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A CASE STUDY ANALYSIS BETWEEN INDO-GERMAN DEVELOPMENT COOPERATION RELATIONS ON RENEWABLE ENERGIES AND DIGITAL INFRASTRUCTURES

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Abstract: India has had diplomatic relations since the year 1951 with Germany, whose interest in India's development has spiked since its economic growth propelled by the economic liberalization of India in the year 1991, which came to be by expanding private and foreign investment, along with various market reforms. We will firstly introduce the reader to the most recent context of the Indo-German cooperation relations, in order to promote an understanding of said relations now and in the near future, since India is Germany's most relevant cooperation partner in South Asia. Afterwards, the main points of analysis will be evaluated, which will be focused on less traditional forms of aid; those being renewable energies and digital infrastructures. The focus will be on the assessment of the importance of the Indo-German relations and its evolution; the assessment of the specific projects concerning renewable energies and the building and improvement of digital infrastructures; and the comparison of Indo-German bilateral relations to Japanese-Indian bilateral relations regarding ODA flows.
Keywords: Indo-German cooperation relations. Digital infrastructures. Renewable energies. Private and foreign investment.

Abstract: India mantiene relaciones diplomáticas desde 1951 con Alemania, cuyo interés por el desarrollo de India se ha disparado desde su crecimiento económico impulsado por la liberalización económica de India en el año 1991. Que se produjo mediante la expansión de la inversión privada extranjera, junto con diversas reformas de mercado. En primer lugar, introduciremos al lector en el contexto más reciente de las relaciones de cooperación Indo-germánicas, con el fin de favorecer la comprensión de dichas relaciones en la actualidad y en un futuro próximo, ya que India es el socio de cooperación más relevante de Alemania en el sur de Asia. A continuación, se evaluarán los principales puntos de análisis, que se centrarán en las formas menos tradicionales de ayuda, como son las energías renovables y las infraestructuras digitales. La atención se centrará en la evaluación de la importancia de las relaciones Indo-germánicas y su evolución; la evaluación de los proyectos específicos relativos a las energías renovables y la construcción y mejora de las infraestructuras digitales; y la comparación de las relaciones bilaterales Indo-germánicas con las relaciones bilaterales entre Japón y la India en lo que respecta a los flujos de AOD.
Palabras clave: Relaciones de cooperación Indo-germánicas. Infraestructuras digitales. Energías renovables. Inversión privada extranjera.

Index:

A mis padres y a mi hermana Elena,
por ser la inspiración de este trabajo.

1. Purpose and motives

It is a well-known fact that Germany is a major player in international development cooperation, at least with regard to the amount of official development assistance (Öhm, 2021), which is defined as government aid designed to promote the economic development and welfare of developing countries (Alonso & Glennie, 2015). This affirmation is supported by the fact that from the DAC members, Germany has been classified as "*the second-largest development co-operation provider of the Development Assistance Committee (DAC)*" in the year 2022 with 33.27 billion USD, right behind the United States of America and before the EU institutions (OECD, 2022). At the same time its bulk of ODA keeps increasing (OECD, 2022). It was after the Second World War that Germany first became engaged in international development cooperation having a 4.2% GNI (World Bank, 2019), founding the first Ministry for Economic Cooperation in 1961 (Öhm, 2021). Also, after the Cold War, the international paradigm shifted sustainably, power was no longer constricted to armed forces or even territories, but to cooperation, communication, information and science; so it was an obvious choice for Germany to invest resources in those particular matters and put its efforts towards development cooperation (Lengfelder, 2016).

Germany's focus on cooperation is mostly bilateral, which means it goes directly from donor to recipient between governments (Degenbold-Martinussen & Engberg-Pedersen, 2003), implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit or the (BMZ) Federal Ministry for Economic Cooperation and Development and the KfW Banking Group, the latter which has been active since 1948, and is in charge of improving living, environmental, social and economic conditions worldwide on behalf of Germany. Although there have been recent trends that shift towards triangular cooperation with countries such as Indonesia, Colombia or Brazil (Lengfelder, 2016), due to the fact that this cooperation allows for better cost-efficiency, local training and less dependency.

> "*Triangular cooperation works when the beneficiary partner has demanded support to tackle a specific development challenge; the pivotal partner often has proven experience tackling the issue, and shares its resources, knowledge and expertise to help others do the same; and the facilitating partner helps connect the partners, supporting the collaboration financially and technically.*" (OECD, n.d)

Strictly regarding official development assistance (ODA), their role is extremely significant, since it's regarded as the second largest donor country (Öhm, 2021). Overall, all throughout the German history of development cooperation, it can be inferred that its importance and relevance was maintained through trade and economic growth.

Germany and India are highly connected by official development assistance, as will be proven in the analysis, being India's second largest recipient country (OCDE-DAC, 2020). Their importance in their own regional arena is quite significant, since Germany is the number four economy in the world according to the World Bank (World Bank, 2019) and India is the fifth economy in terms of GDP (World Bank, 2019). This proves that it is emerging at a considerable pace towards becoming a very significant economic and industrial power. India is not only a member of the G20 or Group of Twenty, but also of the emerging economies known as the BRICS, which are Brazil, Russia, India, China and South Africa (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, 2020).

Germany's aid is mainly given to India by composite loans, soft loans or grants through the German Government's Development Bank" (Indian Ministry of External Affairs, 2020). But even if Germany and India's relationship is mainly focused on development cooperation, it is also true that is not the only way in which they cooperate. For example, they have an agreement on defense cooperation, the India-Germany Defence Cooperation Agreement of 2006, which surprisingly, has strengthened cooperation by providing a framework for bilateral relations. Or institutional cooperation agreements such as the Indo-German Environment Forum, the High Defence Committee, or the S&T Committee (Indian Ministry of External Affairs, 2020).

This aid is focused on a sustainable development of the urban sector, clean technology, clean energy and the protection of natural resources. So, it is only fitting that Germany aids India in those areas. Regarding renewable energies, Germany is very well known to have been focusing on fostering their use and due to the success of the country's feed-in policies for promoting renewable energies (Pons-Seres de Brauwer, 2022). It is suitable that when analyzing their priorities regarding development cooperation, it is one of the main ones.

As a matter of fact, Germany's new government, whose Chancellor is Olaf Scholz, wanted to make 2022 a crucial year for the energy transition and the use of renewables by creating a new Federal Ministry for Economic Affairs and Climate Action. Ministry which focuses on increasing the share of renewables in the power mix from a 65% to a 80% (Amelang et al., 2021). It has also its sights on the end of hard coal and lignite, in order to comply with the Paris Agreement, which is a legally binding international treaty on climate change containing various measures to reduce the effects of greenhouse gasses, and on a nuclear phaseout (Amelang et al., 2021). Regarding strictly foreign policy, since it took the presidency of the Group of Seven (G7) on the first of January 2022, it has the climate and energy crisis as one of their priorities, along with establishing climate partnerships (Amelang et al., 2021), since climate action is one of their new foreign policy imperatives (Wettengel, 2019).

Regarding digital infrastructures, since it is such an open concept and as such can be related to many things, it is important to first set a clear definition which can help delimit the term. Digital infrastructures are regarded as the hardware, software, installations and the services components like data centers and all the necessary components to administrate public or private environments (World Economic Forum, 2021). According to this particular definition, digital infrastructures can be also related to the energy transition, which is one of Germany's main objectives, since their new digitalization strategy uses environmental data and artificial intelligence in order to help fight the climate crisis (Wettengel, 2022).

Digital infrastructures are now of utmost importance, since the world is evolving towards a new economic order based on digital innovation and a circular economy (Getic, 2021). It makes sense that Germany is improving not only their own digital infrastructures, but has an interest in helping its recipient countries as well, so that they might be in a similar situation in which commerce might bloom, having positive effects for both countries and further solidifying their relations. As a matter of fact, in the 77º period of sessions at the General Assembly of the United Nations, states from all around the globe have compromised to the exchange of digital public goods and good practices in order to reach the global development objectives at the event called 'The Future of Digital Cooperation: Building resilience through safe, trusted, and inclusive digital public infrastructure' in September of 2022. This consensus has the development and the use of digital public infrastructures in

mind, since they have become a basic cooperation tool (PNUD, 2022). Germany by itself promised up to 35 million euros for that very matter (PNUD, 2022), even if the European Union as a whole also took part in the initiative and private investors like the Bill and Melinda Gates Foundation promised 200 million USD (PNUD, 2022).

According to data collected by the ICEX España Exportación e Inversiones —which is a public entity whose mission is to promote the internationalization of Spanish undertakings—, Germany is the fourth state in the world with the highest amount of income in the telecommunications sector; and the main actors in the country for the improvement and the promotion of the sector are the Bundesministerium für Verkehr und Digitale Infrastruktur, the Bundesministerium für Wirtschaft und Energie, the Bundesnetzagentur, the Gigabitbüro des Bundes and the Netzallianz Digitales Deutschland (Icex, 2021). As mentioned supra, this digitalization is also strictly related to climate change and the energy transition, which is made clear when the Bundesministerium für Wirtschaft und und Klimaschutz, which is the Federal Ministry for Economic Affairs and Climate Action, is involved, with their own digital agenda (Federal Ministry for Economic Affairs and Climate Action, 2022).

1.1. Historical background

Both India and Germany have had over half a century of trade history, and during the course of that time, both States have focused their efforts on creating and fostering a strategic partnership centered on economic and business aspects (Khashimwo, 2015). The strength of the economic aspect of their cooperation relations is related to the fact that this particular kind of cooperation has had a huge impact on their relationship since the famous German merchant, Jakob Fugger, financed the first trip of German ships to the state of Goa in India in the 16th Century (German Embassy, 2022a). Since that first trip, the trade route between India and Germany was properly established, fostering the creation of various German companies which wanted to trade with India.

This trade created and encouraged different business and investment opportunities for both counties; even if there weren't official bilateral trade agreements like the ones we know today (Rau, 2018). This trade route had not only financial benefits, but also cultural gains,

due to the fact that German researchers have been studying their culture for centuries since the start of their relations. Today another example of cultural cooperation is the implementation by Max Müller, a well-known German indologist, of various Goethe Institutes all throughout India; for instance, there is one in Bangalore, another in Mumbai, another in New Delhi and so on (Rau, 2018).

It was after the Federal Republic of Germany was established and right when India was looking out for its place in the international sphere as an independent country, that these bilateral relations, based on democratic principles, came to be in the 1950s (Jaishankar, 2017). Germany was on the path of rebuilding a more open country, and this path aligned with the fact that India was one of the firsts countries to end the state of war (Khashimwo, 2015); as a matter of fact, when the division into East and West Germany became a reality, India established relations with both Germanies (Rau, 2018). By the end of the 50s, the Indian Prime Minister Jawaharlal Nehru had visited West Germany in more than one occasion (Jaishankar, 2017), and during this period, the West was providing their industrial know-how and supporting both the foundation of the Indian Institute of Technology Madras and the setup of the Rourkela steel plant (Rau, 2018). Furthermore, in the Cold War period, West Germany aided India in defense with their technology and at the same time selling them second-hand equipment (Jaishankar, 2017).

