition countries) and Ucal *et al*. (2016) (for Turkey) also found the insignificant influence of inflation on income inequalities.

6.4.3 Diagnostic check/ the validity of the model

It is essential to conduct an endogeneity test to justify the use of Instrumental Variable approach. If the variables are exogenous, then Instrumental Variable method may not necessarily be required. Table 6.9 represents the results of the diagnostic tests.

Table 6.9: Results of diagnostic tests

Diagnostic test	Statistic	Value [prob]	Outcome
Endogeneity	χ^2_{Durbin}	6.669 [0.009]	Endogeneity exist
	$F_{w-Hausman}$	16.532 [0.0003]	
Instrument Identification tests			
Over-identification	χ^2_{overId}	2.479 [0.1153]	Not over-identified
Weak Identification	$R^2{}_{Partial}$	0.*823*	Not weak
	F_{weakId}	60.742 [0.000]	

In the endogeneity test, the probabilities associated with the Durbin Chi-square and W-Hausman F statistics are less than 5 percent, which rejects the null hypothesis of the absence of endogeneity. Therefore, the presence of endogeneity justifies using the Instrumental Variable or Two-Stage Least Square approach for the estimation.

To achieve efficient and consistent estimates in the Instrumental Variable model, instruments should be properly identified. Therefore, I also conducted over-identification and weak-identification tests for the instruments. In the Sargan-Hansen test of over-identification, I find that the probability value of the Sargan chi-square is greater than 0.1, which accepts the null hypothesis - H_0: the instruments are not over-identified.

In the weak identification test, I find that the partial R^2 from the first stage regression is quite high and the joint F statistic is much higher than the critical values, which rejects the null hypothesis - H_0: the instruments are weak (Bound *et al*., 1995). Large partial R^2 and F statistic values indicate that the instruments contribute substantially to the prediction of per capita GDP. Therefore, the diagnostic tests of endogeneity and instrument identifications confirm that the model and estimation process is valid, and the estimated results are consistent and efficient.

6.5 Corporate social responsibility (CSR) practised by MNEs in Bangladesh

The Corporate Social Responsibility (CSR) of companies could play an important role in achieving sustainable development goals in host countries. Clarke and Klettner (2007) note that CSR activities are voluntarily pursued by enterprises for the benefit of ecosystems and humanity, such as activities that improve human rights, or environmental protection. In the case of the sustainability of the enterprises themselves, CSR has become a key agenda for MNEs as it tends to promote positive attitudes amongst stakeholders, and especially buyers, towards the companies, thus providing them with s a competitive advantage (Porter and Kramer, 2002 ; Waddock and Graves, 1997). CSR is becoming an important issue in the developed countries where most of the MNEs are located. It is assumed that as developed countries maintain a higher level of environmental, labour and social standards, through CSR practices, MNEs will promote better working conditions, corporate governance and high-level business ethics in the host country.

On the other hand, instead of adopting a parent country's standard, the MNEs or their subsidiaries may adopt host country's environmental, labour and social standards and reduce their CSR involvement in the developing countries. The big retailers and brands have their own codes of conduct and have signed many declarations and initiatives to retain customers' faith in their products (Locke and Romis, 2007).

Nevertheless, there is a continuous criticism that CSR is only on policy manuals, and not in action. Global brands and MNEs are more concerned with their financial reputation, product quality and profitability (Locke, 2013; Görg *et al*. 2018).

A large number of studies have been conducted on CSR practices in developed countries; however, few have been carried out in respect of developing countries, particularly in Bangladesh (Adams *et al*., 1998; Azim *et al*., 2009; Rahman Belal, 2001). Momin (2006) examined the corporate social reporting (CSR) of large enterprises and the subsidiaries of the multinationals in Bangladesh, and found MNEs do not mention anything specific about the subsidiaries' CSR activities in Bangladesh or their CSR disclosure to the parent countries. The study also compares the reporting style of the MNE's subsidiaries and selected domestic companies, and did not find any substantial differences between them. However, the average volume of reporting is slightly higher in the MNE's subsidiaries. Instead of following and

promoting the parent country's higher standard, the subsidiaries of the multinationals operating in Bangladesh disclose their environmental and social reporting at the standard of local companies. The study also notes that subsidiaries do not report anything related to opportunity, environmental audit, and environmental policy as their parent company does in the home country.

In another study, Moyeen and Huq (2010) examined the CSR activities of selected MNEs operating in Bangladesh and how the activities are aligned with their global commitment of lifting social and environmental standards in developing countries. The study observed that a good number of CSR programmes were either initiated or often operated by the parent company to fulfil their global commitments. However, the study claimed that CSR activities of MNEs in Bangladesh are somewhat piecemeal and do not focus on sustainability outcomes.

Masud *et al*. (2013) also conducted a study on the CSR activities of a multinational company named Hop Lun (BD) Limited (fully Swedish-owned apparel company) located in the Dhaka EPZ. The study found that the company operated its CSR on a limited scale. The issue of moral obligation did not appear in most of the company's CSR activities. The social responsibilities were performed only to satisfy employees and buyers. The company is only treating employees, shareholders, and government as stakeholders, while the broader community (the political, environmental and social bodies and organisations and systems) are not considered or included in the CSR activities of the company. However, minimum wage, work health safety and workers welfare issues are properly maintained by the company. Thus, MNEs in Bangladesh have taken some CSR initiatives to retain their brand image in the global market, but they are mostly limited to employee's welfare. MNEs should extend their CSR practice in other social and environmental areas, such as investment on ecological and environmentally friendly technology, diffusion of technology, better corporate governance and poverty alleviation.

More importantly, although the foreign-owned firms and their subsidiaries maintained relatively improved working conditions and higher CSR, in many cases, the subcontracting local firms performed very poorly. The regular monitoring and supervision of the subcontracting firms could improve the situation. In principle, CSR is a voluntary activity adopted by the companies and is highly localised; however, the government should develop a mechanism to monitor CSR adoption and performance of MNEs, as well as locally owned companies. The government can also provide directions and specify priorities for CSR practice to achieve sustainable development agendas in a coordinated way.

6.6 Conclusions

The growth of the FDI dominated export-led manufacturing sector, especially the textiles and readymade garments industry, has been the driving force to sustain GDP growth in Bangladesh over the last three decades. The manufacturing sector also makes a positive contribution to employment generation. There has also been a gradual improvement in the poverty situation, both in terms of the poverty gap and severity of the poverty, in Bangladesh. The growth in the labour-intensive readymade garments sector contributes significantly to the improvement in poverty in Bangladesh (GoB, 2015a ; UNDP, 2018); however, the low wage level and poor working conditions in the FDI-backed manufacturing sectors create significant challenges regarding the contribution of FDI inflows towards sustainable development in Bangladesh.

The descriptive analysis reveals that the unequal distribution of income throughout the global value chain of the RMG products, intense competition among the subcontracting firms. The fear of losing contracts, the weak bargaining power of the suppliers, the limited corporate social responsibilities of the companies, weak linkages of MNEs with the subcontracting firms, narrow profit margins of the suppliers, and wage flexibility due to high unemployment, are the major causes for the poor wage levels and working conditions in the RMG industry in Bangladesh. The government has the central responsibility for monitoring labour rights in the country; however, MNEs can play an important role in this area by implementing their home country's codes of conduct and strengthening the supervision of their subsidiaries, as well as subcontracting local firms

Income inequality in Bangladesh is deteriorating, but FDI is not the cause. The empirical analysis shows that in the long-run, FDI inflows are not creating a negative impact on the income distribution of the country. In contrast, FDI exerts a positive contribution to income distribution. The findings of the empirical analysis also proves the existence of a Kuznets curve relationship in Bangladesh. Per capita GDP growth initially increases income inequality. Thus, the benefit of growth is not distributing equally; however, at the later stages of development, this impact will fade out, and GDP will create a positive contribution to income distribution in Bangladesh. The time period to reach the later stage of development is uncertain. Further, growth at the expense of equity and justice is not acceptable, and it contradicts the aims of sustainable development. While FDI is generally positive, the government should be cautious in adopting growth and export-promoting strategies in Bangladesh.

