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Industrial Designs and FDI: India and its Economic Partners

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India's trade agreements and policies related to Intellectual Property Rights (IPR) have played catalytic role in attracting huge Foreign Direct Investment (FDI) since early 2000s. FDI plays an important role in facilitating technological support, financial capital, and the creation of technological products through R&D. Under IPR, Industrial Designs (IDs) is an important indicator about the manufacturing and industrial base in an economy. After 2005, India signed the trade agreements like Comprehensive Economic Partnership Agreement (CEPA) and the Comprehensive Economic Cooperation Agreements (CECA) to facilitate technology transfer, investment and further strengthening of the IPR regime. This study analyses the relationship between FDI inflows from selective ten economic partners and its interlinkages with the filings of industrial design applications by them on yearly basis in Indian offices. The time line for impact analysis is between 2005 and 2022. The countries are divided in 2 groups, those under CEPA & CECA and those which are not. The Year Fixed Estimation methodology is used for the study. The independent variables such as GDP per capita, annual inflation rate and labour force participation rate have been included to demonstrate the macro effect. The findings show a positive correlation for those countries which are part of trade agreements. This study is unique in case of India as not many studies are available which highlights the effectiveness of CECA & CEPA in stimulating FDI inflows for strengthening of IPR structure in India. Overall the study also provide a huge scope for India to move from labour-driven manufacturing competitiveness towards the intellectual property driven knowledge competitiveness economy thus encouraging more industrial design applications in India.

Keywords: Foreign direct investment, Industrial designs, Intellectual property rights, Knowledge economy, Trade agreements

Introduction

Globally, technology intervention and Research & Development (R&D) have played a significant role in the economic growth paradigm since the 1960s.[1] Earlier, natural resource wealth and factor endowments decided the economic growth. Today, R&D and IPRs are the factors that influence economic development.[2] Intellectual property rights give exclusive rights to innovators and inventors to use their creations in various sectors of knowledge for social cause. Several types of intellectual property protection include industrial designs, trademarks, patents, copyrights, GI (geographical indication), etc. The system of intellectual property not only increases society's total knowledge base but also speeds up its diffusion through top-bottom approach. It has a crucial role in advancing economic growth. The micro analysis of IPR such as Industrial design, give entrepreneurs and investors a way to profit from the launch of a new product. However at macro level, intellectual property especially industrial designs, fosters economic growth by attracting FDI inflows and technological investment and mobility of human resources. Trade agreements and its clauses bring certainty in economic relations between the countries. As a result of it, effects of FDI on production frontier, employment, income, prices, exports, imports, economic growth, balance of payments, and overall welfare are evident in the host nation.[3] Depending upon the fiscal and monetary structure; countries adjust their trade policies and agreements to attract sectoral FDI. Since 1980's many advanced countries have brought significant improvement in trade relations and trade barriers to allow export of R&D products.

India has signed significant numbers of bilateral trade agreements with several countries to remove trade barriers. India has trade agreements with Sri Lanka, Nepal, Thailand, Australia, Mexico and many more countries. However, India's Comprehensive Economic Cooperation Agreement (CECA) and Comprehensive Economic Partnership Agreements (CEPA) have been signed with selected countries. Singapore became the first nation to sign a

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Comprehensive Economic Cooperation Agreement with India in 2005. The IPR statement under India-Singapore CECA is reflected under Article 11.2- "The forms of cooperation may include- joint consideration of the organization of seminars, symposia, training programs and workshops in India and in Singapore; and development of programmes, platforms, tools and other infrastructure to promote the effective use and application of IPRs".[4] India signed CEPAs with two East Asian countries: South Korea in 2010 and Japan in 2011. India-South Korea CEPA IPR statements under Article 5.9 & Article 12.5 – "promoting a strong and efficient regime of intellectual property rights in accordance with their laws and regulations & cooperation in the field of IPRs, enforcement of intellectual property rights consistent with the TRIPS Agreement".[5,6] In 2011, it also signed a CECA with Malaysia.[7] India signed a CEPA with the United Arab Emirates (UAE) and CECA with Australia in 2022 further extending its network.[8,9] It is important to acknowledge that although the terms and conditions of these agreements differ, nations including Singapore, Australia, South Korea, Japan, and the United Arab Emirates have included clauses pertaining to intellectual property rights (IPR) in their agreements. The clause gives detailed explanation and cooperation in the field of patent, industrial designs, trademarks, GI and others. As an example, agreements between India and ASEAN in 2010 do not mention intellectual property rights.[10]

Studies suggest that the different type of IPR ecosystem influences foreign direct investment decision.[11] Developed countries have designed the trade agreements and FDI policies which are influenced by developing countries IPR norms. It has been found that a robust intellectual property rights regime and appropriate discussion over the industrial design application process have increased trade, knowledge transfer, and innovation for developing nations. Advanced countries have adjusted their IP rules and regulation (both administratively and legally) according to their needs. This gave them 1st mover advantage when investing in developing countries.[12] India has seen an upsurge in national industrial designs application filed since 2005. The government has restructured the legislation to take into account the country's growth story and emerging technologies in light of India's IPR laws.

The literature available remains mostly inconclusive on the economic effects and strengthening of intellectual property rights (patents, trademarks, industrial designs, others) protection across world. The controversy exists concerning the scope of stronger IPR, whether it is able to stimulate higher foreign direct investment and innovation. However, there are several arguments that have supported both sides' views on effective IPR reform.

On the one hand, more IPR protection could encourage more knowledge-based transactions by increasing market potential and driving out competitors. Tighter IPR, however, might lessen the knowledge transfer that results from copying. Despite its importance, there is still a dearth of research in the empirical assessment of how intellectual property rights affect technology transfer, and specifically international technology contracting. Since many developing nations have drastically changed their intellectual property rights policies since the mid-1980s, it is especially important to present empirical data on this topic. During the Uruguay Round (1986–1994), the Trade-Related Intellectual Property Rights Agreement (TRIPs) was created. This raised several concerns about the benefits of technology transfer and innovation for the developing world, as well as the necessity of harmonizing IPR standards globally. Answering the concerns like do patent protection is a successful means of encouraging innovation in developing nations becomes important it will help them evaluate the implications of technology catch-up and create policies that work in tandem with IPR changes.

