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LINKAGE BETWEEN FDI INFLOWS AND ENVIRONMENT DEGRADATION: A CRITICAL REVIEW

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ABSTRACT

The economies worldwide are competing to attract FDI at the time when there is a wave of environment sustainability in parlance with the UN SDGs 2030. Considering the SDGs all actions are evaluated in terms of environment and activities that lead to environment degradation are discouraged. The present study is an attempt to study the dynamics between FDI Inflows and Environment through the review of the existing literature on FDI and environment degradation which is broadly segregated into Environment Kuznets Curve (EKC), Pollution Haven Hypothesis (PHH), Pollution Halo Hypothesis, the scale-composition-technology effect, financial development and trade openness impact. Also trend analysis highlights increasing FDI inflows worldwide with India also displaying an increase in FDI inflows. However, India also displayed rising CO_2 emissions per capita. Hence, there might be a link between FDI inflows and environment degradation. Also the top 5 Indian states as per FDI inflows were amongst the top states in terms of average No_2, RSPM and So_2 emissions which are a measure of environment degradation.

Keywords: *FDI, Environment Sustainability, Environment Degradation, Financial Development.*

Introduction

The globalization of the world economies and the rapid economic integration in terms of liberalization of trade and investment, growth of capital market, removal of barriers to business and technological development have led to tremendous growth of FDI. The FDI flows worldwide have reached $ 1.58 trillion in 2022 which are a substantial improvement from the first year of COVID-19.[1]

Post the LPG reforms; India has witnessed a substantial increase in FDI flows. In fact, the foreign inflows are viewed as an essential tool for development and achieving self-reliance. Firms often face a dilemma over exporting, licensing and FDI as a mode of entry into the foreign economies. Amongst these three modes, FDI appears to be the most expensive as it involves either establishing own production facilities or acquisition. Further, cultural difference is the key challenge which firms face while entering foreign economies. This is minimal in case of licensing and exporting and can be overcome by employing native agents. Also, in case of FDI the cultural risk is considerable. Though FDI appears to be the least attractive mode, it offers certain advantages that are over and above the costs associated with it *(Hill & Jain, 2011)*. So, one cannot overrule FDI without examining its pros and cons.

Historically, there exist different ideologies regarding FDI. The radicals view which continued till 1980s considered FDI as a means to exploit the host economies for the maximum benefit of home

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1 United Nation Conference on Trade and Development. (2022). *World Investment report,2022:* International Tax Reforms and Sustainable Investment. Retrieved from https://unctad.org/system/files/official-document/wir2022_en.pdf.

economies. Then came the era of free market, where FDI was linked to the international trade theory of comparative advantage and the MNEs were viewd as a means to shift production to the comparatively efficient place in the world. In practice, the economies opt for a pragmantic nationalist view which states that benefits from FDI do not come without cost. In deciding about the investments both benefits and costs are to be evaluated. If the benefits are more than the costs, it provides incentive to the economies to opt for FDI . (*Hill & Jain, 2011*)

There are multiple factors including market size, market growth, availability of resources and technology, infrastructure and transportation costs which determine the extent to which foreign investment flows in an economy. In light of UN SDGs 2030 and increasing environment consciousness, another factor that has gained importance is the environment. Environment quality has emerged as one of the factors which influences business decisions. Until now, the businesses were ignorant about the waste generated by the activities they carry and adversely influenced the environment quality. The continuous actions and programs of UN in terms of MDGs and SDGs 2030 have increased the awareness about environment problem and issues. It is globally recognized that environment degradation is a key barrier in the growth of the economy.

The economies worldwide are competing to attract FDI at the time when there is a wave of environment sustainability. Considering the SDGs all actions are evaluated in terms of environment and activities that lead to environment degradation are discouraged. It therefore becomes significant to examine the dynamics of interrelation between FDI and environment degradation.