In the second half of the century, India chose to become part of the Non-Aligned movement, which created tensions with East Germany, due to the Hallstein Doctrine. This doctrine relied on a strict nonrecognition policy from West Germany directed towards all countries that recognized East Germany, which caused the East to tense relations with the countries which in order to be acknowledged by the West, did not accept the East. These tensions came to an end in 1972, when India recognized the East and set up diplomatic relations (Gallenkamp, 2009). This way, India had established diplomatic relations with both the East and the West and in 1990, it became a supporter of the reunification (Rau, 2018). After the fall of the USSR; which happened just a year after the reunification, the international paradigm had completely shifted, leaning towards the west, so India started to build stronger ties with Germany. The year 1991 was also a key year for India as a country, since it was when it saw its liberalization; thus enabling foreign investment (Jaishankar, 2017) to further the commercial aspect of their economy. The Indian government became

aware of the importance of globalization for economic growth; so changes such as the opening of domestic markets and the reduction of bureaucratic controls (Gallenkamp, 2009).

In the early 2000s, the framework for these bilateral relations was set through the Agenda for the German Indian Partnership in the 21st century, which became a starting point for all the following agreements (Gallenkamp, 2009). Focusing on the exchange of visits between high-level officials, on security policies and disarmament, opening the economic markets and overcoming the barriers of bilateral trade. This document, apart from mainly focusing on cultural, economic and scientific cooperation, also collected several mentions of global challenges and the ways of fighting them through cooperation, like the commitment to work on reforming the United Nations system and its agreements on terrorism and organized crime (Gallenkamp, 2009). Also, they have a “Strategic Partnership" which sets up common goals and identifies the main areas of cooperation.

Nowadays, India is growing at an incredibly fast pace; thus bringing not only opportunities for India, but also for Germany. For instance, over 400.000 people directly or indirectly are currently employed by over 1700 German companies in India such as Volkswagen, Mercedes-Benz or Robert Bosch Engineering and Business Solutions (German Embassy, 2021). That makes Germany one of, if not the main trade partner for India in the European Union, meanwhile Germany is the 7th largest foreign direct investor in India (German Embassy, 2021), which has fostered various Joint Ventures and collaborations. But Germany is not always the investor, for instance, regarding the technological sector, India has invested up to EUR 6.5 billion in Germany and has over 200 Indian companies operating in Germany (German Embassy, 2021).

When solely focusing on development cooperation, it can be observed that they began when trade relations did. According to data, since 1958, approximately 17 billion euros have been spent on Technical and Financial Cooperation (Indian Ministry of External Affairs, 2020). Nowadays, the majority of the aid is directed towards sustainable economic and urban development, renewable energy and energy efficiency, and environment and management of natural resources (BMZ, 2022). India is considered to be a global development partner for Germany, since it plays a key role in fighting for the 2030 Agenda, which focuses on protecting the climate while developing (BMZ, 2022). The way this assistance is provided is

through grants routed through the German Government´s Development Bank or the grant of either soft loans or composite loans (Indian Ministry of External Affairs, 2020). But even if India keeps being one of Germany's main recipients, it must be emphasized that there has not been substantial policy changes these past years, even more so, ODA seems to have suffered a slight decline (Gallenkamp, 2009).

2. State of affairs

Both India's and Germany's foreign policy agenda integrate guidelines for development cooperation, guidelines which are carried out by a variety of institutions. The projects that they undertake are supervised and approved by the German Government, by the DEA or the Department of Economic Affairs of the Indian Ministry of Finance; since the DEA is the institution in charge of development cooperation for the Indian Government.

Both countries are members of the OECD, which is the Organization for Economic Co‑operation and Development first established on the 30th of September 1961 and provides a forum in which the various governments involved work together in order to seek solutions to the problems that affect them. Despite their OECD ties, this forum is not their favored way of cooperation, but governmental vis-à-vis (Indian Ministry of External Affairs, 2020).

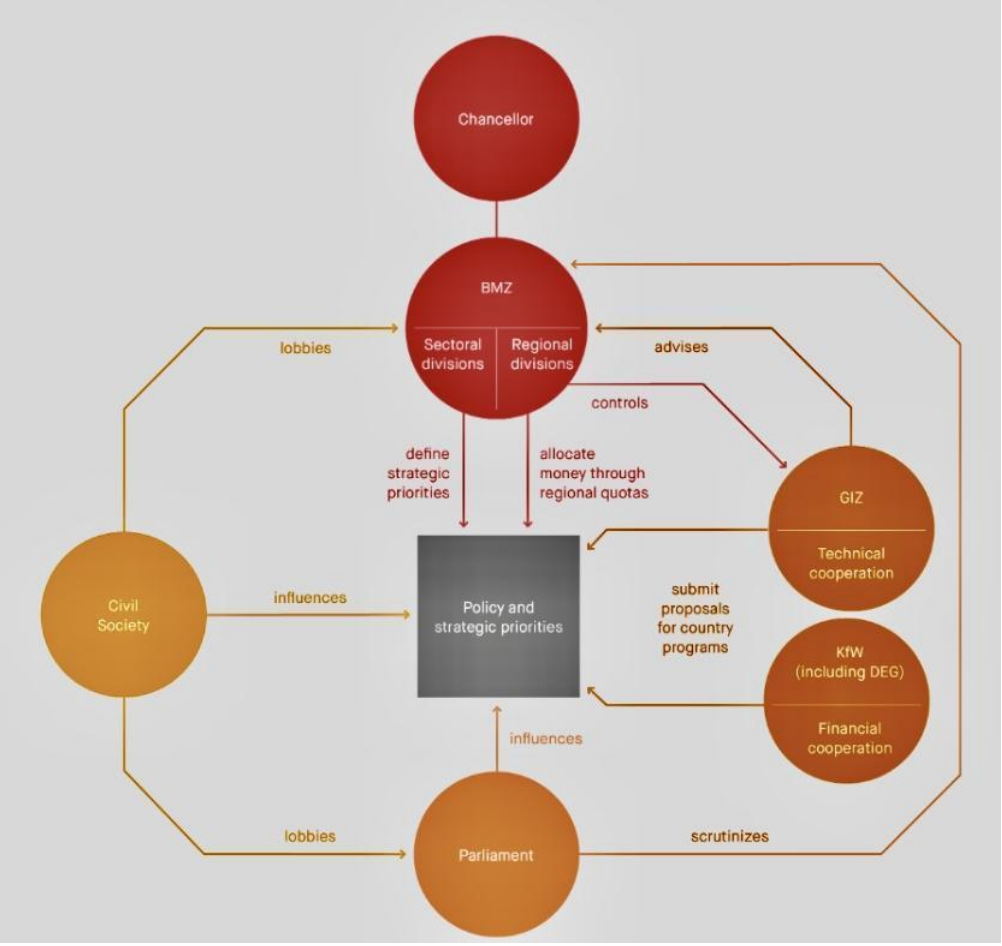
The OECD is an international organization, whose focus relies on building better policies for better lives by working

> "*…on establishing evidence-based international standards and finding solutions to a range of social, economic and environmental challenges. From improving economic performance and creating jobs to fostering strong education and fighting international tax evasion, we provide a unique forum and knowledge hub for data and analysis, exchange of experiences, best-practice sharing, and advice on public policies and international standard-setting.*" (OECD, 2023a).

The DAC, or the Development Assistance Committee is an international forum, part of the OECD, integrated by many of the largest providers of aid, including 31 OECD members, one of which, is Germany (OECD, 2023b).

Cooperation projects are promoted by the German Federal Ministry for Economic Cooperation and Development (BMZ), which is organized across six Directorates-General (Donor Tracker, 2022). Then, the GIZ, which provides consulting services, plans and executes Germany's technical cooperation with partner countries, operates under the BMZ's supervision. The KfW, on the other side, is in charge of Germany's bilateral financial cooperation, raises its own funds on capital markets and is given funding from the BMZ at the same time, as seen on Figure 1 (Donor Tracker, 2022). These are not the only state actors involved in development cooperation, the Federal Ministry of Finance (BMF), levels the amount of aid allotted; the Federal Foreign Office; the Federal Ministry of Health, the Federal Ministry of Education and Research, the Parliament and the Civil Society (Donor Tracker, 2022), each allocating help and contributing in their fields of expertise. As a matter of fact, India is part of the BMZ's group of global partners, like Brazil, China, Indonesia, Mexico, Peru, South Africa and Viet Nam. For those global partners, the BMZ is centered on implementing sustainable scenarios for those economies (BMZ, 2021).

Figure 1: Germany's bilateral financing structure



Source: Donor Tracker, 2022

India, on the one hand, is part of some OECD Committees and its ministers and officials have attended OECD Ministerial Council Meetings, and is also a member of Forums such as the International Energy Agency. India is also part of the Development Centre and is committed to the G20/OECD Principles of Corporate Governance (OECD, 2022).

On the other hand, Germany has a permanent delegation to the OECD, made of one ambassador and various diplomats. Their function is to monitor activities of the International Transport Forum (ITF), the Nuclear Energy Agency (NEA), the International Energy Agency (IEA), the Development Centre, and the Sahel and West Africa Club (SWAC). As well as they are in charge of monitoring some of the OECD's committees work (OECD, 2022).

This governmental vis-à-vis, as stated supra, is carried out by the KfW, German Government's Development Bank when it regards financial assistance, and by the German Government's development agency or GIZ when it regards technical assistance (Indian Ministry of External Affairs, 2020). This highlights their favored way of cooperation, which is State-based development cooperation, which makes their relation mostly bilateral. Regardless of that fact, alternative ways of cooperation can also happen.

An example of this bilateral relations can be the Small-Scale Projects, which are micro projects supported by the Federal Foreign Office and designed to provide direct assistance and quick relief for the least privileged parts of society (German Embassy, 2022a). They target an improvement of day-to-day environments, meanwhile keeping a "helping people to learn to help themselves" spirit. Some of their main objectives are: income generation through education and vocational training, healthcare and sanitary equipment, energy and water supply, food security, reconstructions after natural disasters and more of the sort (German Embassy, 2022a). Each of the projects has their own funding and way of administering it within the district in which they are located, the Embassy in New Delhi and the Consulates General in Kolkata, Chennai, Bangalore and Mumbai (German Embassy, 2022b) are the organs in charge. As an example, the Embassy in New Delhi allotted over €155,000.00 for seven projects, including special funds for COVID-19 related measures in the year 2021 (German Embassy, 2022a). Another example of this cooperation can be the Support to National Urban Sanitation policy (SNUSP) - II or the Indo-German Program for

vocational education and training II (IGVET II) or (GIZ, 2021), which shows the effective work done by the Indian government, supported financially by Germany.

However, the main aim of this cooperation —which can be thought to be evolving towards a more equalitarian partners relation instead of a the classic donor-recipient relation— is through soft loan, composite loans or grants routed through KfW (Indian Ministry of External Affairs, 2020) focusing on improving and creating a sustainable urban development sector, protecting the environment and natural resources and the promotion of renewable energies (BMZ, 2022) with projects which will be explained later such as "Sustainable Urban Development – Smart Cities (SUD-SC)"; "Sustainable and Environment-friendly Industrial Production (SEIP)".

3. Theoretical framework

The theoretical framework used has been wide and different for each main part of this paper. The main authors, papers and documents used are strictly classified as development cooperation; and for that, many of the materials used come or are inspired from the 2022 course of International Cooperation and Development of the Universidad Pontificia Comillas, by Professor Heike Pintor.

Regarding the basic theoretical manuals for an accurate approach towards International Development Cooperation, three of the main books used are "What is development cooperation? Four criteria to help define it" by Gleenie and Alonso,"AID: Understanding International Development Cooperation" by Degenbold-Martinussen and Engberg-Pedersen and "The Palgrave Handbook of Development Cooperation for Achieving the 2030 Agenda" for an actualised approach towards the discipline.