The foundation of India's intellectual property legislation is the Doha Declaration and the rules of the TRIPS agreement. The Designs Act of 2000, the Patent Act of 1970, the Trade Marks Act of 1999 and the Copyright Act of 1957 are only a few of the laws and statutes that the Indian government enacted with the intention of improving their effective enforcement.[13] In terms of intellectual property regulations, the DPIIT (Department for Promotion of Industry and Internal Trade) has complied with the international standards as of 2016 in order to increase its ability to make returns from research and development (R&D) and other artistic activities. A number of exogenous factors may have contributed to this pattern, but the government's desire to raise awareness of intellectual property rights (IPR) through the agreements has been a key influence.

The objective of this research paper is to analyse the impact of FDI inflows from the countries under CECA & CEPA and those which are outside the pact,

on filings of industrial designs in India. The fixed year estimation methodology is used to reach at the conclusion. It was seen that FDI had positive effect on the fillings of Industrial design applications in India if the countries belongs to CECA Group-1 i.e. Singapore and Malaysia and CEPA Group-2 i.e. Japan and South Korea respectively. This study attempt to highlight the need for such type of trade agreements for India as it will boost innovation, R&D and create a knowledge driven economy.

Literature Review

Industrial design originated in the beginning of the 20th century in the United States and Europe as a result of the rapid expanding industrialisation and mass production of consumer goods. Many nations have experienced economic growth in 1980's as a result of global integration and IP usage. Some scholars have linked shifts in growth trajectory like the US and Europe to the growth of IP applications.[14] Technological advancement is typically viewed as one of the key factors influencing economic growth in both neoclassical and contemporary economic theories.[15] Within this framework, economists have interpreted innovation broadly to include breakthroughs in technology, applied research, and administrative and social welfare processes. It follows that distinct IPR protection schemes should be in place for business tools by a wide range of enterprises to achieve innovation and value development.

Innovation promotion is a crucial aspect of industrial design strategies in nations where the ability to innovate is a determining factor in the survival or growth of specific industry segments, such as electronics, biotechnology, aerospace, and pharmaceuticals. IPRs should be strongly and broadly protected in R&D-intensive industries. In such cases, IPRs might not be very helpful in fostering innovation, but they might have an impact on the cost of industrial inputs and, in general, the choices and spending of consumers.[16] The contribution of intellectual property to economic growth in various nations has been the subject of numerous recent studies. Economic globalization has increased the production of complex and specialized goods and services, influencing the creation of intellectual property of wealth. The growing mechanization of manufacturing processes and the significance of creative and innovative activity in producing value-added products are other dynamics that have been recognized as important. Countries either take advantage of manufactured goods or take first move advantage through IPR of it.

Technological change has been identified as one of the primary drivers of economic growth by both the theory of endogenous growth and the conventional neoclassical economic theory.[17] Since its origin, neoclassical economics has been centered on identifying the causes of innovation, drawing from the ground-breaking research of Solow.[18] As a result modern endogenous growth theory models view technological advancement as a causative element influencing the creation of novel designs. Continuous and dynamic growth is facilitated by these advancements, which in turn lead to enhancements that boost the competitiveness of productive processes. Investing in industrial design can affect value addition, competitiveness, business expansion, and employment generation, among other aspects of enterprise success. Countries like USA, Mexico, Germany, Australia and few high income countries are benefitting from strengthening of IDs applications.[19] Furthermore, design investment has the potential to overcome other market failures including knowledge asymmetries and reduce (induce) positive or negative externalities. This illustrates the rationale for the various policy initiatives that nations are implementing to boost industrial design and promote design investment.

It is widely acknowledged that recent economic progress has been significantly influenced by variables like knowledge and innovation. According to eminent economist Paul Romer, economic growth is driven by the growth of knowledge.[20] According to his view, economic policy should support initiatives that foster the development of human capital and encourage investment in new R&D to support a nation's progress. According to these approaches, entrepreneurs fund R&D with the hope of making profit out of their innovations. Along with producing new goods, innovation increases the amount of knowledge held by the public, hence reducing the cost of future innovations. In addition to providing incentives for innovation, Industrial design protection promotes the collection and dissemination of knowledge because the data becomes accessible to other prospective inventors.

Post 1990, high income countries such United States, Germany, France, Australia, European Union and others, have designed the IPR regime which gives a first mover advantage in international trade. Most

research on how intellectual property protection affects growth strategy has been done in developed (High-income group) nations. This is hardly surprising considering the global bias in favor of this group when it comes to the usage of IP protection. The bulk of worldwide IP registrations including patents, trademarks, and industrial designs (IDs), are made up of high-income nations, and more lately, China according to data released by WIPO.[21] The ways in which industrialized countries formulated their policies regarding intellectual property rights during the process of building their industrial bases have been extensively studied. Historical studies highlight that the early industrialization processes of those countries took place within flexible Industrial Design protection frameworks.[22] These frameworks were designed to promote the diffusion of local innovation with new technologies to capture the market.

IPRs encompass a broad range of topics, including as inventions, trademark-like signs, geographical indications, proprietary knowledge, artistic works and performances, plant varieties, functional and decorative designs, integrated circuit designs, and test data for pharmaceuticals and agrochemicals.[23] In the majority of these categories, WTO members are required by the TRIPS Agreement (1995) to adhere to minimum criteria.[24] In the context of business and industry, intellectual property refers to a wide range of human-made works that are highly valuable. While there is a wide range of creative works that fall under the purview of intellectual property protection under TRIPS, only those that have received official legal recognition are included in the protection categories.[25] Items covered by intellectual property include artistic compositions and other works of art, technical advancements, and signs and commercial identifiers used in commerce to identify individuals, products, and services. Within the context of intellectual property, industrial designs are given extra protection and are given specific consideration.