The researchers in the field of international business have explored several dimensions related to FDI inflows. Some researchers are of the view that FDI inflows imply technology spill over which besides increasing production can be environment friendly (Griffith, 2016). FDI therefore improves environment quality (Borhan, 2012). The other researchers believe that when deciding the host economies for FDI, the source countries look for those countries where the environment regulations are weak. FDIis a means of shifting polluting investments from developed nations to the developing hosts with liberal environment laws (Aliyu & Aminu, 2005). FDI is a means of dumping polluting industries in the host economies and hence leads to environment degradation. In continuation to this, few tend to examine the strength of environment quality of host economies in attracting FDI. It might be that to relocate the polluting industries owing to the strict home countries laws, degraded environment attracts greater FDI inflows. Further, the increasing environment consciousness may reverse the relation and a good environment may attract greater FDI inflows (Borhan, 2012). It is still debatable in which direction does these dynamics of FDI and environment work.

In light of the above discussion, this paper aims to achieve the following objectives:

- To review the existing literature on FDI inflows and environment degradation.
- To analyse the trends of FDI inflows and link it with environment degradation with special emphasis on India.

Layout of the Paper

Section 1 introduces the topic. Section 2 reports the review of literature followed by trend analysis in Section 3. The final section 4 summarizes and provides scope for future research on the relationship between FDI and environment.

Review of Literature

With the current wave of sustainable development and changing foreign investment policy, examining the true FDI-Environment nexus has become critical for all economies especially the developing and emerging economies. To what extend FDI inflows degrade the host countries environment. To what extend does the regulatory environment of host economies affect the foreign investment flows. To meet the increasing global demand on account of globalization, resources are recklessly used leading to environment degradation. Also, to improve the BOP position and to strengthen the export orientation the economies end up setting environment damaging industries leading to environment degradation (Mukherjee & Chakraborty, 2013). Previous researchers have analysed the Environment-FDI link by broadly segregating the nexus into Environment Kuznets Curve (EKC), Pollution Haven Hypothesis (PHH), and Pollution Halo Hypothesis, the scale-composition-technology effect, financial development, and trade openness impact. This section provides a review of the previous literature on the environmental effect of FDI categorizing it based on certain key dimensions of FDI-Environment Nexus.

- **Environment Kuznets Curve (EKC)**

EKC links economic growth and pollution. In short run, increase in economic growth leads to increase in level of pollution. However, beyond a particular level of income, a reversal trend is observed, and the environment quality improves with further economic growth. This implies that EKC is inverted U shaped and economic growth works in favour of the environment. The researchers have been working on to analyse the exact shape of EKC for different economies. The hypothetical relationship that exists between per capita income and pollution can be represented through inverted U-shaped curve (Murthy & Bhasin, 2016; Baek,2016; Hitam et al., 2012,Tamazian et al.,2008). The environmental impact depends on the stage of development. In the initial stage, with economic growth and development, the pollution level increases. But beyond certain level of income, there is a reversal trend and environment quality improves.

As per research finding, out of 25 polluted cities of world, 17 can be found in China. Many people die premature deaths. This is nothing but the environmental degradation and health impact of increasing economic growth in China. With such a drastic impact on the environment quality, many researchers attempted to examine the exact relationship between economic growth and environment quality for the Chinese economy and report an inverted U shaped EKC(Li et al., 2016; Halkes, 2016; Cole et al, 2009).

However, when Human Development Index is used to measure economic development, a negatively sloped cubic form of EKC is developed (Jha & Murthy, 2003). Gonel et al. (2013) when incorporated trade liberalization in the EKC model, find evidence for a N shaped curve.

- **Financial Development**

Financial development attracts research and development which brings environment friendly technology but also leads to industrial development which may degrade the environment. Few researchers provide evidence that financial openness acts as a medium to attract technology efficient method to lower the pollution emissions (Tamazian et al., 2008). While there are others who state that financial development explains a considerable portion of pollution emission especially in Indian context (Sehrawat et al., 2015).