For the first few headlands, the theoretical approach has been mostly a historical analysis and a state of affairs analysis. For both, the main sources used, apart from the ones provided by the German and the Indian governments, have been academic papers. Papers which have been compared to one another in order to be able to reach a correct and contrasted conclusion. Some of the most relevant papers, to name a few are: Gallenkamp's

“Indo-German Relations. Achievements & Challenges in the 21st Century“, in which the expert in South Asia, Gallenkamp, explains the history of Indo-German Relations from the beginning until today; Prys-Hansen’s “The Future of Indo-German Relations, or: How to fix a faulty relationship”, gives keys to improve the relation between the two states and also has a critical view on why sometimes these relations are faulty. Rau’s “International Relation between Germany and India” gives a special and complete insight on the relation; Jobelius’s “New Powers for Global Change? Challenges for the International Development Cooperation. The Case of India” is also a very critical paper on how India and Germany must overcome the challenges they are presented; or Khashimwo’s “India and Germany: Global Partnership in 21st century”, which strictly relates to today’s relations and their necessities.

The main analysis present in this project, is the data analysis which has been made in this particular case study by the individual study of the different projects which either have been or are being implemented by the Indo-German cooperation. The type of data used have been reviews, ODA flows graphics and institutional frameworks. For that, the main sources which have been used are the database of the GIZ or the Deutsche Gesellschaft für Internationale Zusammenarbeit, which is the German development organization. The database of the BMZ or the Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, which is the Ministry for Economic Cooperation and Development, and the database of the KfW which is the German Development Bank. Even if many more sources have been used, as can be seen in the bibliography, the GIZ, the BMZ and the KfW have been the main ones for this data analysis.

Also, another reliable sources of information which have been used for the data analysis, have been the the World Bank’s database, especially for foreign direct investment, and the OECD webpage, where not only general information about donor and recipient can be found, but also specific information about the main areas of development cooperation studied, which in this particular case are digital infrastructures and renewables. As well as DAC documents and reports, which can also be found in the OECD webpage. Is in those two main sources, both the GIZ and the OECD, that the majority of the indicators are found for each part of this paper. And after they are found, they are analyzed with the support of other sources, which are mainly academic papers, although there are some exceptions such as the paper The Economist.

But for the comparison of the ODA flows coming from Germany with the ODA flows coming from Japan, the analysis has been made comparatively. A comparative analysis consists of the comparison of different items and distinguishing their differences and similarities, in order to be able to understand the results and the strategies implemented. With this comparative analysis, what is seeked to be understood is how two of India's main donors approach the same issues and which one is more relevant in that particular area. For Germany, the sources to compare data and figures are the ones previously mentioned, and for Japan, the two main sources for retrieving the data and the information are the databases of the Ministry of Foreign Affairs of Japan (MOFA) and of the Japan International Cooperation Agency (JICA). The information retrieved from German and Japanese sources was then compared in order to be able to reach said conclusions.

4. Hypothesis and main objectives

Through the assessment of specific projects concerning renewable energies and the building and improvement of digital infrastructures. I would like to assess how important Indo-German relations are concerning renewable energies and digital infrastructures.

The main objectives of this paper then are as follows:

1. Firstly, to assess the importance of Germany and India as donor and recipient and the amount of ODA flows allotted for development cooperation; as well as finding out if their relation is evolving towards a more equalitarian partners relation instead of the classic donor-recipient relation.
2. Secondly, to assess specific projects concerning renewable energies and the building and improvement of digital infrastructures.
3. Thirdly, to compare Indo-German bilateral relations to Japanese-Indian bilateral relations regarding ODA flows, especially in projects concerning renewable energies and the building and improvement of digital infrastructures, in order to deem the importance of said relations and the most important donor in the region.

The main hypothesis of this paper is to find out through an exhaustive assessment, what is the actual importance of the Indo-German relations and its evolution. For this

purpose, specific projects concerning renewable energies and the building and improvement of digital infrastructures will be studied. Also, a comparison of Indo-German bilateral relations to Japanese-Indian bilateral relations regarding ODA flows will be made in order to find out the actual impact of the policies and of the German aid, using Japanese aid in order to be able to introduce a comparative analysis. In short, the aim is to analyze the ODA flows between Germany and India due to their shared ties, focusing specifically on projects concerning renewable energies and the building and improvement of digital infrastructures, in which the impact of a number of projects with a series of indicators which will be presented below, will be evaluated. Also, a future trend analysis of the relations of both countries will be made.

In order to be able to achieve the analysis the focus will be on the different indicators which provide contrasted information regarding the ODA flows, the number and categories of bilateral relations throughout different projects related to the improvement and fostering of renewable energies and digital infrastructures, the historical background already presented and OECD data. Another kind of indicators that are going to be used in this analysis, are going to be the ODA flows that have India as the recipient and Japan as the donor; since Japan is India's other biggest partner in international cooperation and development. So, the comparative with Japan is pertinent in order to figure out if Germany's aid is more or less relevant than the Japanese. Since Japan is regarded, overall, as India's most relevant donor, but due to the fact that German aid is focused on special projects, the comparison is pertinent in order to find out if in those areas, German aid is more or less relevant. Macro data regarding imports and exports from both Japan and Germany will be studied, as well as their number of projects regarding renewables and digital infrastructures; with the objective of finding out if the impact of these projects is more or less relevant and how they are aiding India.

5. Methodology

The methodology used in this paper, or the rationale and strategy behind it in order to be able to reach the objectives proposed, is an observational treatment of the data found in order to be able to prove the hypothesis. The way this observation is made, is mainly by comparison; so

the modality of analysis is comparative. This comparison will use Japan as the independent variable and India as the dependent, which then will be compared to Germany as the independent variable and India as the dependent variable, because their favored way of providing aid is mainly through bilateral cooperation. All in order to analyze if Germany's aid is more or less relevant than the Japanese aid, and the amount of ODA allotted for development cooperation. As stated before, the focus is going to mainly be on renewable energies and digital infrastructures, since it is the theme of this paper.

The analysis is also going to mainly be a quantitative as well as qualitative one, since not only is the amount of ODA relevant here, but how this ODA is going to have an actual impact on development cooperation and on the specific projects regarding renewables and digital infrastructures. All in the spirit of fostering India's development and promoting their economic self-sufficiency. The impact indicators chosen for this analysis are mainly provided and published by the OECD and by the GIZ.

When collecting data, even if academia is to be consulted regarding researchers specialized on development cooperation and or on India or Germany, the main sources of information that are going to be used are think tanks like the Donor Tracker, or websites such as the one for the World Bank or the one for the OECD-DAC. Official websites of the German Government will also be consulted, such as the Deutsche Gesellschaft für Internationale Zusammenarbeit, the BMZ or the Federal Ministry of Economic Cooperation and Development, the German Embassy in India. Other sources regard the official websites for the Indian Government such as the Indian Ministry of External Affairs.

6. Analysis

6.1. Indicators

Aid for development cooperation is measured by aid effectiveness indicators such as Net ODA received, which can vary according to the theoretical framework the paper adheres to. The usual measure in the patterns of development is GNP per capita, GDP per capita or GNI percentages, but there is certain academic dissense regarding this type of more traditional indicators; since there are many more comprehensive indicators of development today. A

couple of examples of these indicators are the Overseas Development Council's Physical Quality of Life Index or PQLI, or the Human Development Index or HDI of the United Nations Development Program.

In order to keep an organized pattern throughout the analysis, the indicators used will mainly be the traditional ones, for both donor and recipient. All to offer a clear view of how ODA is established in Indo-German relations, which are mainly bilateral. Indicators such as Net ODA received, which can be as a share of GNI, divided into earmarked, core multilateral…, net bilateral flows for DAC donors and more. These indicators will be used in order to find out the relevance of this aid as a share of GNI, the amount of earmarked aid, or of bilateral flows, for example. All in order to be able to reach conclusions regarding the importance and impact of German aid in India.

The donor, Germany, as has been previously stated, is the second-largest provider of the Development Assistance Committee or DAC. As can be seen on Figure 2: ODA allocation overview, Germany -ODA volume, there has been a recent increment on the amount of ODA allocated these past years. In fact, as seen on Figure 3: ODA allocation overview, Germany -ODA as a share of GNI, the total ODA represented this past 2021, the 0.74% of gross national income or GNI (OECD, 2022).

Analyzing the indicators provided and published by the OECD, it can be affirmed that Germany's aid is mostly given as bilateral aid, even if multilateral aid also plays a role, the amount for both core multilateral and earmarked multilateral aid is considerably lower than that of bilateral aid. In 2020, as seen on Figure 4: Germany -Bilateral and multilateral ODA allocations, the share of bilateral aid amounted to a total of 62.2% of the total ODA, while for earmarked multilateral it was 17.5% and for core multilateral it was 20.3%. To showcase this, data from 2018 is also relevant, since that very year, gross bilateral ODA reached almost 80%, when according to Donor Tracker, the average for an standard DAC member is less then the 60% (Donor Tracker, 2022). So, regarding the objectives of this paper and the information contrasted, the focus will be put on bilateral aid.

According to Figure 5: Top DAC Donor countries in 2021 and to Figure 6: Top DAC Donor countries in 2021, ODA disbursements as % of GNI, Germany is at the very top of the

donor countries, since in their foreign policy, International cooperation and development is highly important, and also mainly carried out by the public sector (OECD, 2022).

Now, putting in perspective the indicators recovered in order to affirm the status of Germany as one of the main donors in the international sphere, linking it to India as a recipient country is pertinent. India, as seen on Figure 7: Top 10 Partner countries for bilateral ODA in 2020, is Germany's top partner for bilateral ODA, having reached the amount of 1190 US$ millions. Also, as shown on Figure 8: Country list for the BMZ's bilateral official development cooperation, India is nowadays considered by the BMZ as a global partner, and no longer just as a bilateral partner. Since Germany and India join their efforts to tackle the issues defining their common global future and to protect global goods.

As previously stated, one of India's most significant donors is Germany (Donor Tracker, 2022), as well as the United Kingdom and Japan. This is by no means a surprise, since Germany's aid is mainly directed towards middle income countries (Donor Tracker, 2022) and focused on health, education and infrastructures, as can be seen on Figure 9: Share of sector aid by type of aid. And this aid has been traditionally given in the form of loans (Development Initiatives, 2012).

In addition, it is also relevant to remark that India's ODA has declined as a share of its GNI these past years, as can be seen on Figure 10: Net bilateral aid flows from DAC donors, Germany (current US$) - India. This goes to show that India is not expected to keep its status as a recipient country for a longer period of time; but instead to perhaps become a donor country (Jobelius, 2007). Another indicator used in order to make this prediction is the fact that India is a member of the BRICS and has been included in the G20, having raised quite quickly their position in the international sphere in a relatively short period of time (GIZ, 2022). India's position as a recipient is indeed evolving, as shown by their support by the Non-Aligned Movement to Global South countries; thus establishing itself as a leader in South-South cooperation (Development Initiatives, 2012). At the same time, it started to drastically reduce the amount of aid received from donor countries, even to the point of suspending ODA relations with the majority of its former donors (Jobelius, 2007).

Figure 10: Net bilateral aid flows from DAC donors, Germany (current US$)-India.

Source: World Bank, 2022.

Even if all the statements remain true, it can also not be overlooked that India is in fact, still in need of aid to a certain level, since its poverty levels remain high, so the first Sustainable Development Goal is still very much a work in progress as shown by the poverty indicators provided and published by the Asian Development Bank (Asian Development Bank, 2022). In conclusion, India's society's standards of living have not drastically improved, and therefore, ODA is still needed.