Design as a whole is not adequately represented by statistics on industrial design filings. Industrial designs are designed in different ways in different countries. Some of the examples are as below: The majority of national and regional legal definitions of industrial designs accurately capture their distinctiveness. This is demonstrated by the following instances, which are drawn from a sample of national and local laws:

- The definition of industrial design found in the WIPO Model Law on Industrial Designs is significant.[25] According to the Model Law an industrial design is “any arrangement of lines or colours or any three-dimensional form, whether or not they are connected to lines or colours, as long as the arrangement or form gives an industrial or handcrafted product a unique appearance and can be used as a pattern for such a product. Industrial designs need to be visually discernible.” Industrial designs are used on a broad range of manufactured goods and handcrafted things, such as textiles, lighting equipment, jewellery, and domestic furnishings as well as packages and containers. Moreover, logos, graphical user interfaces (GUI), and graphic symbols may also be related to industrial designs. The purpose of industrial design is to encourage and promote innovation in the creation of new products and make investments to create cutting-edge consumer items that integrate such designs.
- In Japan, under Design Law, No. 125 of April 13, 1959 (as amended by Law No. 220 of December 22, 1999, entry into force: January 6, 2001), section 2 "design" refers to any combination of colour, form, or pattern in an item (or portion of an item) that creates an aesthetically pleasing visual impression.[26]
- In the United Kingdom, under the Registered Designs Act 1949 (as amended by the Copyright, Designs and Patents Act 1988), section 1(1) "design" refers to any characteristic of an article's shape, configuration, pattern, or ornament that is given to it by an industrial process and that is judged by the eye in the final product. It does not include any of the construction method or concept.[27]
- In United States of America, under the Manual of Patent Examining Procedure (MPEP) Edition 8, August 2001, Chapter 1500 – Design Patents, section 1502.“An article's design is made up of the visual elements that are applied to or embodied in it. An article's configuration or shape, the surface ornamentation added to it, or the combination of its configuration and surface ornamentation are all examples of how a design is expressed through appearance”.[28]
- In India under the Design Act, 2000, design is defined as ‘only the features of shape,

configuration, pattern etc. which are applied to the 'article' and 'which in the finished article appeal to and are judged solely by the eye'. The term 'Article' under the Designs Act, 2000 means: "any article of manufacture and any substance, artificial, or partly artificial and partly natural and includes any part of an article capable of being made and sold separately."[29]

- In European Union, under The European Directive on the legal protection of designs - "An industrial design is the outward appearance of the whole or parts of a product resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation."[30]
- In China, according to China Patent Law, " a design is defined, the shape and pattern or the combination thereof, or the combination of the colour with shape and pattern, which are rich in an aesthetic appeal and are fit for industrial application".[31]
- In Singapore, according to the Registered Designs Act (Chapter 266), "A design refers to the features of shape, configuration, pattern or ornament applied to an article by an industrial process. An article refers to any object to which the design is applied. A Registered Design applied to an article must be capable of an industrial process i.e. more than 50 copies of the article have been or are intended to be produced for sale or hire."[32]
- In Malaysia, Design Patents mentioned under the Industrial Designs Act 1996, came into effect on September 1, 1999. Before this date, Malaysia could obtain protection for industrial designs by registering them in the United Kingdom. "Industrial design means features of shape, configuration, pattern or ornament applied to an article by any industrial process or means."[33]

In the era of trade advancement, with diversified trade baskets and bilateral trade agreements, FDI has direct impact on the manufacturing sector and also service sector in any country. In case of India, Indian research activities have been driven by technology, innovation and new products. This new innovation is useful from two aspects: firstly, new innovation creates new product with its own intrinsic values. Secondly this innovation when gets patented in terms of industrial design then it further creates multiplier effects for the innovator and also industry. It's crucial for Indian economy to strengthen the industrial design system in India. The design helps to promote the manufacturing competitiveness. For creation of robust industrial design economy, India needs to attract foreign investment, focus on infrastructure, improve digital connectivity, and enhance trade relations. According to Department for Promotion of Industry and Internal Trade (DPIIT), total FDI inflows from all countries into India from April 2000 to March 2022, was 588,528 million USD.[34] This is lower than the FDI received in USA, China, Brazil and other countries. The top ten industries that attracted the largest inflows of FDI were the following: construction, chemicals, drugs & pharmaceuticals, metallurgical industries, service sector, computer software and hardware sector, telecommunication, and automobile sector.

The requirement to turn Indian economy into R&D powerhouse and knowledge hub is to create optimal space for innovation, and increasing R&D expenditure as percentage of GDP. According to estimates from the data of World Bank, Indian economy has comparatively lesser number of R&D professionals per million people. The number of India is 160, whereas for China it is 890, 710 in Brazil, 3950 in Germany, 3838 in United States and 5151 in Japan respectively.[35] This research study is first of its kind where the role of countries like Japan, Singapore, Malaysia, South Korea, United States and others are being analysed while studying the relationship between FDI and filings of ID applications in India.

Data and Methodology

This research aims to investigate the effects of foreign direct investment (FDI) from ten countries under Group-1 and Group-2 on filing of industrial design applications in India which has been presented through statistical abstract. Further, data on foreign direct investment (FDI) inflows, the total number of industrial design applications filed, variables like GDP per capita, Labour participation rate, and annual inflation rate, have been extracted for quantitative analysis from a variety of sources, including the World Intellectual Property Rights Organization, Reserve Bank of India annual reports, Ministry of Commerce and Industry reports, UNCTAD reports, World Investment Reports, and other government reports. The time period of data related to filings of industrial design applications in India is from 1994 to 2022.