- **Trade Openness**

Increasing trade can have a detrimental impact on environment through its scale and composition effect (Hakimi et al., 2015) or it may bring environment friendly technology which reduces degradation.

The impact of trade openness on environment degradation depends on the level of income of the economy (Le et al., 2016). The economies which have comparative advantage in polluting goods experience greater pollution emissions (Antweiler et al., 1998).

- **Pollution Haven Hypothesis**

The environmental degradation impact of FDI is one side of the FDI-Environment Nexus. It is incomplete without the environment regulations component being evaluated in context of these investment flows. A stringent environment regulation may act as a disincentive for the MNEs when selecting the host economies. Strict regulations increase cost of production and influence's location decisions. But some of the researchers view the regulatory cost as negligible and small. The countries have started entering a race to bottom in context of environment regulations to attract FDI.

Pollution Haven Hypothesis is linked with high pollution abatement cost in home country which provides an incentive to relocate the industries to weaker regulation countries. To avoid high pollution abatement cost in the home economies, firms relocate to economies with liberal laws and thereby dump wastes and make excessive use of non-renewable resources. The laxity in environment regulations helps in attractingFDI (Pollution Haven Hypothesis: Murthy et al. 2016, Xu et al., 2016, Baek et al., 2008, Cole et al., 2006, Keller et al., 2002).

However, Kehlo (2015) and List et al. (2004) are amongst few researchers who do not support PHH. In context of India also, according to few, evidence in support of PHH does not exist (Neelakanta et al., 2013, Acharyya, 2009, Mani et al., 1997). One thing which is to be observed is that strong environment regulations will increase the cost of production and reduce waste disposal but is going to reduce innovation and the productivity level (Xing et al., 2000).

- **Pollution Halo Hypothesis**

In contradiction to the pollution haven hypothesis, He (2005) believes that strict laws will encourage new ideas to find out environment friendly practices. Moreover, environment regulation cost is not critical in comparison to other cost incurred. Further, even if polluting FDI enters an economy, it will still be environment conscious to ensure long run survival. MNEs entering the economy may not always be environment deteriorating and may in fact bring with it the environment friendly production technology through the positive spill over effect (Griffith, 2016). Environment quality is a normal good and increasing economic growth increases demand for good quality environment (Borhan, 2012).

- **Scale, Composition and Technology Effect**

The impact of FDI on environment can be better understood by segregating it into scale, composition, and technique effect. FDI increases pollution by increasing the number of players (scale effect) and making industrial structure complex (composition effect). It also brings advanced environment friendly technology, the effect of former being more. (Cole, Eliot et al., 2009, Yang et al., 2011)

- **Outward FDI**

In the recent era, developing economies have also started competing in the race for being a source country for outward FDI. Inward FDI stock leads to environment degradation and outward FDI stock has a favourable impact on environment sustainability (Chakraborty, 2013). Bhasin et al. (2016) attempt to link the level of environment degradation in the home country to the quantum of outward FDI and establish that greater the level of environment degradation in home country, leads to MNEs going abroad.

Trend Analysis

At the global level, investment inflows increased by 40% in 1995 which were primarily driven by the growth in FDI in developed economies. The developing economies accompanied the developed nations in this tremendous growth of FDI inflows. The FDI inflows in developing nations also witnessed an increasing trend since 1995*(UNCTAD, 1995).*[1]Moreover, the pace has increased significantly from 2002 onwards. In fact, 2013 onwards, FDI inflows in these developing nations have in fact increased at such a pace that their contribution in total global FDI is more than the developed economies in many years*(UNCTAD 2014).*[2] This growth in FDI is attributed to increasing mergers and acquisitions, setting up of infrastructural facilities and increasing competition on account of increasing number of firms. However, the investment flows were concentrated in few countries with ten largest host countries receiving 2/3rd of the total inflows *(UNCTAD, 1996)*.[3]

The share of developing nations in total FDI inflows have increased from around 17% in 1990s to around 34.5% in 1995. Further, amongst the developing economies, region wise trend revealed that Asian economies are the significant contributor to the FDI flows. Since 1995, around 60% of the total FDI inflows in developing economies can be attributed to Asian economies.