CHAPTER 7: FDI, SUSTAINABILITY AND POLICY MOVING FORWARD

7.1 Introduction

In this study, I investigate the impact of manufacturing FDI inflows on sustainable development in Bangladesh. The concept of sustainability or sustainable development is a multidimensional, interrelated and interdependent concept. The impact of FDI inflows on sustainable development has a similar level of complexity. Based on the three dimensions of sustainable development and considering the complexity of the topic, I have broken down the analysis into three parts: the impacts of FDI inflows on economic sustainability; the impacts of FDI inflows on environmental sustainability; and the impacts of FDI inflows on social sustainability. However, given that the three dimensions of sustainable development are interrelated, I synthesise the findings of the analysis of each dimension to get an integrated picture of the impacts of FDI inflows on sustainable development in Bangladesh. Further, I provide policy suggestions to unlock the potential for FDI inflows in achieving sustainable development.

7.2 FDI and sustainable development in Bangladesh: key contributions, potentialities, and challenges

FDI inflows have the potential to generate both positive and negative impacts on all three dimensions of sustainable development, and it is not possible to isolate the impact of FDI inflows on one dimension without considering others. Therefore, a combined, integrated approach of analysis is indispensable for assessing the impact of FDI inflows on sustainable development.

Moreover, appropriate policy strategies are essential to drive the FDI inflows towards sustainable development and maximise its positive potentialities, and minimise its adverse effects. Any government policies should consider wider, integrated dimensions of sustainable development and connect the economy, environment, and society. To develop an integrated framework, Table 7.1 summarises the main findings of the thesis in the context of the major

channels for FDI inflows to contribute to sustainable development in Bangladesh, the potentialities yet to be realised, and the major challenges in realising the potentialities of FDI inflows. This is an integrated approach in the sense that some of the realisations in the economic dimension can be discussed as lacking in their potential to also achieve environmental and social objectives and vice versa. For example, in the economic dimension, FDI may create structural change but there is potential for FDI to create a green-technology driven structural change (see row 3 of Table 7.1).

Table 7.1: Major channels, key contributions, potentialities and challenges of FDI inflows for promoting sustainable development in Bangladesh

Major channels for FDI inflows to contribute to sustainable development	Key contributions	Potentialities yet to be realised	Challenges or concerns in realising the potentialities
By enhancing domestic production base	- FDI inflows are supplying external capital; therefore, directly contributing to enhancing the production base of the country. - The trend analysis presented in Section 4.5.2 shows that the gross fixed capital formation has been increased along with the increased flow of FDI inflows in Bangladesh. The related statistics also indicate that FDI inflows help to expand backward linkages in the country. Therefore, through 'crowding in' effects, FDI inflows are helping indirectly to enhance the production base of the country (Section 4.5.2).	- By diffusing advanced technology and undertaking skill development activities, FDI inflows can contribute to increasing productivity which can indirectly help to promote the production base (Blomstrom *et al*., 1992; Colen *et al*., 2008; Ford *et al*., 2008; Herzer, 2012). - However, the related statistics, indicators and indexes show that technology diffusion due to FDI inflows in Bangladesh is very low and FDI inflows fail to contribute much to productivity gains (Section 4.5.3).	- Low-tech and insufficient inflows of FDI restrict spillover effects in technology diffusion by FDI inflows. - Low absorptive capacity (poor physical infrastructure, low level of technology readiness and low level of industrialisation) are the main obstacles in attracting well-branded, high-tech FDI inflows in Bangladesh, which limits the productivity spillover effects. - The limited role of MNEs in research and training activities is also limiting the prospects of diffusing advanced technology and building absorptive capacity through FDI inflows.
By promoting sustainable structural transformation and inclusive economic growth	- The empirical analysis conducted in Section 4.6 reveals that FDI inflows have a positive contribution to manufacturing value-added. - The share of the manufacturing sector in GDP and exports has increased with the increased flow of FDI inflows (Section 4.5.1). Therefore, FDI inflows are contributing to the structural transformation of the country.	- Sustainable structural transformation requires expansion of green or environmentally-friendly industries. The industrialisation also should be diverse for its own sustainability. If the FDI inflows are channelled to various environmental industries,this will drive the structural transformation towards sustainable development. However, it is not the case for FDI inflows in Bangladesh.	- The FDI inflows and industrialisation in Bangladesh is not diverse and inclusive. High concentrations on one industry (textiles and readymade garments) and the textiles industries are a big threat to water resources in Bangladesh (Section 5.4). - The proportion of small and medium sized enterprises has fallen and the industrial sector fails to absorb the employment displaced from agriculture (BBS, 2012; BBS, 2013).
By generating decent employment and reducing income inequality	- FDI inflows in the labour-intensive sector and its 'crowding in' effects are contributing to employment generation directly and indirectly in Bangladesh (Section 6.3.1). - Foreign firms are paying higher wages, and providing better facilities to their employees compared with the local firms in Bangladesh (Section 6.3.3). - The finding of the empirical analysis implies that FDI inflows are helping to reduce income inequalities in Bangladesh (Section 6.4).	- FDI should increase local wage levels in those industries affected by FDI which leads to wage spillover effects. However, the prevalence of low wages in the FDI dominating industries indicates that wage spillover effects do not occur in Bangladesh (Section 6.3.3). - Even though FDI inflow is contributing to reducing income inequality by being directed at the low–skilled, labour-intensive sector, it fails to contribute sufficiently to improve the	- High unemployment and wage flexibility restricts the promotion of decent wages and employment in the country. People cannot tolerate being unemployed for a long period of time. The investors (local investors in particular) are taking advantage of this and paying poor wages the low-skilled workforce sector. - The low level of linkages with local subcontracting firms and low monitoring and supervision regarding the working conditions of subcontracting firms restricts the promotion of decent working conditions through FDI inflows in Bangladesh. The subsidiaries of MNEs often subcontract to

Major channels for FDI inflows to contribute to sustainable development	Key contributions	Potentialities yet to be realised	Challenges or concerns in realising the potentialities
	- The existence of the Kuznets hypothesis indicates that the current economic growth is not inclusive and is increasing income inequality in the country. However, in the later phase of development, economic growth will help to reduce income inequality in the country (Section 6.4).	minimum wage level of the country (Section 6.3.3).	the local industries, and there is a lack of supervision or monitoring over the environmental and working conditions of these subcontracting companies by MNEs or their subsidiaries . MNEs are only concerned with the quality of the products (Yasmin, 2014). - Limited CSR activities are also responsible for the low contribution of FDI inflows in fostering decent work and reducing income inequality in Bangladesh (Section 6.5). - Lobbying by local producers in regards to the avoidance of proper wage and labour rights is also responsible for poor wage levels in the country (Reuters, 2013). - Unfair competition among the local subcontracting firms is a major challenge for promoting decent wage levels and working conditions in Bangladesh (Section 6.3.3). - The existence of the Kuznets hypothesis of income inequality indicates that at later phase of development income inequality will reduce. However, the later phase might never arise.
By promoting efficient resource management	- The evidence indicates that manufacturing FDI inflows in Bangladesh are not contributing to the promotion of efficient resource management in Bangladesh (Chapter 5). - FDI inflows have a negative significant long-run relationship with renewable energy consumption, and improved resource management technology is not diffusing from FDI inflows in Bangladesh (Section 5.5.1).	- MNEs have the competitive advantages that arise from economies of scale, greater access and experience in the adoption of efficient resource management techniques (Adams, 1997; Gentry, 1998; Zarsky, 2005). - The country is abundant with renewable energy sources like solar, wind and biogas. Therefore, it has a great potential for investments in renewable energy. However, these potentialities are not realised in Bangladesh (Section 5.5.1).	- The comparative cost advantage of using traditional technology and non-renewable energy sources discourages industries from using renewable energy. The cost of energy sourced from the state power supply system and establishing a power plant based on traditional sources is comparatively cheaper than establishing a power plant based on renewable energy sources in Bangladesh (IFC, 2012). - Low level of recycling in consumption and production reduces the potential for a circular economy. - Lack of policies and awareness about sustainable resource management. - Poor quality FDI inflows in the low-tech, low-value adding industries. - Lack of appropriate regulations for promoting renewable energy consumption. - Lack of incentives in investing in renewable energy sectors (Halder *et al.*, 2015; IFC, 2012).