The dependent variable used in the econometric analysis is the total number of applications of industrial designs filed by each country in Indian office represented as design_new_1. There are several

independent variables that can affect the filings of industrial design applications. The major important variables which have the potential to decide the filing of ID applications are presented in Table 1: amount of Foreign Direct Investment as fdi_new_1; Gross Domestic product per capita of the country as gdp_1; Labour force participation rate shows the percentage of working age of the population. It is represented as lfpr_1 in the regression. Annual inflation rate denoted as inflation_1 is an important parameter to capture the purchasing power of the country.

The problem of multicollinearity has been taken into consideration. The problem of auto correlation has also been addressed. Year Fixed Effect Model is a methodology is used to sweep away all those variations between individual countries and control all those variables, whether it is observed or not, as long as the variables remain constant within the larger category. In the analysis, CECA and CEPA have been signed in different years. In order to capture the effect of individual country this year fixed method is used.

The regression used for the analysis is shown as following. The equation (a) is used in case of countries under group-1 and equation (b) is used for the countries under group-2.

areg design_new_1 fdi_new_1 lfpr_1 gdp_1 infilation_1 if (country == "India" | country == "Singapore" | country == "Malaysia" |> country == "Republic of Korea" | country == "Japan"), abs(year) ... (1)

areg design_new_1 fdi_new_1 lfpr_1 gdp_1 inflation_1 if (country == "China" | country == "France" | country == "Germany" | country == "United Arab Emirates" | country == "United Kingdom" | country == "United States of America> "), abs(year) ... (2)

Empirical Results and Discussion

There are numerous arguments in favour of industrial design protection. The most common argument is that robust design protection will boost creativity and innovation by giving designers a financial incentive to produce better goods. This increased creativity and innovation creates other benefits. For instance, researchers argued that strong industrial design protection will have a trickle-down effect on the manufacturing industry in the United States.[36] That is a strong industrial design protection will lead to more creativity and innovation which will lead to higher-quality products, which will result in an increase in the number of consumer goods, manufactured in the higher income countries. To foster expansion in the design sector, it is first necessary to offer robust protection for industrial design. Industrial design is significant to manufacturers as well as consumers. The policy helped the government to emphasize design talents to tackle the fall in investment in industrial design.

Table 1 — Details of dependent and independent variables

S. No	Name	Variable denoted
1	Industrial design applications filed (Dependent variable)	design_new_1
2	Foreign Direct Investment	fdi_new_1
3	Gross Domestic product per capita	gdp_1
4	Labour force participation rate	lfpr_1
5	Annual inflation rate	inflation_1

Source: Authors' representation for research work

Graphical Interpretation

India experienced major transformation named as economic reforms. The goal of this transformation was to open up India's economy and bring in foreign investment. The cumulative Foreign Direct Investment (FDI) inflows into India from 1992–93 to 2022–23 is shown in Fig. 1.

India received $315 million in FDI in 1992–1993, a very small amount that increased to $586 million the following year. But from 1994 to 1995, FDI inflows more than quadrupled to $1,314 million, showing a significant rise in foreign investment. This upward tendency persisted for the following three years. The 1997 East Asian financial crisis reduced foreign direct investment (FDI) into India. FDI inflows decreased slightly during this time, despite India's ability to lessen the effects of the crisis. As a result, foreign direct investment dropped from $3,557 million in 1997–1998 to $2,155 million in FY 1999–2000.

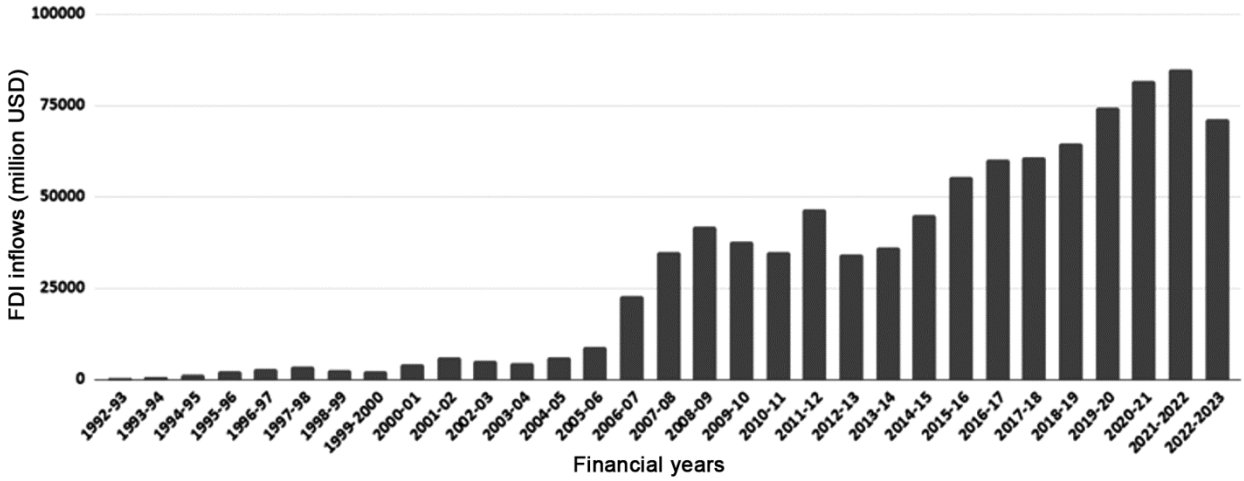
A favourable trend was shown by the rise in foreign direct investment inflows for the fiscal years 2000–01 and 2001–02, which amounted to $4,029 million and $6,130 million USD, respectively. On the other hand, inflows dropped to $5,035 million USD in FY 2002–03 and then fell even lower to $4,322 million USD in FY 2003–04. This decline in FDI inflows into India was caused by a number of factors. In FY 2008–09, inflows of foreign direct investments (FDI) into India increased significantly from FY 2004–05 to FY 2008–09, from $6,051 million USD to $41,873 million USD. During this time, the Indian economy grew rapidly and investor's trust in the country's developing market

increased. There was a decline in foreign direct investment inflows during the next two years, nevertheless, as a result of the global financial crisis of 2008. FDI decreased to $34,847 million USD in FY 2010–11 as a result of the crisis. Investment inflows recovered the next year, reaching $46,556 million USD, despite this setback.