In the recent era, developing countries have attracted FDI at a greater pace. Of the top 10 largest recipient of FDI, more than half are developing economies. Since 1995, around 60% of the total FDI inflows in developing economies can be attributed to Asian economies. For the first time in 2010, developing and transition economies together contributed to around half of the global FDI flows. In these economies again South, East and South-East Asia drove the trend *(UNCTAD, 2011).*[4]This increasing share of developing and transition economies in total FDI flows continued in 2013 as well with around 54% share. One of the prime reasons for increase in FDI is the Sustainable Development Goals 2015-2030 which require an increasing investment from both public and private sector *(UNCTAD, 2014).*[5]Also, EMEs were amongst the top destination for FDI. Developing countries including India secured a position in the list of top host economies for past few years. Even in the pandemic COVID-19, India continued to maintain its position in top 20 host economies. *(Figure 3.1)* (*UNCTAD, 2021)*[6]

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1 United Nation Conference on Trade and Development. (1996). *World investment report,1996: Investment, trade and international policy agreements*. Retrieved from http://unctad.org/en/pages/PublicationArchive.aspx?publicationid=646.

2 United Nation Conference on Trade and Development. (2014). *World investment report,2014: Investing in the SDGs: An Action Plan.* Retrieved from http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=937.

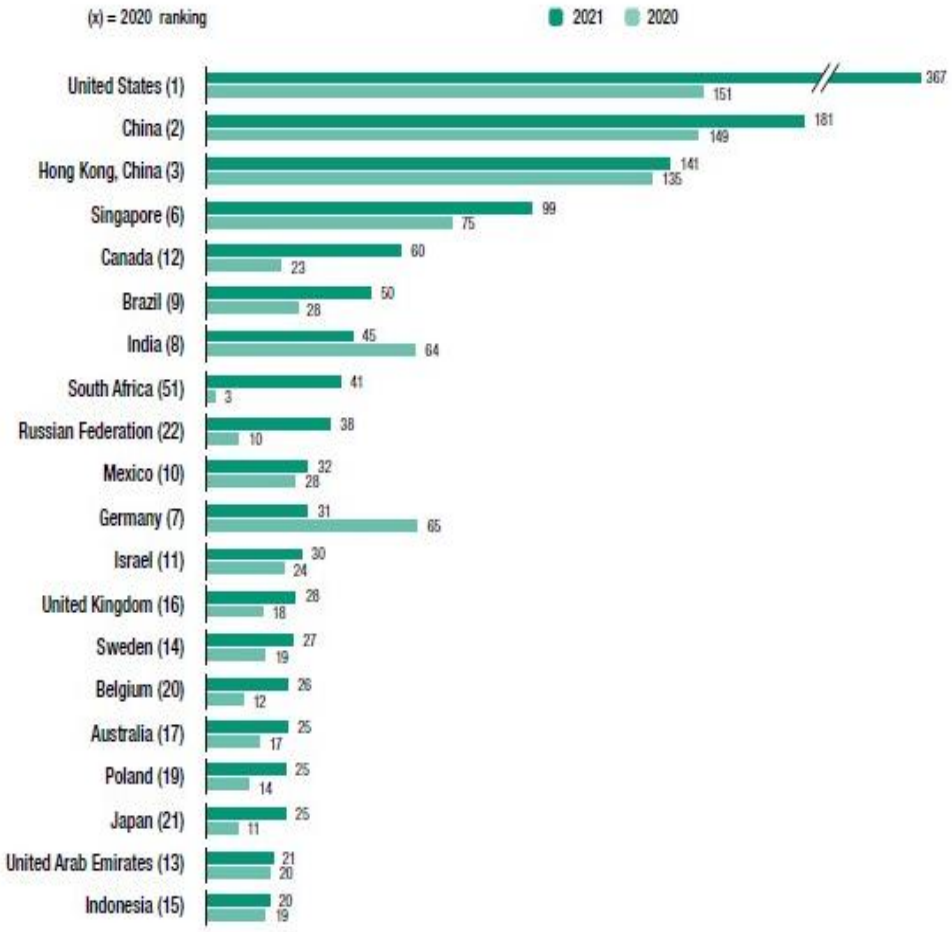
3 United Nation Conference on Trade and Development. (1996). *World investment report,1996: Investment, trade and international policy agreements*. Retrieved from http://unctad.org/en/pages/PublicationArchive.aspx?publicationid=646.