Major channels for FDI inflows to contribute to sustainable development	Key contributions	Potentialities yet to be realised	Challenges or concerns in realising the potentialities
By promoting pollution control technology	- The overall contribution of multinationals in promoting pollution control technology is not satisfactory in Bangladesh (Chapter 5). However, in the case of CO_2 emission, the result of the empirical study reveals that FDI inflows do not exert a significant positive impact on CO_2 emission in Bangladesh. - The existence of EKC relationship for CO_2 emission in Bangladesh demonstrates that the current growth-promoting activities are adversely impacting environmental conditions but there is a potentiality to improve the environmental conditions in long run (Section 5.5.2).	- MNEs usually have a higher capacity to access and implement pollution control technology, than local industries, due to their economies of scale. - MNEs have more experience of using better pollution control systems, as they are usually from developed countries and need to meet the higher level of environmental compliances practised in the parent country.	- The share of FDI in the dirtiest (polluting) industries is very high, particularly in the water polluting sector (Section 5.4). Therefore, even though FDI inflows are not contributing to CO_2 emission significantly, it is a threat to other types of pollutions. - Instead of adopting higher environmental and pollution control standards, MNEs are adopting local standards. Therefore, the use of advanced technology in pollution control is limited (Belal *et al*., 2015; Jamali, 2010). - Low stringency of environmental regulations in the country and the low technology diffusion by FDI inflows also restricts the promotion of pollution control technology through FDI inflows (Table 5.10 and Figure 5.1). - The low penalty levels in Bangladesh for pollution also discourages the adoption of pollution control measures in the production process (Section 5.6).
By promoting good governance and management system	- The limited CSR practices of multinationals indicates that FDI inflows in Bangladesh are not contributing to improving the governance and management systems (Belal *et al*., 2015).	- MNEs have soft power to create pressure to bring transparency in the overall governance and administrative system (Zarsky, 2005). - By adopting high-quality environmental and risk management systems MNEs can promote these practices in local industries (Gentry, 1998).	- MNEs are reluctant to be involved in improving the domestic governance system (Section 6.5). - The environmental and human resource management standards in the country are poor and MNEs follow these poor practices rather than the higher standards in their home country (Section 6.5). - Poor enforcement of law and regulations and low levels of CSR practised by the local and foreign firms also hinders the potential for promoting good governance and management systems through FDI inflows.

Table 7.1 demonstrates that FDI inflows have the potential to contribute to sustainable development in the host economy. However, the main aims of promoting FDI inflows, such as the transference and diffusion of advanced technology, increased productivity and efficiency, the fostering of environmentally friendly technology, and the practising of improved CSR activities, are not realised in Bangladesh. Table 7.1 also identifies challenges and concerns in realising the potentialities of FDI inflows towards sustainable development. Appropriate government policy decisions can help to overcome the challenges and unlock the potentials of FDI inflows towards achieving sustainable development conditions. Section 7.3 provides policy recommendations to drive FDI inflows towards sustainable development in Bangladesh.

7.3 Policy directions

Sustainable development requires specific and deliberate policy interventions and an effective regulatory system. The theoretical and empirical evidence outlined in Chapter 3 demonstrates that while FDI inflows have potentiality, they are not a miracle solution in the advancement of sustainable development. To reap the potential benefits of FDI inflows requires favourable conditions in the host economy, such as a certain level of economic, human and technical development, the appropriate policy settings and a strong institutional and regulatory environment. The realisation of the positive contribution of FDI inflows in promoting sustainable development also depends on mobilising the right kind of FDI inflows in the country.

The challenges identified in Table 7.1 towards realising the positive benefits of FDI inflows in the advancement of sustainable development in Bangladesh are mostly associated with attracting good quality FDI inflows, the capabilities of the country to reap the spillover benefits of FDI inflows and the governing and regulation of FDI inflows for sustainable development. The adoption and implementation of proper initiatives and policy strategies can minimise the adverse effects, and maximise the benefits of FDI inflows. Based on the findings of this study and earlier literature on sustainable development and FDI inflows, policy suggestions are provided below to steer FDI inflows towards sustainable development in Bangladesh.

7.3.1 Policy suggestions in regards to attracting FDI inflows

Limitations in the quantity and quality of FDI inflows is a challenge for creating sufficient spillover effects through FDI inflows in Bangladesh. The amount of FDI inflows in Bangladesh is very low, and the quality of FDI inflows is also poor and concentrated in a few low value-

adding, labour-intensive industries (see Section 4.4.2). The country must build a conducive business climate, particularly regarding the development of infrastructure facilities, to encourage good quality investment in the country.

A well-developed investment climate, particularly physical infrastructure facilities, is vital for attracting good quality FDI (UNCTAD, 2008). Infrastructure facilities (such as good transportation, port facilities, telecommunication and networking, internet facilities, water supply, electrical systems) provide basic structural arrangements for production and marketing products and reducing the cost of business (Wheeler and Mody, 1992). In Bangladesh, poor infrastructure facilities, particularly the shortage of energy supply, absence of a modern, deep seaport, and congested roads with high traffic, are major impediments to attract good quality investment (UNCTAD, 2013).

However, the poor infrastructure facilities also offers an opportunity for channelling FDI into this sector. Bangladesh should encourage foreign investment in physical infrastructure, such as the construction of highways, bridges, railway networks, power plants and upgrading the port facilities. Developed infrastructure not only encourages foreign investment, but it also stimulates local investment in other sectors and industries. However, a lot of preliminary work has to be done for this to occur. The initial return from the investment of this sector is low. Moreover, high externalities and technical and legal complexities, such as land acquisition, are associated with these types of investment (OECD, 2015). The government can promote FDI inflows in infrastructure development projects through public-private-partnerships. The long-term return on investment in infrastructure projects is high, and it is beneficial for long-run sustainable development due to the high spillover effects to other sectors (UNCTAD, 2014).

Infrastructure development is crucial for promoting FDI inflows, but it requires a long lead-time. Therefore, along with overall infrastructure development, to attract high value-adding FDI inflows, the country should focus on building Special Economic Zones; Export Processing Zones; industrial parks and technology parks. These are becoming popular and successful globally for attracting targeted FDI inflows, employment and export diversification. Zeng (2010) estimates that Special Economic Zones and industrial parks contributed to attracting nearly half of the FDI inflows in China. Export Processing Zones have also become successful in export diversification and economic growth in Mauritius, Malaysia and Sri Lanka (Johansson and Nilsson, 1997).

The statistical evidence provided in Chapter 4 indicates that Bangladesh is far behind in terms of innovation and technological progress. The initiatives of high-tech and industrial parks could help in improving and expanding technologically advanced, high value-adding industries. Lall (2000) found that Special Economic Zones played a vital role in industrial and technological transformation in Taiwan, Malaysia, South Korea, and the Philippines.

Recognising the lack of basic infrastructure, and to create a conducive investment climate for attracting specialised high-tech industries, the government has already taken initiatives to establish Special Economic Zones and high-tech parks. Special Economic Zones create facilities for encouraging investment in high technology and knowledge-based industries in the country. The government should continue this initiative and build more Specialized Economic Zones and technology parks in different parts of the country. Skill development activities are also required for ensuring an adequate supply of sufficient labourers for the specialised industries.

Further, the renewable energy sector could be a promising sector for sustainable FDI inflows in Bangladesh. The discussion of Section 5.5.1.7 reveals that Bangladesh is suffering from energy shortages. The energy crisis is one of the main impediments for both local and foreign investment in the industrial sector in Bangladesh (IFC, 2012). Presently, electricity and natural gas are the main sources of energy in Bangladesh. Electricity is generated mostly from natural gas; however, the reserves of natural gas are gradually decreasing. Bangladesh has a natural geographical advantage and potential to utilise renewable energy sources, particularly solar energy.

The empirical evidence in Chapter 5 shows that current FDI inflows in Bangladesh are not helping to promote renewable energy. Relatively high costs of establishing a captive power plant from renewable energy sources, compared with the establishment of a power plant from subsidised traditional energy sources (IFC, 2012), lack of technological knowledge in renewable energy production, insufficient research and laboratory facilities, and the lack of proper incentives are the main challenges in promoting renewable energy use in Bangladesh. Bangladesh can encourage FDI inflows in the renewable energy sector by providing financial incentives.