FDI inflows, however, fell once more to $34,298 million USD by FY 2012–13. Global economic situation played a major role on FDI inflows, with the financial crisis, particularly the Euro crisis in 2012–2013, significantly gloomy investor sentiment and capital flows was noticed. India's foreign direct investments inflows increased steadily during fiscal year (FY) 2013–14 to FY 2021–22, with inflows increasing from $36,046 million USD to $83,570 million USD. FDI inflows into India grew steadily during this time due to a number of causes. More recently a more favorable investment climate was created and FDI inflows were encouraged by the government initiatives like "*Make in India," "Startup India," and Production Linked Incentive (PLI)* schemes that were targeted at specific sectors like electronics manufacturing, FMCG, pharmaceuticals, semi-conductors, telecom, and networking products.[37] India ranked 142nd out of 190 nations in the ease of doing business index in 2014 and by 2022 it had improved significantly to 63rd place.[38] The government efforts helped to continue the increase in FDI inflows into India after 2014.

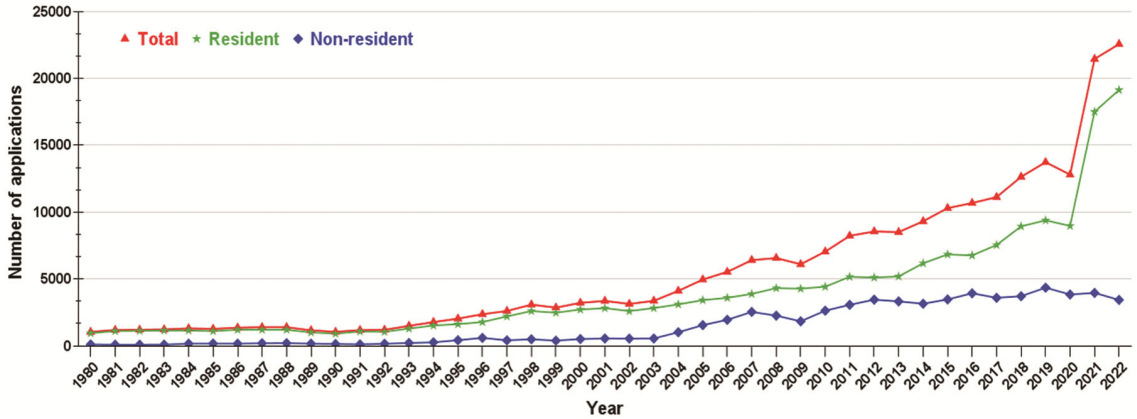
Statistical Description

The total number of industrial designs applications filed in Indian office from 1980 onwards is presented as Fig. 2. The total applications have two categories-



Source: Authors' calculation from Annual reports of Reserve Bank of India (RBI)

Fig. 1 — Year wise FDI inflows in India



Source: Author's calculation based on the data from IP Statistics, WIPO

Fig. 2 — Industrial design applications filed in India (Resident and Non Resident)

Resident and *Non-resident*. The resident applications are those when the applicants file applications at their home office. An application filed by the applicant on behalf of applicant who does not stay reside is referred to as a non-resident application.

Since 1980 onwards the total number of applications under the Resident category contributed around 98 percent in industrial designs applications. In 1980 the total industrial design application was 1033 in which 937 were from resident and just 96 were under Non-resident category.

The size of applications in 1985 was 1260, in 1987 it was 1387 and in next 9 years, the number of applications increased to 1768 (1994). The rise in number of applications gained prominence after 1995 onwards. In 1995 the total applications were 2024 with resident category filing 1613 applications and Non-resident filings 411 applications. The total number of applications of industrial design filing in 2009 was 4886, that increased to around 17224 in the year 2019–2020. The Indian office received more than 10,000 industrial design applications from the year 2017–2018 onwards. In the same way, the percentage of Indian industrial design submissions filed rose to 86.06 percent between 2015 and 2019. In 2019 the applications for Residents (India) reached 9435 while those from Non-residents (India) reached 7789.

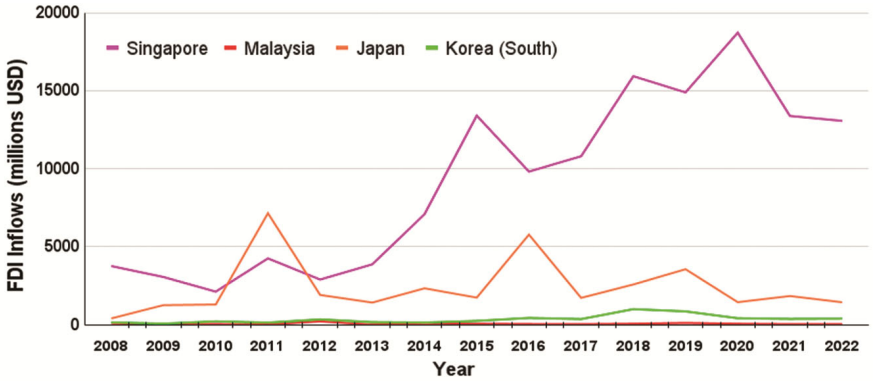
The FDI inflows from the four major economic partners (Singapore, Malaysia, Japan and Korea) under Group-1 category are presented in Fig. 3.

India inked CECAs with Malaysia in 2011 and Singapore in 2005. In 2009, India signed a CEPA with South Korea, while in 2011 with Japan. The amount of FDI inflows has increased from these 4 major countries which were also part of East Asian Tiger forum. FDI was drawn to industries like software services, computer applications, pharmaceuticals, electronics, and communications. Along with the inflow, these nations have submitted more industrial design applications per year in India in a variety of industries.