6.2. ODA evolution in Indo-German cooperation

Germany's ODA is now given mainly as technical cooperation, which is defined by the DAC as

> "*grants to nationals of aid recipient countries receiving education or training at home or abroad, and payments to consultants, advisers and similar personnel as*

well as teachers and administrators serving in recipient countries (including the cost of associated equipment)" (Lengfelder, 2016).

This form of cooperation is one of the largest spending areas of bilateral official development assistance (Lengfelder, 2016), but India is currently not a part of Triangular Cooperation, when regarding Germany as the donor. This Triangular Cooperation is defined as a form of technical cooperation which includes a third party, a third country which is the new provider, which usually is an emerging power. India does not participate in Triangular Cooperation with Germany, but does with other DAC donors (Lengfelder, 2016).

Germany is currently engaged in various Triangular Cooperation projects with countries such as Indonesia, Colombia, Brasil…, and meanwhile it keeps trying to promote this particular form of cooperation with China and India, it has had little to no success, since China prefers to provide independent aid (Lengfelder, 2016). As can be seen on Figure 22. New providers as independent donors, China has independent development programmes and provides aid independently. Meanwhile German Triangular Cooperation is still on the talks, and there is no factual data pointing to success (Lengfelder, 2016) as can be seen on Figure 28. German TriCo Projects with anchor countries.

Strictly focusing on the ODA evolution between Germany and India, it can be affirmed that it is mainly carried out through concessional loans (Donor Tracker, 2022) given in near-market conditions (BMZ, 2022). The main focus is, as has been stated previously and showcased on their Joint Declaration of Intent, on renewable energy, sustainability in urban development and environment issues (IMEA, 2017); which sometimes conflict with India's main goal, which is reducing their extreme poverty rates, since balancing that with the protection of natural resources is certainly a difficult task (BMZ, 2022). Which is of extreme importance for Germany, which is known to be very concerned about climate change mitigation and adaptation, fair trade, gender equality… (Donor Tracker, 2022). So that is one of the main reasons for this cooperation. Germany recognizes the importance of India's role regarding climate change mitigation and the possible solution of this global challenge (BMZ, 2022). Because one thing that can be said with absolute certainty about Germany's and India's bilateral cooperation is that it is going to be inspired by the Sustainable Development Goals, as can be seen in Figure 11: Germany's Bilateral ODA by sector, because they are focused on energy, education, health and more, all related to the SDGs. As a matter of fact, in

their Joint Declaration of Intent, foreign cooperation towards these SDGs is highlighted (IMEA, 2017).

Going back to Figure 10: Net bilateral aid flows from DAC donors, Germany (current US$) - India, it can be seen that the amount of ODA has decreased these past years. One of the reasons why can be that, for example, in the year 2019, Germany allotted 1.614 billion euros for cooperation, but not all was classified as ODA (BMZ, 2022), which can also influence the final result of Figure 10. Even if ODA flows are decreasing, Germany's role in India hasn't really, just the 2019 data proves it.

Having seen the overall ODA evolution, it is pertinent to analyze the impact it has had on the recipient country, India. As has been previously stated all throughout this paper, India has grown at an especially fast pace (International Monetary Fund, 2019), in the economic sense of growth. As can be seen on Figure 23. India: Selected Social and Economic Indicators, 2015/16–2020/21 1/, also, "*both the IMF and the Reserve Bank have projected India's GDP to grow at 6.1 percent in 2019-20 and WEO has projected growth to be at 7.0 percent in 2020-21 and to accelerate further in the subsequent years.*" (International Monetary Fund, 2019). Furthermore, their poverty rate, which is one of their main concerns, has decreased significantly these past years, even if there is a lot of work to do. This is so not because poverty is on its way to be completely eradicated by all means, but because India, like many other developing countries, has started a middle class growth, so people are no longer just rich and poor; the middle class does exist. Even if an enormous amount, in the millions, still have less than 2 USD a day to survive (BMZ, 2022), which again goes to show that the lower class still has a long way to go before poverty, or at least extreme poverty is eradicated.

Even if a causal nexus cannot be completely proven between India's exponential economic growth as a developing country part of the BRICS; it is true that the ODA flows have aided in some way. Since there has been a significant investment in India's economy from donors like Germany, and that has indeed impacted India's gross domestic product or GDP's growth.

Is also important to mention that India's human development has also significantly improved these past 30 years, even if it is still not in a good position in the United Nations Development ranking for the Human Development Index or HDI (United Nations Development Report, 2018). In fact, not only life expectancy and schooling have improved, but also India's GNI per capita (Dhawan, 2020). As a matter of fact, from all of the BMZ's global partners, India is the only one maintaining a medium Human Development Index with a 0.645 in 2021, as can be seen on Figure 27. Comparative data for the global partners using selected indicators**.**

Strictly focusing on how Germany's ODA as a donor has impacted India, the recipient country in their bilateral relation, a very quick conclusion intuitively comes up. That conclusion is that the worst development data, regards the main areas of focus of the German development cooperation, which are related to sustainability in urban development, renewable energies and environmental protection in general (BMZ, 2022). This conclusion is also founded on the fact that on the Multidimensional Poverty Index or MPI, India comes one of the last in the ranking (Human Development Reports, 2022).

This ODA evolution has evolved towards a greener form of cooperation, which is characteristic when analyzing German cooperation in general terms, can be said for almost every donor country they have; since it is a fundamental part of their foreign policy at large (BMZ, 2022). Here is especially pertinent, since those particular areas are not India's strongest points, so aiding India in its environmental goals could be most helpful. As can be seen on Figure 12. ODA by sector -bilateral commitments by donor and recipient, regarding ODA flows between Germany and India.

In the end, even if the results do not show it and can raise concerns regarding the effectiveness of the aid provided by the German ODA and the structural importance of the projects that will be analyzed.

Now, in order to be able to deem the importance of Germany's aid towards India and its impact, which has been explained supra, a comparison with Japan is in order. Since Japan is also a member of the Development Assistance Committee (DAC) of the OECD and one of India's most important donors. As a matter of fact, India has been Japan's top recipient for

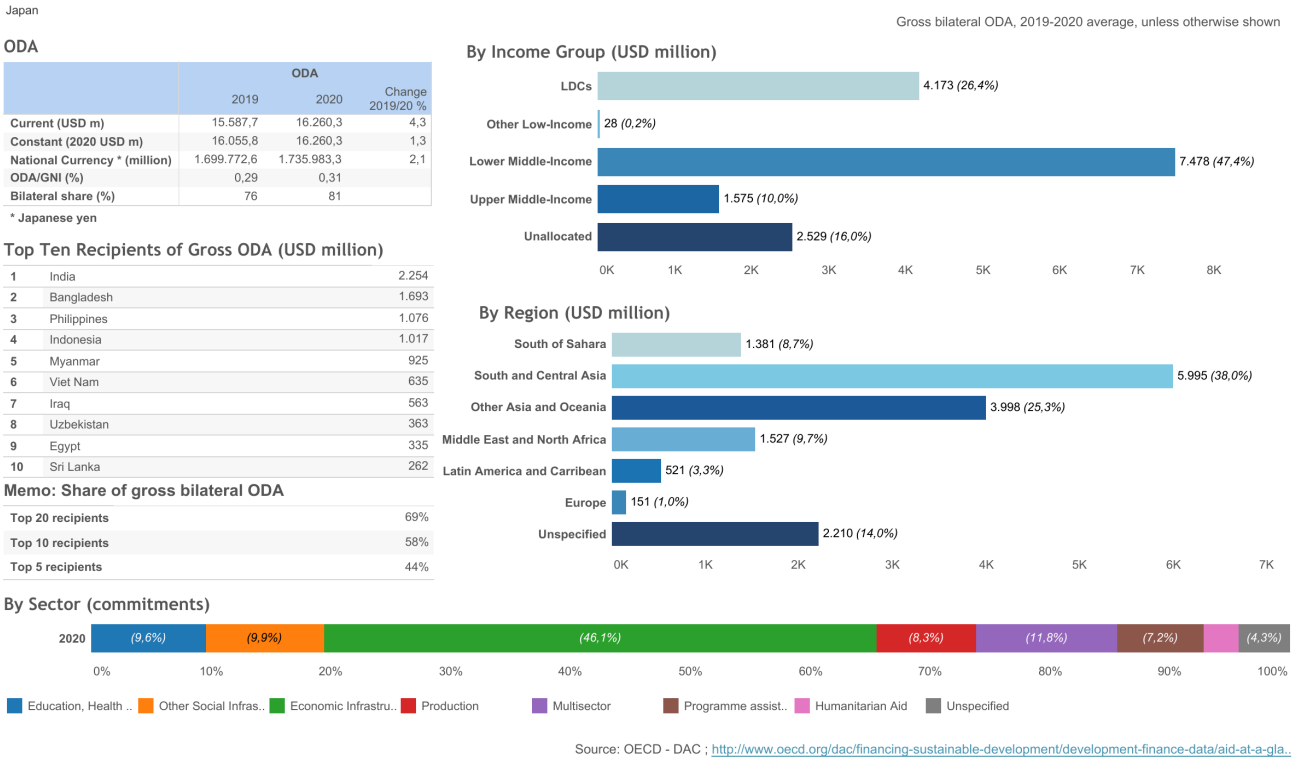
ODA flows since 2003; and between the years 2010 and 2020, a total of JPY 3.1 trillion have been allocated towards development cooperation projects (The Economic Times, 2021), especially regarding infrastructures, all organized and supervised by the the Japan International Cooperation Agency or JICA. Whose mission is to work on human security and quality growth (JICA, 2022) and terms of ODA, provides bilateral aid through loans, technical cooperation and grant aids, as can be seen on Figure 13. Japan's International Cooperation Agency's ODA.

Japanese cooperation with India has been highly successful in many different ways, in order to prove this success, throughout the use of Official Development Assistance and the effective impact it has had on India and its population, several numbers and projects can be mentioned. For instance, the Delhi Metro is one of the most successful examples regarding infrastructures, an area which is still on the main ones for their bilateral relations, with the "Act East" policy and the "Partnership for Quality Infrastructure" (Ministry of Foreign Affairs of Japan, 2022). Furthermore, there is the Shinkansen System for the building and improvement of their high-speed railway system. When strictly mentioning numbers, the amount of ODA allotted for loans, grants and technical cooperation is also representative of the success. For loans in 2021, there were 312.25 billion yen which amount to 2.152.290.367,89 EUR; and in 2020 for technical cooperation 7.3 billion yen, or 50.317.834,20 EUR, and for grants 5.12 billion yen or 35.292.008,46 EUR (Ministry of Foreign Affairs of Japan, 2022). The positive impact, apart from the success of the projects and the fact that India is one of Japan's main recipients, is shown by the success of their other kinds of international relations, such as VIP Visits, Direct Investment, Trade between the two countries and cooperation in security, like with the "Acquisition and Cross-Servicing Agreement" or ACSA in 2021 (Ministry of Foreign Affairs of Japan, 2022).