Bangladesh also needs to continue its initiatives for attracting labour-intensive FDI inflows to generate employment for the huge and growing unemployed labour force. However, the majority of the labour-intensive manufacturing FDI inflows are concentrated in the polluting industries; the textiles industry is a particular concern as it is the major cause of water pollution in rivers and waterways in Bangladesh (see Chapter 5). Given that the readymade garment and textiles industry is saturated, Bangladesh should discourage FDI inflows in the textiles industry. In contrast, Bangladesh should take initiatives to encourage FDI in other industries which have the potential for large scale employment generation such as food processing, automobiles, and electronic goods, which are relatively less polluting.

7.3.2 Policy suggestions in regards to strengthening domestic absorptive capabilities

Strengthening absorptive capabilities is an essential condition to reap the benefits of spillover effects of FDI inflows. There is a strong interlinkage between domestic technological capability, technology transfer, and investment inflows (Blomström and Kokko, 2003; Borensztein *et al.*, 1998). The acceleration of advanced technology diffusion is the most desirable and important channel for FDI inflows to effectively contribute to the sustainable development efforts of a country. FDI provides a package for technology diffusion by combining technical know-how, equipment, management, market access and other skills. However, only good quality and high value-adding FDI inflows can generate a high level of technological diffusion.

The composition of FDI inflows in Bangladesh demonstrates that the country fails to attract high-quality manufacturing FDI inflows and, as such, technological diffusion is very low (see Figure 5.1). Higher quality FDI cannot be attracted if the local economy is not able to offer a high level of complementary skills and technological efforts. High-tech technology requires a next-generation, dynamic, efficient workforce who are equipped with advanced knowledge and have the ability to adapt quickly with the dynamic globalised market (Lall, 1993). Quality education with technical expertise can assist in providing this dynamic workforce.

As a developing country, Bangladesh has a lack of technical graduates and facilities for skill development, such as training centres, laboratories, and technical institutions. FDI can indirectly help to build up this capacity through the demonstration of new technological processes. However, foreign investors cannot themselves create a skilled workforce (Lall, 1993). Therefore, the Bangladesh government should focus on human capacity building

activities, such as the expansion of technical education, establishing technical institutions, and building training and research centres.

In addition to the skilled workforce, other complementary institutional facilities, such as standard laboratories, research centres and support institutions is required to attract sophisticated high-tech FDI. Moreover, for efficient utilisation of transferred technology and further improvement of the technology, the host country must have a certain level of technological readiness: the cost of absorbing and deploying new technology will be higher if local technological capabilities are weak.

The careful selection of desirable projects for investment, and identifying the associated adverse impact, is necessary for sustainability. Projects or investment, which have high potential to generate more economic, environmental and social benefits and can minimise the adverse effects, require expertise in project assessment and selection. The quality of the project appraisal, including the environmental impact assessment, is very low in Bangladesh (see Section 5.6). In most cases, the feasibility study for projects, and the environmental impact assessment, is conducted only to meet the basic requirements of the approval process. The implementation of the feasibility study and compliance with the directions given in the environmental impact assessment is poor (Haque, 2017) Therefore, necessary training and skill-building initiatives to strengthen the project appraisal capacity of the related agencies, as well as the proper enforcement of the compliances, is urgently needed to drive projects and investment towards sustainable development.

7.3.3 Policy suggestions in regards to governance, institutional and regulatory mechanisms for FDI inflows

Good governance is a key prerequisite for achieving sustainability. As business is profit-driven, a strong and efficient regulatory and governance system is needed to drive activities towards projects that also enhance social and environmental goals. Unfortunately, a poor governance system is a challenge for Bangladesh (UNCTAD, 2013; UNIDO, 2018a). To promote justice, the governance system should be transparent, accountable and free of corruption. Corruption and administrative inefficiency generate extra expense in business operations and cause a decline in the profitability of the investment. The presence of high corruption and weak institutional capacity gives some companies the opportunity to exploit Bangladesh's natural and human resources. Sustainable development is also a very complex and transformative concept;

therefore, the governing system should also be dynamic and adaptive and engage all stakeholders.

Proper enforcement of regulations and laws is the precondition of good governance. The stringency of environmental protection laws and their enforcement is very low in Bangladesh (World Bank, 2018b). Environmental pollution and destruction are increasing at an alarming rate due to unsustainable activities (see Chapter 5). In most cases, penalties are very low compared with the gravity of the offence, and also compared with the cost of compliance measures. The capacity of the regulatory authority to inspect, monitor and enforce environmental rules and regulations is also very poor, in terms of manpower, technical expertise and facilities (see Section 5.6).

The presence of high-level corruption and unlawful influence also limits the enforcement of environmental laws and regulations in the country. Therefore, to protect the destruction of the environment from industrial activities, the government needs to undertake necessary initiatives for increasing the size of the penalties for violating environmental regulations; ensuring proper and regular monitoring, inspection and enforcement of environmental regulations; strengthening the capacity of the regulatory agency; and addressing corruption.

Fixing a decent minimum wage level for all sectors and the proper enforcement of labour rights are critical to establish justice and protect the labour force from exploitation, as required by the equality and justice aspects of sustainable development. Therefore, along with employment creation and income generation, protection for the basic rights of workers is vital. Bangladesh does not have a minimum wage for most sectors. After some recent crises, the government fixed a minimum wage for the readymade garments industry; however, it is still very low compared with the real wages of other south Asian countries (Figure 6.5). This study also shows that industrial working conditions are very poor and other labour rights are badly violated in Bangladesh (see Section 6.3.3). Although wages in foreign firms and working conditions are more favourable than local firms, minimum wage laws are needed for all sectors as well as strictly enforced labour rights to establish justice and equality.

In addition to formal governance, an informal oversight system is also helpful and effective for the promotion of sustainable development. Sustainable development requires a holistic multi-stakeholder approach where governments, the business community, international agencies, civil societies, NGOs, and the community are all involved. For example, when the community itself

practices sustainable consumption it not only helps to reduce waste and natural resource use, but it can also force investors and the business community to adopt sustainable production and marketing. Civil society and NGOs can also play a complementary role in building sustainability awareness (White, 1999), as they can undertake the monitoring and oversight role of the government in promoting a sustainable business practice. Newell (2001) notes that 'civil regulations' can play an important role in increasing environmental disclosure by companies, compliance with the codes of business, and reduced adverse environmental impacts of the business. The author also says that the increasing importance of some NGOs (such as ‘Corporate Watch' and ‘Oil Watch') has made impacts on the environmental and social performances of multinational enterprises.

7.4 Conclusion

The chapter synthesises the findings of the impacts of manufacturing FDI inflows on economic, environmental and social sustainability in Bangladesh, described in Chapters 4, 5 and 6, respectively, to get a complete picture of the impact of FDI inflows on overall sustainable development in Bangladesh. The findings indicate that in terms of economic and social sustainability, FDI inflows are generally positive. FDI inflows are contributing positively to economic growth, structural transformation, export earning, employment creation and poverty reduction, through both direct and indirect effects. However, the spillover effects of FDI inflows, particularly in technological advancement and innovation is not realised in Bangladesh. This is crucial in order to drive economic development towards sustainable development.

In terms of environmental sustainability, the impact of FDI inflows is not positive; rather it is negative and destructive, particularly of water resources in Bangladesh. In this chapter, I also identify the challenges of realising the positive benefits of FDI inflows for sustainable development including: the limited and low value-adding FDI inflows; poor governance and weak institutional systems, poor infrastructure and business facilities, weak domestic absorbing capacity and technological readiness; and poor corporate attitudes. A set of policy suggestions is also offered to overcome the challenges and drive the FDI inflows towards sustainable development.