4 United Nation Conference on Trade and Development. (2011). *World investment report,2011: Non-equity modes of international production and development*. Retrieved from http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=84.

5 United Nation Conference on Trade and Development. (2014). *World investment report,2014: Investing in the SDGs: An Action Plan.* Retrieved from http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=937.

Overall, a rise in FDI inflows was observed in developing economies as well with India, being one of the favourite destinations for foreign investors.The top 5 FDI recipient in the Developing Asia - China, Hong Kong, Singapore, India, and Indonesia *(UNCTAD, 2018).*[3] In 2018, the FDI inflows in the Developing Asian economy further increased by 4%, the major contributor being India accounting for 70-80% of the total inflows of this region. *(UNCTAD, 2019)*[4]

Figure 1: FDI Inflows Top 20 Host Economies, 2020-2021. (Billions of Dollars)



Source: UNCTAD, World Investment Report, 2021

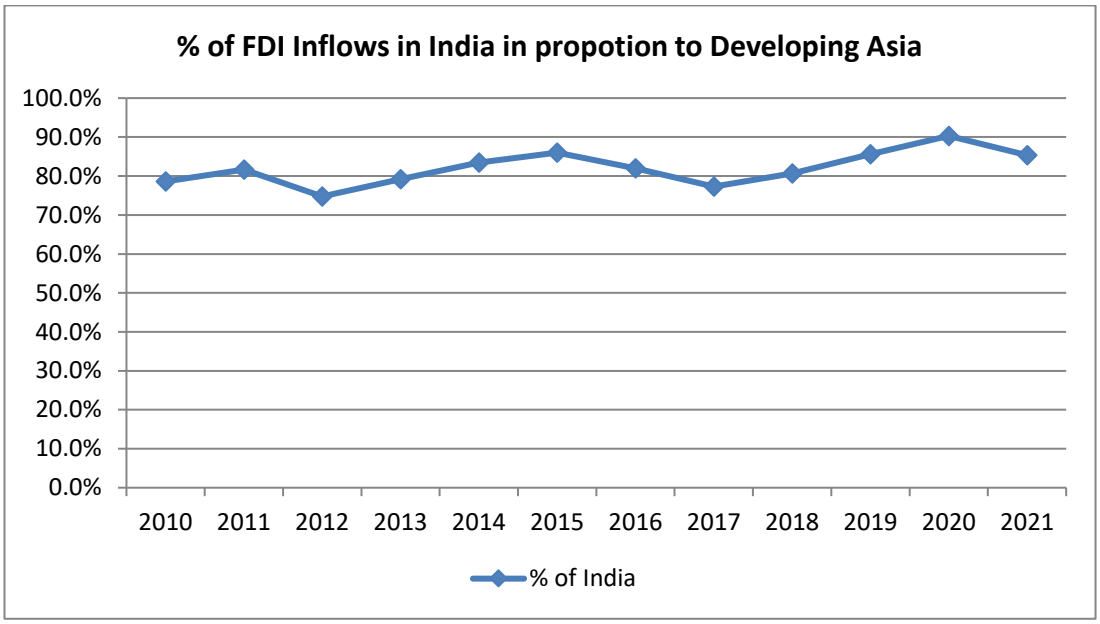
Before 1991, India followed a closed door and restrictive policy. Post liberalization, several sectors were made less restrictive and attempts were made to provide a conducive environment to the investors. As a result, the percentage share of India in global FDI has increased from 0.63 in 1995 to 0.752 in 1997 going forward. The increasing trend is visible from 2010 onwards also with percentage share of India in global FDI reaching to 0.90 in 2020. *(Table 3.1, Figure 3.2)*