The other six nations that make up Group-2 are China, France, Germany, United States, United Kingdom, and United Arab Emirates. Over the time, investments have been made in the Indian economy by these nations as presented in Fig. 4.

These major high income countries remain outside of the CEPA and CECA treaties. Based on criteria of investment contribution, high growth rate, high level of per capita income, and high skilled labour, these six nations are considered for the study. The largest FDI contribution to the Indian economy has come from these six countries during the past 14 years. These economies, which have distinct trade agreements with India over the period, have targeted the manufacturing and service industries in India. Under the trade agreement, India has given access to pharmaceutical industry, automobiles, green energy, transport sector and others. There's an understanding that for any country, investing in industrial design improves its business's profitability and economic growth prospects. The contribution of industrial design can be represented in higher turnover and employment for those firms who make design investments. This can be linked to the development of the economy and financial sector.

The total filings of CECA and CEPA partners (Group-2) in India are an interesting case study. In



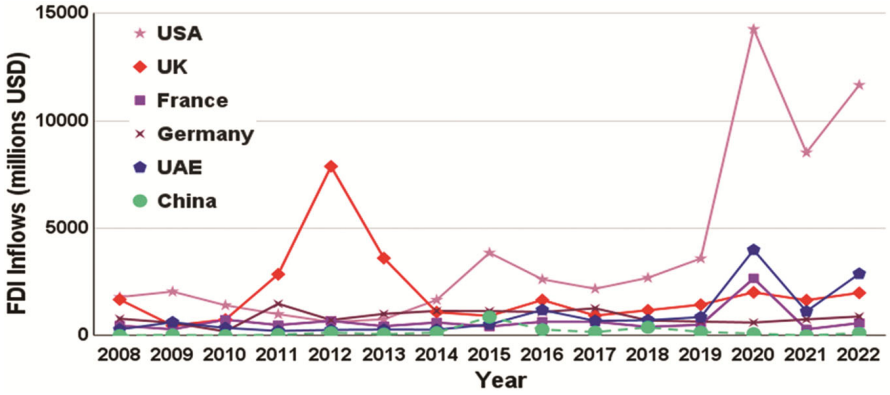
Source: Author's calculation based on data from RBI, Ministry of Commerce, Govt of India
Note: The yearly FDI inflows from Malaysia are less compared to other countries. The visibility of FDI contribution seems negligible in the above graph

Fig. 3 — FDI Inflows from India's CECA and CEPA Partners (Group-1)

Fig. 5, countries under CECA (such as Singapore and Malaysia) have shown interest in investing in India and promoting industrial designs in India. Singapore had filed nearly 80 applications around 1995 in various sectors. Over the period of time the number of applications remained stagnant. The major breakout in applications happened from 2005 onwards when CECA treaty was concluded. The number of applications of IDs kept increasing every year crossing 600 in 2012–2013. However, the number has declined by 2020.

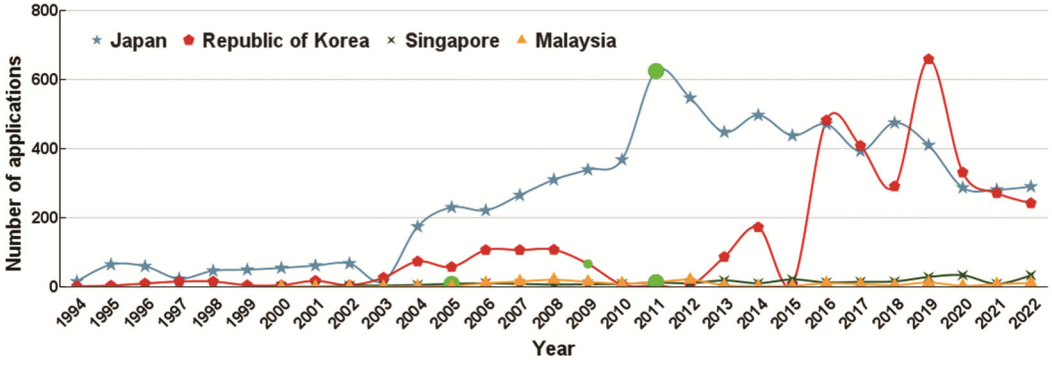
In case of Malaysia a slight change in the number of applications filed post 2011 can be observed. The number of applications has been below 100. It's due to the amount of FDI inflows from Malaysia in India. Compared to Singapore, the number is not big enough however the likelihood is positive. The treaties carry special chapters and discussion on intellectual property rights protection and awareness among both the countries. Similarly, there is mention of the chapters on investment policies. The data from WIPO statistics shows that ID application filings from Malaysia post 2011 has increased substantially.

Similarly, under Fig. 5, countries under CPEA (Japan and Republic of Korea) have filed industrial design applications in India. Japan signed CEPA in the year 2011, and Republic of Korea signed in the year 2009. Japan is in the top 10 countries known for highest foreign direct investment in India. Since 1995 onwards Japan has been filing industrial designs application in India. In 1995 around 64 applications were filed; it increased to 174 in the year 2004; the turnout started with signing of CEPA in 2011. From 2011 the number increased to 625. Subsequently the number of applications filed by Japan had declined with 438 in the year 2015, 393 in the year 2018, 287 in the year 2021. The Republic of Korea had around 9 applications in the year 1996; the number increased to 17 in 2001, the turn out happened after 2009 onwards. The number increased to 172 in year 2014, 208 in the year 2017, 659 in the year 2019 and declined to 242 in 2022. The CECA and CEPA countries have been showing interest in filing ID applications in India seeing the potential in economic growth, political stability, and strong economic reforms.