CHAPTER 8: CONCLUSIONS

8.1 Introduction

This chapter provides an overview of the study, limitations of the study and directions for future research. The overarching Research Question explored in this study is whether manufacturing FDI inflows are assisting or hindering sustainable development in Bangladesh. Considering the complexity and multidimensional issues of the topic, the main Research Question has been broken down into three Research Questions, each of which is based on the three dimensions of sustainable development. Research Question One asks whether manufacturing FDI inflows are contributing to economic sustainability in Bangladesh. Research Question Two asks whether manufacturing FDI inflows are contributing to environmental sustainability in Bangladesh and Research Question Three asks whether manufacturing FDI inflows are contributing to social sustainability in Bangladesh.

The following section of this chapter 8.2 provides an overview of the earlier chapters with key findings. Subsequently, Section 8.3 outlines the theoretical contributions and policy implications of the study. Finally, section 8.4 discusses the limitations of the study and suggests future research directions.

8.2 Review and summary of the key findings

This study was a comprehensive analysis of the effects of manufacturing FDI inflows on sustainable development in Bangladesh. The chapters are designed and developed to explore and analyse the research topic and related research questions.

The first chapter introduces the thesis topic and provides a background and motivation to explore the research questions. Since the 1990s, Bangladesh has undergone large-scale environmental degradation, including a sharp increase in the level of pollution, depletion of natural resources, and loss of biodiversity. Along with large-scale climate change, the world faces social challenges, such as the growing patterns of inequality, poverty and hunger. Therefore, traditional development thinking has been shifting toward sustainable development.

Sustainable development places environmental protection and social improvement on the same footing as economic development. The United Nations declared Agenda 2030 in September 2015, whereby 17 Sustainable Development Goals (SDGs) were adopted to be achieved by 2030. All of the signatory nations are committed to achieving the SDGs; however, a huge investment is required to do so. Developing countries are already suffering from insufficient resources to achieve their own development agendas; therefore, implementing SDGs would only be an extra burden.

Considering resource limitations, the UNCTAD (the main UN body dealing with trade, investment and development issues) is continuously advocating channelling more FDI inflows to developing countries, particularly in the SDG sectors. FDI inflows not only supply capital to the capital scare countries, but they are also the primary vehicle of supplying advanced technology and management systems from developed to developing countries.

However, FDI inflows can have dramatically different impacts – both positive and negative – on the three basic pillars of sustainable development. The impacts of FDI inflows depend on the type of FDI, the sector where it is channelling, the role of multinational enterprises and the absorptive capacity of the host country. The formulation and implementation of appropriate policies are indispensable for realising the benefits of FDI inflows and driving it towards sustainable development. Therefore, comprehensive case studies are needed to analyse the impact of FDI inflows towards achieving the sustainable development goals of different countries.

There has been a rising trend of FDI inflows in both developed and developing countries since the 1980s. Bangladesh, in particular, has a strong commitment to achieve the SDGs targets. Considering the low resource and technological base, high demand for creating employment for the growing labour force, and urgent need to improve the quality of the product and production processes, the government of Bangladesh is trying to attract more FDI inflows to the export-oriented manufacturing sector, in particular. As a result, FDI inflows have been increasing in Bangladesh, and the manufacturing sector holds the major share (particularly the readymade and textiles industry). With this knowledge, in this study, I conducted a comprehensive analysis to explore if FDI inflows in the export-oriented manufacturing sector are assisting or hindering the achievement of sustainable development targets in Bangladesh.

Chapter 2 describes the two central concepts of the topic, sustainable development and foreign direct investment (FDI) inflows. Sustainable development is a multidimensional, intergenerational, interdependent and holistic concept. The concept evolved through a series of international agreements, conferences, meetings and reports (from Stockholm Conference 1972 to, most recently, Agenda 2030). The central spirit of sustainable development is to ensure intergenerational equity of development efforts, which sufficiently protect the environment and establish justice for all communities and generations. Sustainable development has three basic dimensions: economy, environment, and society. The concept of sustainability also focuses on the intergenerational equity of preserving and using capital stock (natural capital stock, physical capital stock and social capital stock). Based on the assumption of substitutability between natural capital stock and physical capital stock, the proponents of sustainability principles are divided into two principles: weak and strong sustainability. Weak sustainability assumes a perfect elasticity of substitution among physical and natural capital stock. On the other hand, considering the characteristic of the irreversibility of natural capital stock and its importance for the existence of life, the strong sustainability proponents oppose the substitutability between the physical capital and natural capital stock. More recently, the social values or social capital stock, has also been included in the concept of sustainability, acknowledging the heterogeneity of social structure, needs, values and capabilities in society.

Foreign Direct Investment (FDI) is a long-run investment channelled usually by multinational companies and enterprises, and investors have a degree of control over the business. FDI inflows are classified in different categories and types based on the motive, nature of the investment and supply chain of the production process. Dunning and Lundan (2008) classified FDI into four categories, based on the investment motives of companies: market seeking; resource seeking; efficiency-seeking; and strategic asset or capability seeking.

Based on the supply chain of the production process, FDI inflows are also classified as being horizontal or vertical FDI. Developing countries are offering various incentives and undertaking reform initiatives to attract FDI inflows as they are considered an important catalyst for rapid economic growth and technological transformation. These countries compete with each other; however, there are various determining factors that contribute to attracting FDI in a particular country. Some factors are related to the internal issues of firms/investors and explain why a firm will invest abroad, such as cost reduction and economies of scale. Some factors are related to the host country's situation, such as resource availability, market size, and the business environment.

Global leaders and policymakers are encouraging FDI as a channel for promoting sustainable development in developing countries; however, there is no clear theory that can explain the impact of FDI on sustainability or sustainable development. Both the weak and strong sustainability theories are based on the conditions of non-declining capital stock over the respective time period. FDI supplies physical capital to the capital-scarce country. With its spill-over effect, it can increase the stock of human capital through training, research, and innovation, which can then contribute to achieving the necessary conditions for weak sustainability.

Through its contribution to technological advancement, FDI can even help to retain or protect the natural resource stock by introducing and promoting energy savings and waste reduction technology to the host country. On the other hand, the presence and activities of FDI inflows may increase competition between companies, which may force the domestic firms to leave the industry; this results in a decline of the productive base of the host country. Therefore, FDI inflows have the potential to contribute to achieve the necessary conditions of sustainable development; however, this depends on the type, sector of FDI, institutional mechanism and absorptive capacity of the country.

Chapter 3 reviews the theoretical and empirical literature on FDI inflows and the way in which FDI inflows interact with the three basic pillars of sustainable development. This chapter provides the foundation for developing the three Research Questions and the analytical approach in the thesis. The economic, social and environmental dimensions of sustainable development each include a large number of issues. FDI inflows can generate both positive and negative consequences to most of the elements of all three dimensions of sustainable development through its direct and indirect (spillover) effects.

The economic dimension of sustainable development not only includes economic growth, but also includes expansion of the productive capacity base (physical capital and human capital), and innovation and technological development. In theory, both neoclassical and endogenous growth models endorse the role of FDI inflows in economic growth as it supplies capital (direct channel) and diffuses technological advancement (indirect channel) to developing countries. The literature is more focused on the indirect or spillover effects of FDI inflows than the direct effects. FDI inflows can diffuse advanced, efficient technology and management systems to the host economy through the following: demonstration effects (learning by doing); competition effects (increasing competition forces domestic firms to adopt new technology); linkage effects (establishing linkages with domestic firms promotes new technology); labour turnover effects

(moving labour from foreign-owned firms to local firms); and human capital accumulation effects (providing training and research activities).

On the other hand, FDI inflows may also generate negative spillover effects in the host country. In the case of FDI contributing to learning by doing, the technology might be too advanced to be acquired by other firms in the host economy. For competition effects, foreign firms may 'crowd-out' domestic investment. In the case of labour turnover, the skilled workforce of local firms might move to foreign firms for higher wages. Foreign firms might not create sufficient linkages with the domestic firms by sourcing materials and inputs from overseas. Therefore, the net effects on the economy will be negative instead of positive. Further, the benefits of FDI on growth will not come automatically, but depends on the absorption capacity of the host country. The empirical literature about the impact of FDI inflows on the host economy also provides inconclusive results; the results vary by country, nature, and mode of FDI inflows.