Table 1: Percentage of FDI Inflows in India in Proportion to Total FDI Inflows in Asia

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total FDI inflows in Developing Economies	34,863	44,332	32,365	35,613	41,449	51,227	54,281	51,640	52,262	59,086	70,957	52,417
% of India	78.6%	81.6%	74.8%	79.2%	83.4%	86.0%	81.9%	77.3%	80.7%	85.6%	90.3%	85.3%

Source: Author's own compilation based on UNCTAD database.

Figure 2: Percentage of FDI Inflows in India in Proportion to Total FDI Inflows in Asia



Source: Author's own compilation based on UNCTAD database.

Also, a sub- national FDI inflows trend analysis for India highlights that different Indian states attract different quantum of FDI inflows. The top 5 FDI recipients in India are: New Delhi, Mumbai, Chennai, Bangalore and Ahemdabad.[1]In context of FDI inflows in India, the LPG reforms have accelerated the pace of investment flows. FDI inflows increased till the year 2008. Though, there was a fall in FDI Inflows in absolute terms after 2008, the share of India in global FDI Inflows continued to increase. Even in absolute term FDI inflows started to increase from 2012 onwards.

To examine the environment degradation trends in India at aggregate level, CO_2 emission per capita is selected. *Table 3.2*highlights the increasing CO_2 emissions per capita indicating increasing environment degradation.

Table 2: CO_2 Emissions Metric Tons Per Capita for India

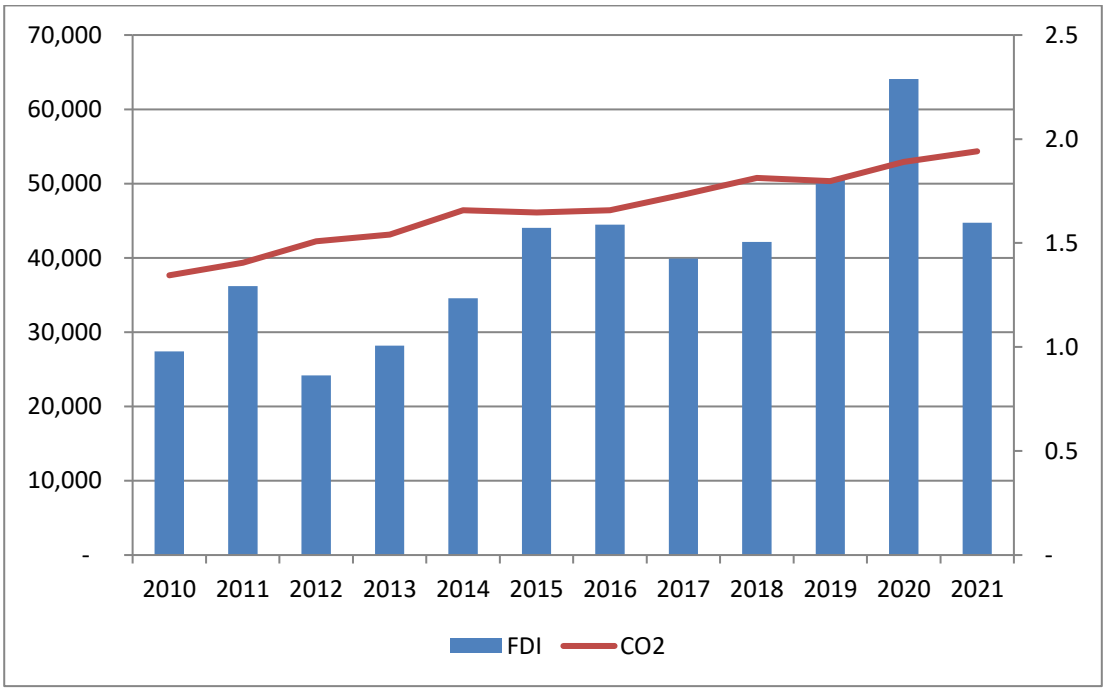
Year	Co2 emissions (metric tons per capita)
2010	1.344896147
2011	1.405068333
2012	1.508508252
2013	1.539947839
2014	1.657231271
2015	1.647151914
2016	1.657396308
2017	1.733360844
018	1.8126965
2019	1.797620119
2020	1.890202483
2021	1.941077889