In order to conclude the comparison on ODA flows is very helpful and illustrating to analyze and briefly compare Figure 14. Official Development Assistance (ODA) flows for DAC members. Japan and Figure 15. Official Development Assistance (ODA) flows for DAC members. Germany. In USD million, India was allotted 2.254 from Japan, against the 1.069 from Germany. For both countries, it was the first top recipient of gross ODA. Also, Japan, as can be seen on the charts and supra, is mainly focused on firstly, economic infrastructures with a 46,1% of the total amount of ODA allotted and multisector aid with a

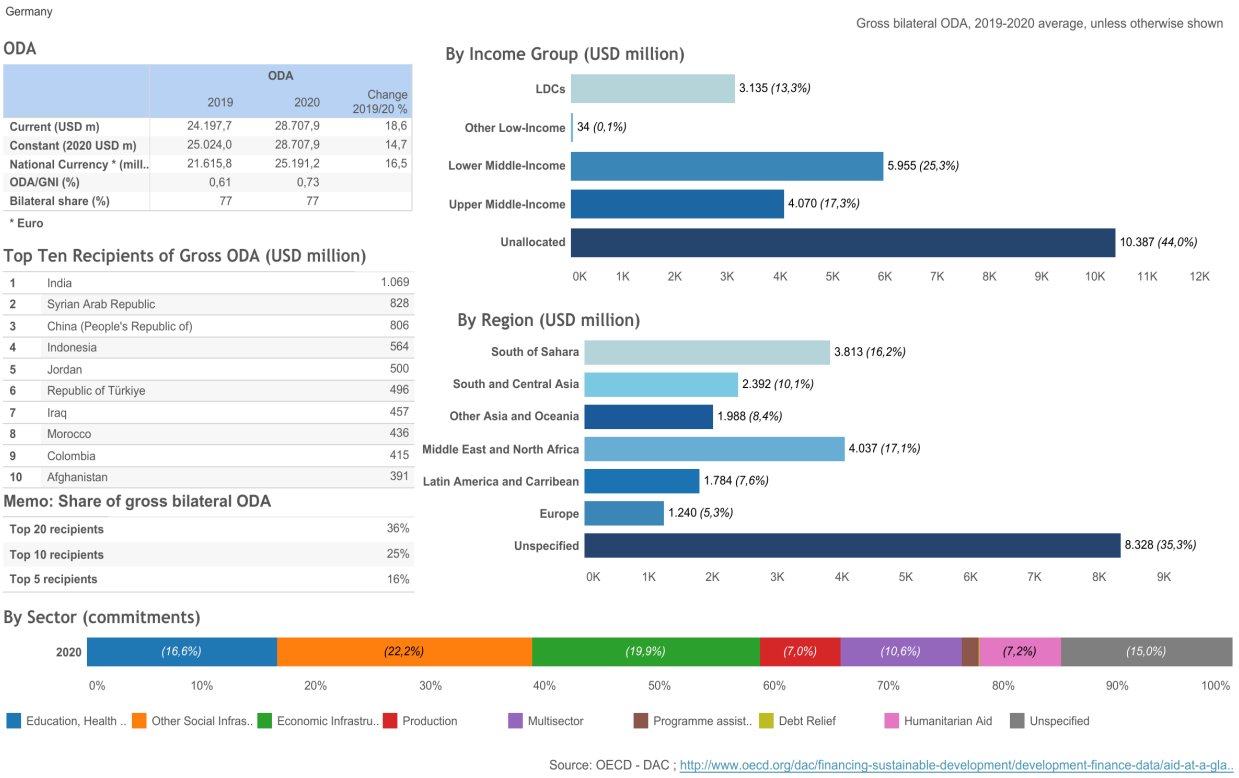
11,8% of the total amount of ODA allotted. Whereas Germany is more focused on firstly, social infrastructures, with a 22,2% of the total amount of ODA allotted and then, the economy with a 19,9% of the total amount of ODA allotted. So there are many differences to the way ODA is given and has an impact on the recipient; which is actually a positive aspect, since Germany and Japan target different goals with their development cooperation policies, even if they are all related to the SDGs. Even if both of these countries have the majority of aid allocated towards economic infrastructures, the quantity is relevant, because Japan allotes a half of the total towards the economy, but Germany only a 19,9%, which is still very significant. Another fact worth mentioning is the fact that Japan, being an Asian power, is mainly centered on aiding South and Central Asia; Germany, being a European power, is mainly focused as well on aiding South and Central Asia.

Figure 14. Official Development Assistance (ODA) flows for DAC members. Japan.



Source: OECD, 2022.

Figure 15. Official Development Assistance (ODA) flows for DAC members. Germany.



Source: OECD, 2022.

6.3. Analysis conclusions

Regarding the analysis made supra in the indicators and the ODA evolution, several conclusions can be reached. Because even if the specific sectors, renewable energies and digital infrastructures have not yet been analyzed, general conclusions for the ODA evolution allotted by Germany and the impact it has on the recipient, also in the comparative with Japan as a donor, can be reached.

One of the very firsts conclusions that can be reached just by analyzing Indo-German relations is that, at the end, they have proven to be quite strong and have lasted all throughout time without falling out. This relation, which has derived into the development cooperation we know today, has been almost a millennia long. Even if development cooperation per se has only been since the year 1958. According to the data, since that year, approximately 17 billion euros have been spent on Technical and Financial Cooperation; thus starting development cooperation (Indian Ministry of External Affairs, 2020).

Another conclusion that can be made is that regarding the amount and the recipient countries that are allotted German ODA, several general assumptions can be made. Because, firstly, Germany generally tends to engage in development cooperation relations with Middle Income Countries such as India, as can be seen on Figure 15. Official Development Assistance (ODA) flows for DAC members. Germany. Also, even if Germany, as has been stated supra, has been Triangular Cooperation, its cooperation with India remains mostly technical and bilateral, mainly through loans. This aid, even if India has been growing as part of the BRICS, and holds an important position in the international sphere, it is also a reality that Germany's role in India has not decreased, but risen. Although the main areas in which Germany's aid is allotted, remain the same, aligned with Germany's exterior policies. These areas, which have been explained throughout the paper are sustainability in urban development, environmental and resource protection and renewable energies and their efficiency. Germany is focused on green policies not only inside the country, but as a whole due to the EU Green Deal, which aims for the EU to become the first climate neutral continent by 2050. Germany's green policies vary depending on the topic, but as an example,

> "*Germany aims to raise the share of renewables from 17% today to more than 80% in 2050, while completely phasing out electricity production from nuclear power plants by 2022. Greenhouse gas (GHG) emissions would be cut by 40% by 2020 and at least 80% by 2050. In the field of energy efficiency, Germany intends to reduce primary energy consumption by 20% by 2020 and 50% by 2050 compared with 2008*." (OECD, 2023c)

Even so, there is still a big incognita regarding the future and what is going to happen, because India, being part of the BRICS, has also started to aid and be a donor of development cooperation to low income countries, meanwhile it is still in need of its donor's aid, such as Germany or Japan.

Also, it can be inferred there is sort of a monopoly in Germany regarding the public organs which get to allocate and distribute aid in the form of ODA, because that is exclusive competence of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the German Federal Ministry for Economic Cooperation and Development. Even if the most important public actors and the ones which actually decide and distribute the ODA the Ministries approve are, firstly the German Development Bank or

KfW and secondly, the Germany's International Cooperation Agency or GIZ; both equally relevant.

Moreover, when strictly looking at the ODA evolution and how it has impacted the Indian economy and overall development it can be affirmed that poverty has been somewhat reduced, even if there is still a very long way to go. Whereas its Human Development Index had improved since last century, the truth is that in the past years, not much has furthered this improvement.

Another conclusion is that, is somewhat curious that the main areas in which Germany provides ODA flows, are the ones that are still most in need, since they show the worst development data (Human Development Reports, 2022). These areas are related to sustainability in urban development, renewable energies and environmental protection in general (BMZ, 2022). This fact does not necessarily mean that Indo-German cooperation performs poorly, but is actually a positive fact, since it shows that the aid is being given where it is most needed. Nevertheless, if the situation persists, a rethinking of how this development cooperation in those particular areas is being handled would be in order. Despite this, ODA flows have impacted the recipient country in a positive way, especially regarding social and economic infrastructures, as can be seen supra in Figure 15. Official Development Assistance (ODA) flows for DAC members. Germany.

In order to be able to have a proper global view in order to help analyze the actual impact of German ODA in India, a comparison with Japanese ODA was deemed pertinent, as Japan is also, if not the biggest, one of them, donors for India. For both Germany and Japan, India is the number one top ODA recipient, but the likelihood ends there, since they focus their ODA allocation in very different sectors. While Germany is mainly centered on social infrastructures and the economy as a whole, along with sustainability in urban development, renewable energies and environmental protection in general (BMZ, 2022); Japan has other priorities. Japan lays its focus on economic infrastructures and multisectorial aid, as can be seen on Figure 14. Official Development Assistance (ODA) flows for DAC members. Japan., where almost half of the total amount of ODA goes towards the improvement of the economic infrastructures, along with infrastructures such as the Delhi Metro. These differences are actually beneficial for India, since Germany and Japan target different goals

with their development cooperation policies which perfectly complement each other. At the same time, they both seek to comply with the Sustainable Development Goals.

Also, the way the Indo-German development cooperation seems to be evolving, technical cooperation is one of the main ways is being implemented and will still be so (Prys-Hansen, 2019). This type of cooperation is most efficient when smaller actors are involved; so it seems the relations will be done at a smaller level in order to get better results in the smaller communities. This way, the smaller communities can, with the help given, organize themselves according to their particular necessities, even if there is also the downside that there are less ways to control smaller projects given to smaller actors by the government.

To conclude, a last remark could be that maybe Germany's role as a donor could end up evolving towards a more intermediary role between India and the European Union (Prys-Hansen, 2019); and engage in Triangular Cooperation, even if the definition does not really fit. At the same time that India could be making its way towards the figure of a donor country regarding South-South cooperation (Prys-Hansen, 2019); a fact which would certainly affect their cooperation relation with Germany, even if the way in which it will affect it is still unknown.

6.4. Renewable energies

First and foremost, renewable energies must be defined in order to be able to analyze development cooperation regarding them. Renewable energies are defined as those involved in the energy transition. Which is the process of change in the generation, distribution, storage and overall use of energy; this process is usually accompanied by political, social and economic changes (García-García, Carpintero & Buendía, 2020). The energy transition this paper refers to is the progressive abandonment of fossil fuels and the use of renewables (Wang & Lo, 2021). According to the United Nations, "*Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed*" (2022).

Once the concepts have been clearly defined, India's situation must be explained before analyzing ODA flows from Germany and how this aid has or has not been key in the improvement of the sector. First, it must be said that the energy market in India has been acquiring more and more importance these past few years, since they have realized that it truly is a key sector, specially being India a producer of technology. One of the measures that prove that they have taken action regarding the reinvention of the energy sector is the creation of the state-supported Energy Efficiency Services Limited, which falls under the competences of the Ministry of Power and is in charge of the large scale energy efficiency implementation in India (EESL & IEA, 2017).

Nevertheless, these measures have not solved the problem and regardless of the fact that they have taken a certain amount of action, the energy transition in India has yet to prove its success. As can be seen on Figure 16. Twenty countries with the largest number of people lacking access to clean fuels and technologies (average for 2016–20), India was the largest population without access, even if it increased over time. Also, along with China, it was responsible in 2019 for the largest increase in nonrenewable electricity consumption (United Nations, 2022b), offsetting the increase in renewables, showing their urgent need for a change in the way energy is handled. Also, there has been an increase in nonrenewables, as can be seen on Figure 17. Share of renewables in total final energy consumption, 2000 and 2019, and renewable energy consumption, by source, in the top 20 energy-consuming countries, 2019 and on Figure 18. Annual change in renewable and nonrenewable energy consumption, top 20 countries with the largest total final energy consumption, 2019. In both figure 17 and 18 this increase in the consumption of nonrenewable energy can be analyzed, and, in spite of the growing consumption of modern renewable energy, the percentage of nonrenewable energies is significantly higher in comparison to other top energy-consuming countries such as France or the United States (United Nations, 2022b). Although, it must also be said, that due to the rising of the energy prices in 2021 and the restrictive measures imposed, more difficulties in the energy transition have emerged; such as the additional increases in prices of solar and wind infrastructures in key markets like the Indian market (United Nations, 2022b).