The environmental dimension concerns the ecological balance of development, which includes emission of pollutants, natural resource depletion, use of renewable energy, energy efficiency, biodiversity and climate change. The pollution haven hypothesis and pollution halo hypothesis generate debate about the effects of FDI inflows on the host country's environmental conditions. The pollution halo hypothesis supports the notion that foreign firms engaging in FDI usually have advantages over local firms in the host markets, which includes greater access to state-of-the-art technologies, the development of new products and new processes of production. Modern, sophisticated technology brings resource efficiency and reduces industrial waste and pollution in the production process. Multinational firms usually also need to meet higher standard operational and management compliances. They not only follow the host country's environmental standard but also need to comply with their parent country's higher environmental standards. Therefore, the presence of FDI inflows may help to improve the environmental conditions and reduce the pollution level in the host country.

On the other hand, the pollution haven hypothesis postulates that the status of the enforcement of environmental regulations is found to be low in developing countries, compared with developed economies. Hence, MNEs prefer to shift the polluting industries to the developing countries to lower the costs and penalties related to environmental compliance. As a result, the environmental situation worsens in developing countries due to the activities of FDI.

FDI inflows have the potential to generate economic growth; therefore, the relationship between FDI inflows and the environment is also linked to the Environmental Kuznets Curve (EKC) hypothesis. The EKC hypothesis argues that with the increase of per capita income, the environmental situation worsens, but when a country reaches a certain income level, environmental quality starts to improve. At low income levels, the adverse 'scale effect' of FDI inflows seems to be more prominent, which leads to increasing pollution levels as indicated by the upward rising part of the EKC. After reaching a certain level of development, the composition effects and technique effects (by adopting advanced, efficient technology) play a more dominant role than the scale effects, and pollution levels start to decline with the increasing per capita income and contribute to the inverted U-shaped EKC relationship in the host country.

The empirical literature explores the validation of the pollution haven, pollution halo and EKC hypothesis; however, the results of the empirical studies are inconclusive. Some studies found evidence of the pollution haven hypothesis, and some studies found evidence of pollution halo hypothesis; others reject the EKC relationship for FDI, and some support the EKC relationship. depend on the performance of the MNEs, the host country's environmental policies, regulations and their enforcement, types of FDI inflows and technology used by the MNEs.

In regards to the social dimension of sustainable development, social equality is the primary goal and people and their quality of life the main concern. In the literature, the impacts of FDI inflows on the social dimension mostly focus on the impact of FDI inflows on employment generation, poverty reduction and income inequality. FDI creates new employment opportunities through direct investments and generates jobs indirectly through expanding or stimulating domestic investment through its backward and forward linkage effects. FDI might not create any direct impact on poverty reduction in the host country, but it can indirectly contribute to poverty reduction through the following channels: the systematic channel of FDI-growth-poverty reduction; the redistribution of revenue income channel; and the enterprise's channel, or through CSR activities. In the case of income inequality, it is argued that if FDI is channelled to the labour-intensive sector, it creates employment and increases the demand for low-skilled labour, thus leading to increased wage levels and a reduction in income inequality.

In addition, as per the Kuznets inverted-U curve hypothesis, if FDI induces growth, then the presence of FDI may contribute to raising the income inequality of the host country; but FDI can later help to reduce income inequality. However, the extent to which FDI affects

employment generation, poverty reduction and income inequalities mostly depends on the type of FDI (greenfield or brownfield investment), the production techniques applied in the sectors (labour intensive or capital intensive), linkages established with the local industries ('crowding in' or 'crowding out'), the sources of growth, the fiscal policies of the government and the CSR practices of the MNEs. The results of the empirical study regarding the impact of FDI inflows on social improvements are also inconclusive and diverse. The results vary by country.

The theoretical and empirical literature shows that FDI inflows offer both opportunities and challenges for sustainable development. Appropriate regulatory and institutional frameworks are crucial to make FDI inflows effective for sustainable development. Every country has a different productive structure, different domestic economic policies, and varying social, political and institutional frameworks; therefore, the impacts of FDI inflows differ from country to country. Case studies are required to find out if FDI inflows are assisting the country to achieve the goals of sustainable development or what policy reforms and strategies are essential to make FDI inflows effective for sustainable development. In particular, no studies have analysed the impact of FDI on sustainable development in Bangladesh.

With the backdrop discussed above, this study explores the broad Research Question: are manufacturing FDI inflows assisting or hindering in advancing sustainable development in Bangladesh? Against the goals and hopes of promoting FDI and the three dimensions of sustainable development (economy, environment and social) the research question is broken down as follows:

> **Research Question One**: To what extent are manufacturing FDI inflows contributing to economic sustainability in Bangladesh?
>
> **Research Question Two**: To what extent are manufacturing FDI inflows contributing to environmental sustainability in Bangladesh?
>
> **Research Question Three**: To what extent are manufacturing FDI inflows contributing to social sustainability in Bangladesh?

Chapter 4 explores Research Question One, which focuses on the contribution of manufacturing FDI inflows to economic sustainability in Bangladesh. The chapter starts with an overview of the various reforms and policy changes and the performance in Bangladesh economy. Since its independence in 1971, the Bangladesh economy has passed through various reforms and

refinements. First, the country adopted a state-controlled, inward-looking, import-substitution development policy. In the late 1980s, the country initiated various liberalising policy reforms under the guidelines of the World Bank's Structural Adjustment Programme (SAP) and the IMF's Structural Adjustment Facility (SAF). One of the prime goals of the development strategy of Bangladesh is to transform the country from a low value-adding agrarian economy to a high value-adding industrial economy. The government of Bangladesh has formulated and adopted eleven investment and industrial policies. Since the inception of the New Investment Policy (1982), the export-oriented manufacturing sector has received extra attention in all development strategies, trade policies and industrial policies in Bangladesh and is considered the engine for accelerating economic growth. Bangladesh is promoting foreign direct inflows in the export-oriented manufacturing sector to access advanced technology, brand names and global markets, and to also realise the benefits of productivity and efficiency spillovers from FDI inflows.

To address Research Question One, I conducted both a descriptive statistical analysis and an econometric analysis. The key findings from the descriptive analysis are as follows:

- The export-oriented manufacturing FDI helps the structural transformation of the country. With the increased flow of FDI, the share of the manufacturing sector to GDP and export performance of manufactured products also increased.

- FDI inflows are contributing to an increase in the production capacity through the 'crowding in' and backward linkages effects. Gross capital formation increases along with the increased flow of FDI.

- The productivity and efficiency spillover effects are seemingly not realised in Bangladesh; the technology diffusion by the FDI inflows is very low. The productivity indicators in the manufacturing sector paint a depressing picture in Bangladesh. The technological and innovation capacity of the country is also poor.

- The sources of growth and exports are highly dependent on just one industry, textiles and clothing, which leads polarises the manufacturing sector and reduces the economic sustainability of the country.

- Backward linkages are only established in the low value-adding parts. The low value-adding parts of upstream industries have expanded in the country. High value-adding

segments of the upstream industries fail to expand, which limits the backward linkages effects in this sector.

The major findings from the empirical analysis are:

- Evidence of long-run co-integration among the manufacturing value-added FDI inflows, gross fixed capital formation and trade openness in Bangladesh.
- FDI inflows and gross fixed capital formation have a long-run positive and significant impact on manufacturing value-added in Bangladesh.
- A short-run causality is running from gross fixed capital formation to manufacturing value-added.
- In the short-run, FDI inflows do not Granger cause or make any impact on manufacturing value-added in Bangladesh.

Therefore, FDI inflows are providing some positive contributions to economic sustainability in Bangladesh; that is, FDI inflows help to expand the productive base of the country through 'crowding in' effects and establishing backward linkages. FDI It also has a long-run positive impact on manufacturing value-added; however, a high concentration of FDI inflows in one of the low value-adding industries, failure to create backward linkages in high value-adding parts of the production process, and the low technology diffusion by the FDI inflows, combine to restrict the realisation of the benefits of productivity and efficiency spillover effects, which are crucial for economic sustainability.