Source: Author's calculation based on data from RBI, Ministry of Commerce, Govt. of India

Fig. 4 — FDI inflows from India's Non-CECA and Non-CEPA Partners (Group-2)



Source: Author's calculation based on the data from WIPO Statistics (2023)

Fig. 5 — Industrial Design applications filed by India's CECA and CEPA partners (Group-1)

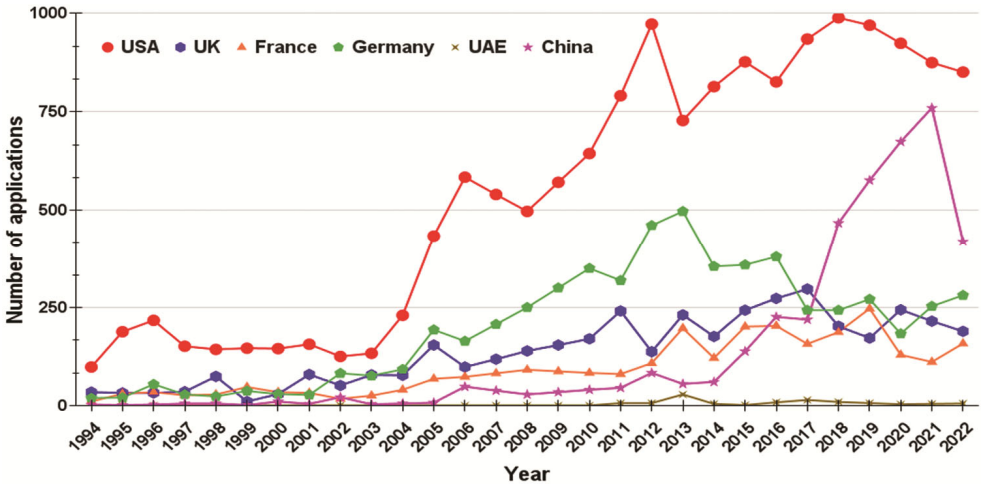
In comparison to CECA/CEPA partners, there are several countries which are under Non-CECA and Non CEPA partners. The graph below shows the trend in filings of applications by those Non CECA and Non-CEPA countries. This study has analysed countries like United States of America, China, United Kingdom, France, Germany and United Arab Emirates. The reasons behind selecting these countries are that they have been among top ten investors in India in different sectors. The trend of Industrial design applications filed by six countries which are not part of CECA or CEPA agreements could be analyzed from Fig. 6. Each country has separate bilateral trade agreements, but they have not focussed on filing of designs applications in Indian territory which means they are mostly focused on manufacturing sector, production of goods and less focus on promoting innovation in India. UAE has been a key investor in India however the registration in IDs has been substantially very low. As per the data UAE filed 6 applications in 2012 with highest number of 28 in 2013. Since then the number of applications have declined. For China the applications number was 10 in the year 2000 and increased to 48 in 2006. It increased to 138 in the year 2015, and touched 760 in the year 2021. The rise in numbers was due to various reasons. Germany has been the biggest investor in automobile, defence sectors, telecom and scientific development in India. In the year 1994 the number of IDs application was 19 which increased to 37 in 1999. In the year 2002 the applications filed was 82 in 2002 and reached 497 in 2013. However, after it the subsequent years showed up and down in the filing of the applications.

France has remained an effective trade partner with specialization in defence, chemical products and machines. In the year 1994 the number of applications filed were 10. In 1999 it increased to 47 and by 2005 the number increased to 68 applications per year. In 2012 the number touched 108 applications, in 2013 the applications filed were 197, and by 2019 the number increased to 247. There was slight decline in the year 2022 with 158 applications filed.

United Kingdom and India has a long trade history. India has been importing products like pharmaceutical products, electronic equipment's, etc. In 1994 the applications of Industrial Designs filed in India was 34. It increased to 74 in the year 1998 and in 2005 it touched 154 applications. Since then the number fluctuated but in 2011 the applications filed increased to 241 and touched the highest level of 297 in 2017. Later on the number has declined to 189 in the year 2022.

United States of America has been a first among these countries in filing of Design applications in India. In the year 1994 the number of applications was 98 and it touched 217 in 1996. The numbers declined after this and in 2002 the number of applications filed was 125. After 2005, the number again increased. In 2005 the number of ID applications was 434, in 2010 the number increased to 644, in 2012 the number of ID applications was 973, in 2018 it was 989, by 2022 the number declined to 851. All these countries show a particular trend of filing of Industrial design applications.

It is clear that the United States has been filing more of ID applications in India. This outcome is due



Source: Authors' calculation based on the data from WIPO (2023)

Fig. 6 — Industrial Design applications filed by Non CECA and Non CEPA partners (Group-2)

to MoUs and agreement signed at different time intervals. In 2005, India and US signed Science and Technology Cooperative Agreement.[39] The agreement was first of its kind in India, which mentioned about the collaboration between Indian and American scientists in government agencies, the private sector, and academia in areas like basic sciences, space, energy, nanotechnology, health, and IT. It also establishes for the first time intellectual property right protocols and other provisions necessary to conduct active collaborative research. In 2020, India and USA signed a MoU to strengthen IPR regime and take effective steps for IP protection and enforcement around the world to benefit various stakeholders.[40] However, both of the countries have not shown any interest towards signing of CECA or CEPA in current scenario.

There are two results using Year Fixed Effect methodology. Fixed effects help in controlling for individual country and gets rid of any kind of variation between individual countries. The quantitative result is divided in 2 parts, Group-1 and Group-2 respectively.

The result in Table 2 shows that the FDI inflows from countries under Group 1 (Japan, Singapore, South Korea and Malaysia) have positive and significant impact on the filings of Industrial Design applications fillings in India offices across different sectors. FDI inflows from the above four countries were in sectors like manufacturing, automobiles industry, electronics system design and other sectors. The signing of the CECA and CEPA agreements establishes a positive impact on Industrial designs applications in the Indian economy. The relationship between industrial designs applications and GDP per capita is having positive relationship and is also significant. This means rising GDP per capita of India has attracted IDs applications from these countries.