The situation has slightly improved, since the efficiency of fossil fuel electricity generation increased due to the use and construction of more efficient gas-fired and coal-fired

plants in both India and China (United Nations, 2022b); the problem is meanwhile gas is considered to be renewable by the European Union (Hancock, 2022), coal most certainly isn't. As can be perceived by the data referred to, more measures must still be taken in order to increase the usage of renewables in India. In order to achieve sustainability in development, renewable energies are a key element (Perea-Moreno, Hernandez-Escobedo & Perea-Moreno, 2018). This is supported by the fact that the Goal 7 of the SGDs is Affordable and Clean Energy, and Target 7.2 presents to have increased the share of renewable energy in the global energy mix by the year 2030; renewables are also targeted by Target 7.a and 7.b (United Nations Environmental Programme, 2022).

It is a well known fact, that India has expanding energy needs that it cannot satisfy in an eco friendly manner if not aided. Germany has offered its assistance on building sustainable livelihoods and a clean environment whilst maintaining their energy access (Indian Ministry of External Affairs, 2015). This has been done with projects such as the "Green Energy Corridors" for providing rural areas with cleaner energy. Also, they have implemented a Solar Partnership regarding renewables with Germany (Indian Ministry of External Affairs, 2015). Those are a few of the projects, but one of the main forums has been the Indo-German Energy Forum or IGEF, which has contributed and now contributes to the development of the energy sector regarding renewables (Indian Ministry of External Affairs, 2015).

Another cooperation measure they have taken regarding renewables, which is indeed a priority in their development cooperation policy, has been for the KfW to grant a credit line of 200 million euros for renewable energy supply in India (Wehrmann, 2019). Which proves once more Germany's environmental concerns. Germany has been known to make alliances having international climate action as a priority, as a matter of fact, Germany came fifth in in Bloomberg's 2018 global renewable investment ranking (Henze, 2019); as well as exporting energy transition technologies. Which are key in India, because emerging renewables markets in India are categorized as promising for multinationals (Wehrmann, 2019).

Since renewables and climate change in general have been established to be some of Germany's main concerns regarding their foreign policy. The BMZ has made an effort on various occasions to encourage the investment on renewables, and focusing on India, also

with the installation of solar plants in the richer solar power regions (BMZ, 2016). This only enriches the sustainability of India's energy supply. As a showcase of Indo- German energy cooperation, there is the "Sakri Solar Power Plant", this Power Plant, supported by the KfW, bridges the energy gaps and enables sustainable growth (BMZ, 2016). Since in India, the energy requirements are not met, due to the fact that they need more than they produce. The project in itself is one of the most significant plants that exist in India, and only in 2016, the "Sakri Solar Power Plant" provided clean energy for 220,000 households in Maharashtra (BMZ, 2016), which considerably reduced CO2 emissions, in Figure 24. Ex post evaluation report: 2020 of the Sakri Solar Power Plant, the amount of EUR millions invested can be seen, as well as the effectiveness, which can be seen in Figure 25. Effectiveness of the Sakri Solar Power Plant, whose indicator target values were achieved in full.

Having stated some of the most relevant actions the BMZ has helped implement, the GIZ or the Deutsche Gesellschaft für Internationale Zusammenarbeit and its work must be broken down. The GIZ has been known to work towards ecological, economic and social development and since India's uncontrolled urbanization and excess of population don't exactly facilitate sustainable development, is one of the main areas in which it is focused (GIZ, 2021). The Indian Government has launched various initiatives regarding those areas, a majority of which count with the help of the GIZ (GIZ, 2021). Some of the completed and ongoing projects are going to be analyzed, along with their impact. Taking into account that the main commissioning parties of the branch of the GIZ focusing in India are: the Federal Ministry for Economic Affairs and Energy, the BMZ and the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (GIZ, 2021).

First, completed projects regarding renewables and energy efficiency will be assessed. One of the first projects was the "Integration of Renewable Energies into the Indian Electricity System (I-RE)", which took place from 2014 to 2020 (Gaebler, 2020a). It searched to identify the measures for installing 175 GW of renewable energy capacity for 2022. Its results were positive: since they identified the technical challenges and the measures to mitigate them, a plan for the promotion of solar energy was developed and the adaptation to the changing framework conditions was studied as well as the recommendations for improving energy security (Gaebler, 2020a). Another of the completed projects was the "Indo German Energy Programme (PVRT) IGEN-GEC-Rooftop Solar PV Component", which took

place from 2015 to 2020; this particular project searched the acceleration of the expansion of photovoltaic (PV) rooftop systems in several Indian states (Gaebler, 2020b). This project was based on programmes on capacity building, on the accreditation of the institutes and on the advice on accelerating the rooftop systems (Gaebler, 2020b). But even if for the first project, data accredited its success, for this project there is no further data, so the impacts and the results have not been accredited.

The Indo-German Energy Programme – Green Energy Corridors (IGEN-GEC) is another completed project, this one takes care of designing and developing recommendations in order to bring more RE electricity in the electrical network (Wypior, n.d.). This project was extremely successful, since seven Renewable Energy Management Centres were created, as well as the first "International Conference on Large-Scale Grid Integration of RE in India". Along with training for grid operators and the development of a solar power forecasting model (Wypior, n.d.). Another example could be the Energy Efficiency: making economic growth in India sustainable project, which seeks to make economic growth in India sustainable (Damm, n.d.). This project was also a successful one, since in total, more than 60 million tonnes of CO2 were saved and various demos for innovative development took place (Damm, n.d.).

To name a few more successfully completed projects which prove the strength of the Indo-German cooperation relations, there are: the Indo-German Energy Programme (IGEN), the Green Wicket with regard to green technologies, Promoting energy efficiency in residential buildings, the Indo-German Energy Programme - Access to Energy in Rural Areas (IGEN-Access), the Solar mapping and monitoring (SolMap) and the Commercialisation of solar energy in urban and industrial areas (ComSolar) (GIZ, 2021).

Now, ongoing projects regarding renewables and energy efficiency will be assessed. One the firsts would be the Constructing climate smart buildings project, whose objective is by adopting a sustainable design and using cutting-edge technology, to enhance climate resilience in housings (Vikash Ranjan, 2022). Another, the Decarbonising transport in Asia with a focus on China, India and Viet Nam (Project: NDC TIA), which searches to reach zero emissions in their transport systems (Eichhorst, 2021). Also, another project is dedicated to

Promoting energy efficiency in Indian industry by improving the companies' capacities to implement energy-efficient technologies (Jain, 2021).

To once again, just name a few more of the projects that currently occupy both India and the GIZ, and in many ways also the BMZ, in the Indo-German cooperation relations, there are the: Energy Transition with distribution companies, the Access to Energy in Rural Areas II, the Indo-German Solar Energy Partnership (IGSP) or the Promoting Solar Water Pumps through the Indo-German Energy Programme - Promotion of Solar Water Pumps (GIZ, 2021). To finish up the ongoing projects, the Indo-German Energy Forum deserves a special mention, since… "*It has established itself as a bilateral platform for exchanging on experiences, opportunities and challenges in global energy system transformation. Strategic cooperation projects have been successfully initiated by IGEF and the two governments are increasingly implementing rapid energy system transformation*." (Winter, n.d.). And it has initiated activities such as the initiation of the ComSolar Programme, or the SolMap, the construction of a pilot plant and the integration of renewables in the power grid (Winter, n.d.), even if the amount of EUR invested has not been published by the GIZ.

In order to be able to have a proper global view of how development cooperation is advancing regarding renewables, a brief comparison with Japanese development cooperation regarding this area seems pertinent. As Japan is also, if not the biggest, one of them, donors for India. An illustrative example could be the project launched by both the Government of Japan and the UNDP aided by the Japanese embassy in India. The initiative seeks to achieve net-zero emissions and ensure climate-resilient development (UNDP & the Embassy of Japan in India, 2022). The grant provided by Japan to this very project amounts to USD 5.16 million in climate grant (UNDP & the Embassy of Japan in India, 2022).

Another showcase of this type of cooperation can be found in the "*India-Japan Clean Energy Partnership (CEP) for cooperation towards achieving sustainable economic growth, addressing climate change and ensuring energy security*" (Indian Ministry of External Affairs, 2022). This partnership is also centered around the goal of net-zero emissions. But when searching for the results of these projects, not much can be found since that data is not available, which gives room to the thought that while German cooperation in this particular area is stronger in general, the lack of data suggests that it has not been strengthened.

To conclude, having made a comparison with Japan, and having analyzed the majority of the projects regarding Indo-German development cooperation on renewables, it can be inferred that even if a lot of work is being done, it is still not enough. This can also be proven by Figure 19. Aid activities targeting Global Environmental Objectives, which shows the amount of money in US$ allocated towards the projects, especially regarding climate change having principally allocated 158.997 million US dollars, but from those, being significant 38.445 million US dollars. Being bilateral technical cooperation, the success should be proven by progressively needing less and less aid. This is not the case, since India has serious issues regarding energy security and environmental policies in general. So German efforts are still needed in those areas, partly because India's uncontrolled urbanization and excess population don't exactly facilitate sustainable development. Even if the national development banks, both the KfW in Germany and the IREDA in India —even if it is not a strict national development bank and India is still a developing country— search to scale climate finance in renewables, interacting with both the public and private sector (Zhang, 2022).

6.5. Digital infrastructures

First and foremost, in order to be able to explain and analyze both the infrastructures and the implications that development cooperation has in this particular area, what this area entails, must be clarified. The normative definition for digital infrastructures is the technology that abilitates a foundation for information and operations, be those of the kind that it may (Singh & Pathak, 2022).

This definition of digital infrastructures can either be opened to fit more infrastructures in the definition, or restricted. For the sake of this paper, the definition used is going to be opened to fit more categories in it. Such as the ones regarding the digital infrastructures needed for clean mobility, digital cooperation, urban development regarding smart cities and clean technology. Because in short, digital infrastructures, or as the World Economic Forum stipulated, the Infrastructures 4.0 (2021), are the set of long service life engineering structures and facilities, which form the basis for the provision of necessary services for the development of social, political, productive and personal purposes (Rozas & Sánchez, 2004).

Once the concept has been clearly defined, India's situation must be explained before analyzing ODA flows from Germany and how this aid has or has not been key in the improvement of the sector. When looking at Figure 12. ODA by sector -bilateral commitments by donor and recipient. Germany and India, the definition valid for this paper extends to transport and communications as a whole, and it can be seen that the sector has suffered an enormous increase regarding the amount of ODA allotted. What remains to be seen is the impact this aid has had on the sector, and the reasons for the increase.

Having established that, the truth is that, at least regarding the OECD, there is not much data available regarding digital infrastructures, which leads to the conclusion that not much has been done in the matter regarding Indo-German development cooperation relations. But after looking at more sources, it can be seen that this is not the truth, even if this is not one of Germany's main areas of cooperation.

Now, some of the current projects for Indo-German development cooperation regarding the digital infrastructures defined in this paper will be commented on. In the year 2019, Angela Merkel and the Indian prime minister, Modi, announced the German millionaire investment of 1.000 million euros on artificial intelligence and digital transformation. This way, Germany became invested in India's plans for smart cities and e-mobility; thus bringing new opportunities for German companies, so a quid pro quo, and also strengthening bilateral cooperation in general (Euronews, 2019). India has a very clear interest regarding technology and digital infrastructures, which is proven by measures taken by the Indian government such as Digital India or the"Zero Net Imports by 2020" (Aragón Exterior, 2019).