Chapter 5 explores Research Question Two, which focuses on the contribution of manufacturing FDI inflows for environmental sustainability in Bangladesh. Rapid population growth, coupled with increased economic activity, unplanned urbanisation, industrial intensification and improper management, has led to serious environmental degradation in the country. For a long time, policymakers have ignored the environmental consequences of industrialisation in Bangladesh. In recent years, the government has paid attention to sustainable industrialisation or promoting green growth. Along with the enforcement of proper environmental regulations, technological advancement and the introducing of efficient, environmentally-friendly technology is also crucial to prevent, preserve and reduce the use of critical natural resources and for the achievement of environmental sustainability. FDI could be

a vehicle for promoting environmentally-friendly technology and management systems in developing countries.

To address Research Question Two, the study investigates the presence of evidence supporting the pollution haven hypothesis, the pollution halo hypothesis and EKC hypothesis in Bangladesh through descriptive and empirical analysis. The main findings from the descriptive analysis are:

- The statistical analyses of available indexes and trends provide evidence of the pollution haven hypothesis in Bangladesh.

- The proportion of dirty industries, both in terms of FDI inflows and exports, is very high (more than 80 percent) and also has an increasing trend. Dirty industries are flocking to Bangladesh through export-oriented FDI inflows.

- The textile industry is causing severe pollution of waterways and is also extracting vast quantities of water from the aquifers of Bangladesh unsustainably.

- The enforcement of environmental regulations is very weak in Bangladesh. Bangladesh scored the lowest among the selected South Asian Countries for the enforcement of environmental regulations; therefore, polluting industries might take advantage of the lax environmental regulations and their enforcement.

- The industries in the list of 'thrust sectors' (such as pharmaceuticals, chemicals or dyes and fertilisers) are highly polluting industries. By encouraging FDI in these industries the pollution haven effect is being encouraged.

- There is little evidence of the pollution halo hypothesis in Bangladesh. Foreign-owned firms might have a better environmental performance than local firms, but there is no substantial difference.

- The main barriers to promoting environmentally-friendly technology are poor enforcement of environmental regulations, low penalties, the comparative cost advantage of old technology, lack of technical expertise and high initial investment costs.

In the empirical analysis, the study examined the presence of the pollution halo effect for renewable energy consumption and the existence of the pollution haven effects and Environmental Kuznets Curve (EKC) for CO_2 emissions in Bangladesh. The main findings are as follows:

- A long-run co-integration exists among renewable energy consumption, FDI inflows, and manufacturing value-added.

- The estimated long-run coefficient of FDI is negative and statistically significant, which indicates FDI inflows in Bangladesh are not helping to promote environmentally-friendly energy use in Bangladesh. Therefore, the pollution halo effect in renewable energy consumption does not exist in Bangladesh.

- The estimated long-run coefficient of manufacturing valued added is found to be statistically insignificant. The result indicates that the manufacturing sector does not have any significant contribution to promoting renewable energy in Bangladesh.

- The Granger causality test indicates that there is no causality running from FDI inflows to renewable energy consumption, which means the FDI inflows in Bangladesh are not influencing renewable energy consumption.

- Uni-directional causalities are running from renewable energy consumption to FDI inflows and manufacturing value-added, which indicates that the domestic capacity of technological advancement stimulates industrial expansion and FDI inflows in the country.

- The empirical study does not find any significant evidence of the pollution haven effect for CO_2 emissions in Bangladesh.

- The significant positive relationship between per capita GDP and CO_2 emissions, and the negative relationship between the squared form of per capita GDP and CO_2 emissions, confirms the existence of an EKC relationship in Bangladesh, both in the short- and long-run.

- The empirical results also reveal a positive relationship between energy consumption and CO_2 emissions both in the short- and long-run. Therefore, innovation and the introduction of low carbon, energy-efficient technology is urgently required for environmental and economic sustainability.

Therefore, the current FDI inflows are not helping to advance environmental sustainability in Bangladesh. Although the empirical analysis rejects the pollution haven effect for CO_2 emissions in Bangladesh, the arrival of many 'dirty' industries, through FDI inflows in the water-polluting sector, is a big concern for environmental sustainability in Bangladesh. The empirical study also rejects the pollution halo effect for renewable energy consumption in Bangladesh, which proves that FDI inflows are not promoting environmentally-friendly technology in Bangladesh. The presence of the EKC relationship implies that it's the growth-enhancing strategy in Bangladesh should lead to improved environmental protection in the long-run. However, growth-enhancing strategies could be more environmentally-friendly to reduce short-run environmental impacts.

Chapter 6 explores Research Question Three, which focuses on the contribution of manufacturing FDI inflows to the social sustainability in Bangladesh. Justice, equality and capabilities are key elements of social sustainability. In relation to FDI, employment generation, poverty reduction, income equality, and decent wages and working conditions are considered important in assessing the contribution to social sustainability. Through descriptive and empirical analysis, this chapter investigates the extent to which FDI inflows in the manufacturing sector are helping to achieve the social goals of sustainable development in Bangladesh. The main findings from the descriptive analysis are:

- The manufacturing FDI inflows may have made a positive contribution to employment generation in Bangladesh, through direct and indirect effects;

- FDI inflow in Bangladesh may contribute to poverty alleviation efforts indirectly through its contribution to GDP growth, which increases government revenue and therefore the capacity of the government to provide employment creation programs;

- FDI inflows do not help to promote 'decent' wage and working conditions in Bangladesh. Wage flexibility, high unemployment, weak linkages with the local firms, narrow profit margins, intense competition between subcontracting firms, and the

limited corporate social responsibility practices of MNEs are the main reasons hindering improvements to wages and working conditions.

The empirical study explored the Kuznets hypothesis and the impact of FDI inflows on income inequality in Bangladesh. The main findings from the empirical analysis are as follows:

- Income inequality in Bangladesh is increasing, but FDI inflows are not the cause.
- The Kuznets Hypothesis of income inequality exists in Bangladesh. The per capita GDP growth initially creates a positive impact on income inequality. If per capita GDP increases beyond some point it has a negative relationship with income inequality.

Therefore, in general, FDI is positive for social sustainability in Bangladesh in the long run. The presence of the Kuznets hypothesis indicates that growth is needed to reduce income inequality in the long-run; however, the immediate impact of growth is creating adverse effects on income equality. Therefore, the government should be cautious in adopting growth and export promoting strategies in Bangladesh.

Chapter 7 synthesises the findings of Chapters 4, 5 and 6, based on the different channels through which FDI could promote sustainable development in the host country. It provides an integrated picture of the impact of FDI inflows on overall sustainable development in Bangladesh. The chapter also identifies the challenges towards the achievement of sustainable development through FDI inflows and provides several policy recommendations to steer FDI inflows towards sustainable development.

8.3 Contribution to theory and practice

In this study, I examine the impact of FDI inflows on various dimensions of sustainable development in a systematic and comprehensive way. In doing so, the study contributes to existing theories and literature related to foreign direct investment and sustainable development. Based on the principles, characteristics, and elements of sustainable development, I connect the existing theories and literature of FDI inflows with the broader integrated concept of sustainable development.

In Chapter 2, I connected FDI inflows and the weak and strong versions of sustainability. In Chapter 3, I compiled and discussed a wide range of theoretical and empirical studies on the impact of FDI inflows on various elements of sustainable development. The earlier literature

discusses the impact of FDI inflows on various elements of sustainable development in an isolated way. Some theories and literature explain the impact of FDI inflows on economic sustainability, some explain the impact on environmental sustainability, and others explain the impact on social sustainability. In contrast, I compiled and connected the literature and theories within the framework of a broader integrated concept of sustainable development.

I also connected the direct and indirect or spillover effects of FDI inflows on various elements of sustainable development throughout the study. The theoretical and empirical literature discussed in Chapters 2 and 3 demonstrates that the impacts of FDI inflows on all three dimensions of sustainable development are inconclusive and diverse, and the impacts vary by country; thus, the case study was required. Therefore, the study contributes to the existing debate and knowledge regarding the impact of FDI inflows and sustainable development by analysing the impact of FDI inflows on sustainable development using the case study of Bangladesh.