Source: Author's own compilation based on World Bank database.

Further, an attempt is made to study the link between FDI Inflows and environment degradation in context of India. It is evident from the *Figure 3.3* that there is an increasing trend of FDI inflows going forward. Along with this increasing investment flows, India also experiences increase in CO_2 emission per capita. This signal increasing environment degradation which is a matter of concern for the policy makers.

[1] Source: FDI data from DIPP.

Figure 3: FDI Inflows and CO2 Emission Trends in India



Source: Author's own compilation based on UNCTAD database.

The state wise data for environment degradation is available in the form of state level emission of average NO_2, SO_2 and RSPM. We attempt to rank the regional offices [1] from highest to lowest based onFDI inflows, average NO_2, SO_2 and RSPM levels. The top 5 states under each category are stated in the *Table 3.3*.

Table 3: Top 5 States as per FDI Inflows and Pollution Emissions

Rank	FDI	Avg. SO2	Avg. NO2	Avg. RSPM
I	**New Delhi**	Kanpur	New Delhi	New Delhi
II	**Mumbai**	Ahmedabad	Kolkata	Patna
III	Chennai	Kolkata	Patna	Kanpur
IV	Bangalore	Bhopal	Chandigarh	Bhopal
V	**Ahmedabad**	Mumbai	Jaipur	Jaipur

Source: Author's calculation based on DIPP and Indiastat data.

3 out of 5 top 5 FDI recipient states are amongst the top polluted states also in respect of at least one of the three pollution emission indicators. Therefore, we witness increasing FDI inflows as well as increasing environment deterioration.

Conclusion and Scope for Future Research

The present study is an attempt to study the dynamics between FDI Inflows and Environment. The review of the existing literature on FDI and environment degradation is broadly segregated into Environment Kuznets Curve (EKC), Pollution Haven Hypothesis (PHH), Pollution Halo Hypothesis, the scale-composition-technology effect, financial development, and trade openness impact. Also trend analysis highlights increasing FDI inflows worldwide. Developing economies witness a tremendous increase in FDI inflows primarily attributable to developing Asia. Within Asia, India displays an increase in FDI inflows and is at a comparatively better position. However, along with FDI inflows India displayed rising CO_2 emissions per capita. Hence, there might be a link between FDI inflows and environment degradation. Also, the top 5 Indian states as per FDI inflows were amongst the top states in terms of average No_2, RSPM and So_2 emissions which are a measure of environment degradation.

[1] Classification as per RBI.

The major studies in context of FDI inflows and environment have been conducted at national level. However, we should note that every state has some unique characteristics in terms of market size, infrastructure, resources, environment quality etc. Each state therefore is not equally attractive to foreign investors. Moreover, though environment regulations are framed at Centre, the enforcement of these regulations depends on states. So, each state will have different regulations enforcement norms in respect of environment. Therefore, the factors which may impact foreign investor decision vary at sub national level. The studies in respect of environment and FDI inflows at the sub national level are very scarce. This provides a strong rationale for studying a state level analysis for determining the linkage between FDI inflows and environment degradation. The first dimension which needs to be explored is whether the foreign investors are looking for a good quality environment or a degraded environment. In short, attempt is to be made to understand environment quality as a determinant of FDI inflows. Another dimension which needs to be explored is what contributes to environment degradation, the domestic players, or the foreign firms.

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