Also, India by itself has been making progress on the matter, since the World Innovation Index of 2019, was even sponsored by India, which constitutes proof of their efforts on fostering digital innovation. Being awarded with being the number one regional State in innovation in Central Asia, being the 52nd of the global ranking, due to their progress on productivity and exports on information technologies and communications (Gurry, 2019). At the same time, it has become a FinTech superpower, with various unicorns —which are privately held startups with a current valuation of US$1 billion or more — such as acko or chargebee (Mankotia, 2022). India, in the international sphere, has also positioned itself on

various international organizations dedicated to the matter, in order to keep improving their digital infrastructures, such as: the International Telecommunication Union (ITU) or the International Mobile Satellite Organization (IMSO) (ICEX, 2022). All of this proves that regarding core digital infrastructures such as information technologies and communications, India already is one of the main Asian powers and as such, does not need much aid.

Germany is not indifferent to digital infrastructures, even if, as it has been stated, is not one of their main areas of cooperation, they do prioritize it within Germany. This is proven by the fact that the The German Federal Ministry for Economic Affairs and Climate Action, in its digital agenda for 2025, stipulates the measures for a German digital transformation, allotting around €10 billion in only public funding (2022). Some of these measures have been collected in the White Paper on digital Platforms, and are as these: the modernization of telecommunications law in order to provide better investment opportunities, safeguarding the plurality of telecommunication providers and building public-private-partnerships to give better access to rural areas (Federal Ministry for Economic Affairs and Energy, 2017). The digital agenda has already made progress by raising awareness of digital solutions, creating a network to support the digital transformation and improving the Digital Summit (Federal Ministry for Economic Affairs and Climate Action, 2022) along with the German regulatory framework and presenting a green paper on digital platforms, which covers the inputs of different stakeholders (Federal Ministry for Economic Affairs and Energy, 2016).

This area, as can be proven only by India's and Germany's actions alone, holds an extreme relevance nowadays. Since now, everything and everyone is or must be connected. That is why the global leaders, in the 77º sessions period of the United Nations General Assembly, agreed on financing with the initial amount of 295 Million USD, the development and implementation of inclusive digital infrastructures, which can reduce the digital gap, scale technical assistance and deepen capacity building (PNUD, 2022). This also helps to achieve some of the Sustainable Development Goals such as the reduction of poverty or climate resilience. In fact, the official statement reads "*this event is an opportunity to set in place building blocks for a bold vision of inclusive Digital Public Infrastructure that leaves no one behind and accelerates implementation of the Sustainable Development Goals*." (PNUD, 2022). Germany, which was represented by Dr. Bärbel Kofler, who is the

Parliamentary State Secretary to the Federal Ministry for Economic Cooperation and Development, made a special statement promising to contribute by the allocation of 35 million euros towards the development of digital infrastructures (PNUD, 2022).

Regarding more of the specific cooperation projects, this time regarding clean mobility since the majority of German cooperation on digital infrastructures is related to green policies, India and Germany have agreed on a close partnership. All to promote the transition in the energy and transport sectors into a climate-sensitive one (Wehrmann, 2019). The total quantity of the aid for the "German-Indian Partnership for Green Urban Mobility" amounts to 1 billion euros; and the impact of this aid will be reflected, for instance, on the deployment of more than 500 new electric buses, replacing the diesel ones (Wehrmann, 2019). Also, for green mobility, there is the "Establishing an open platform for innovation in Green Urban Mobility in India (Living Lab, develoPPP)" project, which seeks to bring together private and public parties to foster green urban-mobility solutions (Doering, 2022a). Other projects regarding urban mobility are the "Supporting the Indo-German Green Urban Mobility Partnership (GUMP)" project, which is strictly focused on the infrastructures (Doering, 2022b); or the "Promoting India's transformation to sustainable and climate-friendly e-Mobility" project, which seeks to promote e-mobility by joining the transport and energy sectors (Doering, 2022c). Also regarding urban mobility, several projects have been successfully completed, like "Supporting Sustainable forms of transport in India (SMART-SUT)", which has done work with smart cities such as Coimbatore, improving transport and urban planning, an example could be the sharing of e-autos in Kochi (Doering, 2022d), or the "Sustainable and Environment-friendly Industrial Production (SEIP)". The latest, has made progress in skills development for technicians, has improved the operation of their treatment plants and is currently developing guidelines for adoption by the state governments (GIZ, 2021).

When analyzing Indian urban development, it can be seen that for German companies, several new opportunities have been presented regarding India's initiative on 100 Smart Cities. In 2015, Germany provided India with the amount of 360 million euros and the Joint Working Group on Sustainable Urban Development was established as a bilateral forum (Indian Ministry of External Affairs, 2015). Another key project on the matter has been the "Sustainable Urban Development – Smart Cities (SUD-SC)", this particular project has had

very positive results, such as the “EnteKochi”, which was the name the project for the vision of the development of Kochi received (Jahnsen, n.d). Or the “Climate Smart Cities” project, which seeked solutions for urban infrastructure projects that were climate friendly. This project was very successful, since in Kochi, Coimbatore and Bhubaneshwar the solutions were implemented with a considerable amount of success, enabling the assessment of their climate mitigation status, and improving it (Nandan, n,d). The “Inclusive Cities Partnership Programme (ICPP)” is another project worth mentioning, since it seeks to foster and promote the support needed in order to give poor urban areas the inclusivity and environmentally conscious infrastructures; one of the main wins of the project has been the on-going drafting of the “Tamil Nadu State Urban Housing and Habitat Policy (SUHHP)” (Feldmann, 2018).

There are more ways of cooperation in digital infrastructures. Like the “Digitalisation and employment: shaping the future of work” project, commissioned by the BMZ, since the modern IT is transforming service exports and now individual workers are working in digital labour platforms, which comes with its inconveniences, both regarding digital access and workers rights (Flicke-Loetzsch, 2021). Another example could be the “Protecting the environment and climate with innovative technologies” project, which seeks to create the framework conditions needed in order to introduce the modern environmental protection technologies through technical cooperation (Lücke, 2021).

In order to be able to have a proper global view of how development cooperation is advancing regarding digital infrastructures, a brief comparison with Japanese development cooperation regarding this area seems appropriate. This is due to the fact that, as has been previously exposed, Japan is, if not the biggest, one of the main donors for India. To be able to briefly compare both donor countries, one of the latests projects regarding digital infrastructures began the summer of 2022, when the Japan International Cooperation Agency signed a loan agreement for 100,000 million yen as Japanese ODA for the “Project for the Construction of Mumbai-Ahmedabad High Speed Rail (III)” (JICA, 2022). What this project entails is the construction of a high-speed rail which will improve the efficiency of the transport in the region. Meanwhile contributing to the Sustainable Development Goals (JICA, 2022).

From this brief comparison, it can be seen that meanwhile Japanese development cooperation regarding digital infrastructures regards more economic growth, industry, innovation and infrastructures, as can be seen on Figure 20. ODA by sector -bilateral commitments by donor and recipient. Japan and India. What German cooperation regarding digital infrastructures entails is mainly sustainability. Which in Japanese ODA is also taken care of, but in German aid, is one of the main reasons and common denominator in all of the projects. To remind a few: "Sustainable Urban Development – Smart Cities (SUD-SC)", "Climate Smart Cities" or "Establishing an open platform for innovation in Green Urban Mobility in India (Living Lab, develoPPP)" (GIZ, 2021). All of those even have climate, or green in the very title of the project, which proves what is a priority for Germany; in keeping the climate in their priorities, they are respecting their own green policies and the EU Green Deal, which have been previously explained.

To conclude, having made a comparison with Japan, and having analyzed the majority of the projects regarding Indo-German development cooperation on digital infrastructures, it can be inferred that measures are being taken, always with the climate in mind. This happens because they plead for a digital transformation that is also beneficial for the environment and takes measures to mitigate climate change. It is what is nowadays regarded as clean tech. This is extremely on point with India's ambitions, since India wishes to become a green superpower, which may sound ironic, since it is an extremely polluting country starting to heavily invest in clean tech (The Economist, 2022). So regardless of the image India currently has, which is that of an non-environmentally friendly country, the projects that are currently being implemented with Germany's aid seek to change that situation. Since India, as has been stated, is looking to become a green superpower.

6.6. Future trends indicators

Having analyzed both India's and Germany's foreign policy agenda regarding development cooperation in the areas of digital infrastructures and renewables. Now it would be pertinent to examine the different future trends indicators, which can help make an approximation towards what the future is going to bring for India in those particular areas. Firstly, German cooperation in general will be examined. Secondly, it would be regarding renewables.

Thirdly, it would be digital infrastructures. And lastly, an interrelation between renewables and digital infrastructures will be analyzed, since throughout the project it can be inferred that they could be related and that they have the capability to strengthen each other, as could be seen on projects such as the "Establishing an open platform for innovation in Green Urban Mobility in India (Living Lab, develoPPP)" (GIZ, 2021).

Firstly, regarding German development cooperation with India and in respect to their most probable future state, it can be seen that the future center of the relations will be on the smaller actors, like it has already happened with projects such as the "Tamil Nadu State Urban Housing and Habitat Policy (SUHHP)" (Feldmann, 2018). The smaller actors such as villages will benefit from smaller agreements, these agreements will most likely be rendered as technical cooperation; thus becoming the know-how, the very center of the relation (Prys-Hansen, 2019). Nevertheless, more kinds of development cooperation will also be in the center, such as more flexible partnerships. Partnerships in which Germany could act as the intermediary between the rest of the European Union and its institutions and India (Prys-Hansen, 2019).

These predictions could be rendered as inefficient since India's economic and political growth, specifically regarding the South, is reaching new highs. What this fact has the potential to mean in the future is that India may as well be able to switch roles, going from recipient to donor (Prys-Hansen, 2019). Regardless, this is the least likely scenario, because, for example, regarding poverty, even if it has been reduced, the improvement has not been furthered. Poverty levels remain high, it is still very much a work in progress as shown by the poverty indicators provided and published by the Asian Development Bank (Asian Development Bank, 2022), as can be seen on Figure 26. Sustainable Development Goals. India. No Poverty. Since the proportion of employed population below $1.90 PPP a day (Age 15+) was in the year 2021, a total of 7,6%.

Also, the main areas in which Germany provides ODA flows, are still the ones in most need of it. So even if ODA flows have impacted India in a positive way, especially regarding social and economic infrastructures, as can be seen supra in Figure 14. Official Development Assistance (ODA) flows for DAC members. Germany, there is still much to be done since India's poverty levels remain high (Asian Development Bank, 2022). Which

makes the prediction that India will stop being a recipient country to become a donor one, less likely. Even so, regardless of the future approach both India and Germany will adopt regarding development cooperation; their relation is solid enough to endure.

Secondly, regarding Indo-German cooperation in renewables, the future trends indicators can be found on some of the ongoing projects, which can predict where this relation is going towards. For example, the Constructing climate smart buildings project, it has only been going on for a couple of years, and is set to be finished in 2024, but there is no data available as to how it is going (Vikash Ranjan, 2022). The Decarbonizing transport in Asia with a focus on China, India and Viet Nam is also set to finish in 2024, and like the latter, there is no data available as to how it is going (Eichhorst, 2021). Same happens with the Promoting energy efficiency in Indian industry project (Jain, 2021).

This pattern is repeated with the Energy Transition with distribution companies project, the Access to Energy in Rural Areas II project, or the Promoting Solar Water Pumps through the Indo-German Energy Program - Promotion of Solar Water Pumps (GIZ, 2021).