The study also contributes to the empirical literature in the area of FDI inflows and sustainable development. I conducted three empirical analyses to explore the impact of FDI inflows on economic, environmental and social sustainability in Bangladesh. Most of the earlier literature considers economic growth, or Gross Domestic Product (GDP), as the dependent variable to determine the impact of FDI inflows on economic performances of the country. The main aim behind promoting FDI inflows in Bangladesh is to accelerate industrialisation and structural transformation of the country. Therefore, instead of focussing on GDP, the study considers manufacturing value-added as the dependent variable with a view to exploring the impact of FDI inflows on the performances of the manufacturing sector, and the structural transformation of the country. No empirical research has been located that investigates the impact of FDI inflows on manufacturing value addition. Therefore, this study opens up a new avenue to examine the economic performance of FDI inflows.

The environmental impact of FDI inflows is viewed with regard to three hypotheses: pollution halo, pollution haven and Environmental Kuznets Curve (EKC). The earlier empirical studies mostly investigate the pollution haven and EKC hypothesis for FDI inflows. Due to the limitation of the availability of data, very few or no empirical study has been carried out in relation to the pollution halo hypothesis. This study is the first empirical study to investigate the pollution halo hypothesis by investigating the impact of FDI inflows on renewable energy consumption in Bangladesh. Sustainable energy production and consumption are essential

elements in environmental sustainability. Therefore, the empirical analysis of the pollution halo hypothesis is a significant contribution in the area of environmental sustainability, which opens up a new avenue for further research in this area.

Quite a few studies have already been carried out in relation to the pollution haven and EKC hypothesis. Almost all the earlier studies applied linear regression and co-integration analysis to investigate the EKC relationship; however, the Environmental Kuznets Curve suggests a nonlinear, inverted U-shaped relationship. Therefore, this study applies a more recent advanced econometric co-integration technique of the Nonlinear Autoregressive Distributed Lag Model (NARDL) method to investigate the pollution haven and EKC relationship for FDI inflows in Bangladesh. The application of the NARDL model provides improved estimates of the EKC relationship (Ur Rahman *et al*., 2019).

The social aspects of sustainability have received less attention than the economic and environmental relationships and only a few empirical studies have analysed the social sustainability of FDI inflows. Moreover, most of the earlier research uses the OLS regression method, which frequently suffers from an endogeneity problem. This study conducts an empirical analysis to investigate the distributional impact of FDI inflows, using a simultaneous equation modelling approach, which corrects for the endogeneity problem. Therefore, the results are more efficient and the analysis addresses a research gap in the literature on the impact of FDI inflows on social sustainability.

The findings of this study also contribute to policy. At the time of conducting the research, the United Nations announced the adoption of the most recent universal guideline of sustainable development via Agenda 2030 or the Sustainable Development Goals (SDGs). This study embraces the SDGs in the discussion and analysis of the impact of FDI inflows on sustainable development. Agenda 2030 is the roadmap or policy framework for developing and implementing development planning until 2030. Countries, states, world-leading organisations, the business community and civil societies all are committed to achieving the targets of SDGs.

Monitoring progress towards the SDGs, at both the global and national level, is emphasised in Agenda 2030 and169 targets and 232 indicators are developed to monitor progress. The journey towards SDGs is a participatory and inclusive process and UNCTAD is advocating the channelling of more FDI inflows for achieving the SDG targets in the developing countries (UNCTAD, 2014). The findings of this study contribute to assessing and reviewing the impact

of FDI on the SDGs. I have taken the Bangladesh manufacturing sector as a case study because Bangladesh is promoting FDI inflows in the manufacturing sector with various incentives. The country also has a strong commitment towards the achievement of the SDGs. The findings of this research and policy suggestions will assist in designing FDI policies for Bangladesh, and other developing countries in the future.

8.4 Limitations and future research

The study explores how FDI inflows are influencing sustainable development in developing countries, and Bangladesh in particular. As noted, sustainable development is a vast, multidimensional concept that comprises a wide range of interrelated issues. To analyse the impact of FDI on some of the core elements of sustainable development, I have divided the study in terms of the three broad dimensions of sustainable development and analysed them separately; however, the three dimensions of sustainable development and their elements are interrelated. While I have attempted to integrate the analysis in chapter 7, a methodology for systematically analysing the impact of FDI on an integrated index of sustainable development may be a worthwhile avenue for future research.

I have carried out descriptive and empirical analysis based on secondary data and information. Primary data collection or field surveys may provide a more updated and precise picture of the economic, environmental and social performances of foreign- and locally-owned firms. In particular, assessing the indirect or spillover effects of FDI inflows is important for identifying the net effects of FDI inflows for all three dimensions of sustainable development. I have attempted to analyse the indirect or spillover effects on different areas of sustainable development through descriptive analysis based on available statistics and information; however, I could not assess the spillover effects through empirical econometric analysis due to a lack of firm-level data. Therefore, I recommend conducting a field survey for assessing the indirect effects of FDI. A field survey should include both the performances of foreign- and locally-owned firms in various economic, environmental and social areas. Data on how MNEs are interacting with the local firms and subsidiaries, and the monitoring and supervision of MNEs on the activities of their subsidiaries and subcontracting companies are also required to investigate the linkage effects of FDI inflows.

The lack of regional-level and industry-based data also imposes a limitation in conducting impact analysis of FDI inflows. The indirect or spillover effects of FDI inflows may differ by regions within a country. For instance, well-developed physical infrastructure provides a positive investment environment and may amplify the spillover effects of FDI. If a region has improved physical infrastructure facilities, such as railway, highway, port, and power plants, the indirect or spillover effects of FDI inflows could be higher than a region which does not have those facilities. Therefore, a spatial or regional-based analysis of the spillover effects of FDI will provide a more complete picture and will be useful for policy formulation. Given the lack of regional-level data, such an analysis could not be carried out and, as such, I recommend the development of regional databases that could be used to assess the spatial spillover effects of FDI inflows.

Good governance and rule of law are important in realizing the benefits of FDI inflows as discussed in the thesis. Proper enforcement of the rule of law can also drive FDI inflows toward promoting sustainable development. Conducting a comparative regional analysis of how the direct and indirect impact of FDI inflows differ by indicators of governance would provide a useful area for policy formation. Therefore, when regional level data becomes available, I recommend conducting a regional impact analysis of FDI inflows incorporating good governance indicators such as the corruption level and participation in the electoral system and assessing the interaction of these variables with FDI inflows in determining economic, environmental and social sustainability.

The literature reviewed in this thesis suggests that FDI inflows generate heterogeneous effects across industries. For example, FDI inflows in the automobile industry may generate higher backward and forward linkages to the local economy and might be less polluting than the textiles industry. Therefore, an industry-specific analysis would help for promoting and regulating FDI inflows. The availability of industry-specific data will open up future research opportunities in this area.

The limited timeframe also imposed a barrier to the study. Each dimension of sustainable development covers a broad range of topics and time limited the degree to which each element could be studied. For instance, in the case of social sustainability, I was unable to conduct an empirical analysis regarding the impact of FDI inflows on gender equality and poverty reduction in addition to the study on income inequality. Further, in the case of inequality, I only consider income inequality. However, inequality may persist through differences in basic social

and economic services such as access to education, health, employment. I also could not conduct an empirical investigation regarding the impact of FDI inflows on water pollution due to the lack of data and time constraints in creating such data; therefore, more research is required in these areas.

Although it is also a strength of the thesis, another limitation is that the results are focussed on Bangladesh, and the manufacturing sector in particular, and have not been generalised to other countries and contexts. However, the findings provide indications of the implications of FDI inflows for developing countries more generally. The study recommends undertaking the same comprehensive, and integrated approach in other case studies of developing countries to determine the relationship between FDI inflows and sustainable development.

Findings of this study depict that FDI inflows are generally positive for economic and social sustainability in Bangladesh. However, the high concentration of FDI inflows in the polluting industries is the major concern for environmental sustainability in Bangladesh. Further, Bangladesh fails to reap the spillover benefits of FDI inflows in terms of technology transfer, productivity and efficiency gains and the diffusion of better environmental management and working condition. MNEs in Bangladesh are also very reluctant to practice corporate social responsibility.

In conclusion, I strongly advocate considering efficient, environmentally-friendly technology diffusion when promoting FDI inflows in Bangladesh and other developing economies. Domestic absorptive capacity and the enforcement of rules and regulation also need to be strengthened to harness the positive spillover benefits of FDI inflows.

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