It could be seen from Fig. 5 that Singapore and Malaysia have registered less industrial design applications in India. However, the amount of FDI inflows from these two countries is also less compared to Japan and South Korea. Overall there is significant number of ID applications from Singapore and Malaysia. The other variables which show negative relationship are labour force participation rate and annual inflation rate. The labour force participation rate is negatively correlated but it's significant. This means the working population force does decide the filings of applications. The Indian labour participation rate has not been attractive for the other countries. Similarly, the rising annual inflation rate has generated negative impact on the filings of ID applications and also it is non-significant in nature. Low inflation is always the choice of the foreign country while investing. Overall the regression is a good fit given the values of R-square and Adjusted R-square.

The results support the argument that in India signing of CECA and CEPA does influence the ID applications. This is because these agreements carry special and exclusive chapters on Investment and IPR protection and the government local laws emphasis in the IPR Acts have been successful in creating conducive atmosphere for promotion of significance of Industrial Design applications in India. The result outcome establishes a relationship that the countries under CECA and CEPA have interest in Industrial design when the host country is towards adoption of favourable IPR structure.

The findings in Table 3 for Group-2 indicate that countries like United States, United Kingdom, China, France, Germany and United Arab Emirates have negative relationship with filings of ID applications in India. The graphical interpretation, Fig. 6, shows that United States and China have been filing significant number of ID applications in India. The other

Table 2 — Liner regression values for Group 1 countries

F (4, 12) = 93.91 Prob > F = 0.00
R-squared = 0.97 Adj R-squared = 0.94
Root MSE = 0.47

Design_new_1	Coefficient Values	Std. Error	t-value	P> l t l values	[95% Conf. Interval]	
Fdi_new_1	0.13	0.06	2.14	0.05	−0.002	0.26
lfpr_1	−27.12	5.28	−5.14	0.00	−38.63	−15.62
gdp_1	0.27	0.13	1.94	0.07	−0.32	0.57
inflation_1	−0.02	0.19	−0.11	0.91	−0.45	0.41
_cons	112.18	23.30	4.81	0.00	61.40	162.95
Year	F (11, 12) = 3.87 0.01					

Source: Author's calculations derived from econometric model based on year Fixed effect Estimation Methodology

Table 3 — Liner regression values for Group 2 countries

F (4, 44) = 30.15 Prob > F = 0.0000
R-squared = 0.7874 Adj R-squared = 0.7053
Root MSE = 0.8084

design_new_1	Coefficient Values	Std. Error	t-value	P> l t l values	[95% Conf. Interval]	
fdi_new_1	−0.07	0.08	−0.86	0.39	−0.25	0.10
lfpr_1	−0.59	1.63	−0.37	0.71	−3.88	2.69
gdp_1	−1.79	0.20	−8.87	0.00	−2.20	−1.39
inflation_1	−0.04	0.19	−0.20	0.84	−0.43	0.35
_cons	26.89	6.61	4.06	0.00	13.55	40.22
Year	F (13, 44) = 1.394 0.201					

Source: Authors' calculation derived from econometric model based on year Fixed Effect Estimation Methodology

countries have also registered good number of applications in Indian offices. However, the fixed year effects estimation shows that the variables are neither significant nor positively correlated.

The estimation shows that FDI inflows has negative coefficient and is non-significant. This means the filings of applications in India is not driven by FDI inflows by the partner countries. The Labour force participation rate is having negative coefficient and is non-significant as well. The correlation with GDP per capita is significant but negative coefficient. This shows that these countries prefer to file applications if the values of GDP per capita are lower. The annual inflation rate has not attracted filings of ID applications. The outcome is negative and non-significant. One of the primary reasons for negative outcome might be that due to absence of IPR chapters in trade agreements. In such kind of agreements there is manifestation of strengthening of IPR rules and regulations. This suggests that, countries outside CECA and CEPA treaties are focusing on establishment of manufacturing hub and increase offshore production sites. These countries are not interested in promotion of knowledge economy

The primary objective of this research was to investigate how FDI inflows from CECA and CEPA partners, as well as their non-CECA/non-CEPA economic partners, affect the filing of patent applications in India. The outcome also shows that such kind of agreements supports in establishing knowledge economy base. Filing of industrial applications strengthens the manufacturing base in India. The outcome matches the work under Schumpeter's innovation theory and Paul Romer Endogenous growth model. Technological investment contributes towards innovation which strengthens the production frontier of the manufacturing base. The countries which are out of CECA and CEPA should build an atmosphere for joining such type of agreements. Countries like Germany and France have been strong trading partners with India but there is more focus towards sharing of technology and investment in manufacturing sector. There is low interest in IP protection and promotion from these developed countries. There is requirement of FDI and systematic facilitation of industrial design ecosystem as well. Without focus on IDs there is a risk for Indian economy to fall behind the advanced nations. Industrial design applications help in creating flexible ecosystem for local firms and operation unit to gain efficiency in manufacturing. These activities support initiatives like Make in India scheme. Countries with robust ID environment yield more than 50% more innovative output compared to those with weak ID regime.[41] The surge in the number of patent applications filed in India is indicative of the country's growing intellectual environment and technological improvement. However due to imbalances in the economy some of the countries have not showed positive willingness in supporting Indian IPR system.

Conclusions

India has benefitted from trade agreements in attracting higher FDI inflows and strengthening of IPR regime. The trade agreements such as CECA and CEPA have successfully encouraged innovation in sectors like biotechnology, automobiles, service sectors and others in India. The result gives a positive correlation between FDI inflows and filing of industrial design applications in India. The economic trust and cooperation between India and its CECA-CEPA economic partners is significant for policy makers to frame more number of such types of agreements. Indian economy can substantially improve its manufacturing base and further promote building of a knowledge based economy. There is limitation in this study as other potential exogenous

and endogenous variables can influence the degree of filings of Industrial design applications in India. There is a scope of where data of small scale and medium scale industries could be used to make analyses between trade agreements and intellectual property right linkages. Finally, India should strengthen its IPR system by being more receptivity towards collaborations with other countries.

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