Some of these projects have succeeded in the past, such as the Indo-German Solar Energy Partnership (IGSP). Which has doubled the capacity of rooftop PV systems, it also has increased fourfold, and the number of systems in the industry, housing and trade sectors has also doubled (Gäbler, 2021). Another success is the Indo-German Energy Forum, which has initiated new activities to foster the energy transition such as the integration of renewables in the power grid (Winter, n.d.) gives hope to the future. Since even if data is still not available, the success of past projects speaks for itself, so even if the change is not going to be monumental, it is a given that these projects indeed have an impact in Indian society.

Thirdly, like with Indo-German cooperation in renewables, the future trends indicators can be found on some of the ongoing projects for digital infrastructures. Like it has happened with the ongoing projects regarding renewables, the majority have not published results yet; which might be misleading as to deem how the projects are going. Some examples of ongoing projects which have yet to publish results are the “Establishing an open platform for innovation in Green Urban Mobility in India (Living Lab, develoPPP)” project, the “Supporting the Indo-German Green Urban Mobility Partnership (GUMP)” project

(Doering, 2022b), the “Promoting India’s transformation to sustainable and climate-friendly e-Mobility” project (Doering, 2022c). The impact that is expected for these projects, according to the GIZ is quite significant, regardless of those predictions, the truth is that no data has been yet published, so the evolution and the amount of capital allotted to the projects remains an incognita.

Nevertheless, for other projects, data has indeed been made accessible to the public, like for the “Sustainable Urban Development – Smart Cities (SUD-SC)”; project which has been very successful, since for example, using a portion of the 2,089,586 € allotted, it has promoted many changes like the creation of the “EnteKochi”, which was the name the project for the vision of the development of Kochi received, and also an advisory on Public and Community Toilets; thus managing highly functional sanitation facilities (Jahnsen, n.d). Or for the “Sustainable and Environment-friendly Industrial Production (SEIP)”, a project which has also been highly successful. In that project, they have managed to demonstrate through cooperation different manners in which industrial development can become more efficient and environment-friendly, like with the regeneration of a former waste dump in Delhi’s Patparganj Industrial Area into a park. Other examples involve improving the way wastewater treatment plants are handled, former waste dumps have been regenerated, new management structures and service delivery mechanisms for industrial areas have been developed and more (Babu Nukala, n.d.).

For Indo-German development cooperation regarding digital infrastructures, the scenario is quite similar to renewables. In both cases, there is not much data available, because the majority of the projects are still ongoing projects, and the GIZ does not regularly publish updates before the project has been completed. But when analyzing the previously closed projects, they have been completed, more or less successfully. So that gives hope to the fact that the data has not yet been made public, since it is more probable that since they have succeeded before, these new and ongoing projects will still have a certain degree of success, which can help foster India’s digital infrastructures. And as it was affirmed for renewables, the projects indeed have an impact in Indian society. One of the most paradigmatic examples could be the “Sustainable and Environment-friendly Industrial Production (SEIP)” project, since it has improved the operation of treatment plants, leading to reduced pollution loads and lower operating costs (Babu Nukala, n.d.).

Lastly, an interrelation between renewables and digital infrastructures will be proved. In doing so, it will be analyzed how the future trend indicator may affect this development cooperation. The reason for doing so is that throughout the project it can be inferred that renewables and digital infrastructures are related and have the capability to strengthen each other.

On the one hand, it is widely known that in order to foster the use of renewable energies and energy efficiency, certain infrastructures which can hold the energy or which can create or distribute it, are needed; like virtual power plants or machine learning in order to optimize the extensive use of renewables. For example, the creation of solar water pumps in the "Promoting Solar Water Pumps through the Indo-German Energy Programme - Promotion of Solar Water Pumps" project combines both the fostering of solar energy, which is classified as a renewable, and the climate-smart installations, which classify as digital infrastructures (Ghose, 2020).

On the other hand, it is also true that even the GIZ classified development cooperation on digital infrastructures as development cooperation on sustainable infrastructures. Projects on digital infrastructures such as "Sustainable Urban Development – Smart Cities (SUD-SC)"; "Sustainable and Environment-friendly Industrial Production (SEIP)", "Protecting the environment and climate with innovative technologies" or "Supporting Sustainable forms of transport in India (SMART-SUT)" have two things in common (GIZ, 2021). Firstly, they are clearly digital infrastructures projects and secondly, these projects approach digital infrastructures in a sustainable manner. Thus fostering sustainability and in some cases, the use of renewables in various areas, like in transportation.

This goes to show the intent Indo-German cooperation has, which is to unite both into one, because the digital infrastructures needed are greener ones. This fits the narrative the Indian prime minister defended in Glasgow, in the COP26, since they will aim to have "net-zero" emissions for 2070 (The Economist, 2022). One of the ways they are mitigating emissions is by reducing fossil-fuels power generation as can be seen on Figure 21. India, installed power-generation capacity. Not only becoming greener and fostering green hydrogen, but also reducing dependency (The Economist, 2022). In order to do so, as it has been explained before, the correct digital infrastructures are needed, such as new solar-panel

factories or new buildings for hydrogen. Companies such as ArcelorMittal Nippon Steel, or Greenko are already on the matter. A great indicator is that "*the IEA projects that it will have more pumped-hydro than any other country by 2026*" (The Economist, 2022).

In conclusion, it seems as though Indo-German development cooperation remains to be done, perhaps focusing less on traditional aid and more on technical cooperation. Since, firstly, Germany's ODA is now given mainly as technical cooperation and secondly, technical cooperation enables the infrastructures for development such as hospitals, transport…, it also fosters training and counseling and provides the know-how needed to increase capital stock as well as increasing country ownership when increasing use of national consultants. Nevertheless, their relation has the potential to persist, especially regarding renewables and digital infrastructures; which have also been proven to be intertwined. The beginning of India's second green revolution is being witnessed, and with regard to green technologies, India has the potential to rapidly grow. That added to the fact that India has the prime natural conditions, might as well provoke that India will have a front and center seat in the green technological world, it has also been said that "*India will do for hydrogen what China did for batteries*" (The Economist, 2022).

7. Conclusions

Now it would be the time to finally consider from what has been thoroughly analyzed, which are the final conclusions of this paper and if the hypothesis and main objectives have turned out to be true or false and why. All while reminding that India's diplomatic relations with Germany have been very consistent since the beginning, having had no fallouts, and have only spiked since its economic growth propelled by liberalization of India in the year 1991. Which can be proven by the vast amount of projects they have undertaken together, such as the "Sakri Solar Power Plant" and more mentioned throughout the paper. When the historical background was studied, it was concluded that they began when trade relations did and that their main way of cooperation was through technical and financial cooperation, which is still favored (Indian Ministry of External Affairs, 2020). Also, the main areas in which this cooperation is carried out is sustainable economic and urban development, renewable energy and energy efficiency, and environment and management of natural resources (BMZ, 2022).

Now, the hypothesis and main objectives will be studied. Taking into account that this paper means to analyze the ODA flows between Germany and India. With a focus on projects concerning renewable energies and the building and improvement of digital infrastructures.

1. Firstly, the importance of Germany and India as donor and recipient and the amount of ODA flows allotted for development cooperation must be taken into account. As well as finding out if their relation is evolving towards a more equalitarian partners relation instead of the classic donor-recipient relation.

Their cooperation relations have proven to be both strong and long-lasting, based on their consistency. Remaining mostly technical and bilateral; and carried out mainly through loans. This ODA is carried out by two main public German organs, which are the German Development Bank or KfW and the Germany's International Cooperation Agency or GIZ. Nevertheless, India's poverty and Human Development Index, even if they have both somewhat improved, still have a very long way to go; since not much has furthered this improvement these past years.

There is also a relevant amount of uncertainty regarding the future of Germany's role as a donor. Since it seems when analyzing the data presented as if the cooperation is evolving towards the European Union. Meanwhile, India could be making its way towards the figure of a donor country regarding South-South cooperation (Prys-Hansen, 2019). This means a change in the paradigm of India's cooperation relations towards a more active role, perhaps even towards a donor's role regarding South-South cooperation. At the same time that Germany, as part of the European Union, will lose presence in India in favor of the supranational organization.

2. Secondly, the assessment of specific projects concerning renewable energies and the building and improvement of digital infrastructures must be made. Regarding Indo-German development cooperation on renewables, it can be inferred that even if a lot of work is being done, it is still not enough. Since, even if the aid allocation has been quite significant these past years, the success should be proven by progressively needing less and less aid. This has been proven not to be the case, since India has serious issues regarding energy

security and environmental policies in general. Additional efforts are needed to guarantee the achievement of environmental standards.

Regarding Indo-German development cooperation on digital infrastructures, it can be inferred that a lot of work is being done, but always with the climate in mind. It is what is nowadays regarded as clean tech. So regardless of the image India has as of a non-environmentally friendly and a heavy polluter, India is looking to become a green superpower. The projects that are currently being implemented as part of the Indo-German development cooperation strategy, seek to reach that goal.

In conclusion, it seems as though Indo-German development cooperation in these particular areas has a long way to go. Nevertheless this relation has the potential to persist, specially regarding renewables and digital infrastructures; which have been proven to be intertwined in this paper. Since India has the potential to rapidly grow, which when added to the fact that India has the prime natural conditions, might as well provoke that India will have a front and center seat in the green technological world, regarding both green digital infrastructures and renewables (The Economist, 2022).

3. The last objective of this paper was to compare Indo-German bilateral relations to Japanese-Indian bilateral relations regarding ODA flows, specially in projects concerning renewable energies and the building and improvement of digital infrastructures, in order to deem the importance of said relations and the most important donor in the region.

With respect to the comparison on renewables, the results are quite clear, since in the partnership with Japan, even if it is also centered around the goal of net-zero emissions, the same level of transparency was not found in the data. Proving that German cooperation in this particular area is considerably stronger, since it is one of Germany's main priorities regarding their foreign policy. At the same time, organizations such as the GIZ and the BMZ publish a vast amount of data following German strict transparency policies. Regarding the comparison of digital infrastructures, Japanese development cooperation aims more towards economic growth, industry, innovation and infrastructures. Meanwhile German cooperation is mainly

about sustainability, since it is one of the main reasons and common denominator in all of the projects.

In relation to ODA flows in general, the likelihood ends in that for both Germany and Japan, India is the number one top ODA recipient. But they focus their ODA allocation in very different sectors. Germany is mainly centered on social infrastructures and the economy as a whole, along with sustainability in urban development, renewable energies and environmental protection (BMZ, 2022). Japan has other priorities, which are economic infrastructures and multisectorial aid, along with infrastructures, as can be seen on Figure 14. Official Development Assistance (ODA) flows for DAC members. Japan. In USD million, India was allotted 2.254 from Japan in total, and that amount is mainly focused on firstly, economic infrastructures with a 46,1% of the total amount of ODA allotted and multisectorial aid with a 11,8% of the total amount of ODA allotted. These differences are extremely beneficial for India, since different goals are targeted, which furthers their growth complementing each other.

In conclusion, even if it is somewhat curious that the main areas in which Germany provides ODA flows, which are sustainability in urban development, renewable energies and environmental protection, are still the ones that are most in need (BMZ, 2022). This does not necessarily mean that Indo-German cooperation performs poorly. It is actually a positive fact, since it shows that the aid is being given where it is most needed; those areas being sustainable economic and urban development, renewable energy and energy efficiency, and environment and management of natural resources (BMZ, 2022). If the situation persists, a rethinking of how this development cooperation in those particular areas is being handled would be a must. This has happened because the aim has shifted from the basic needs approach towards sustainability (Chaturvedi. et.al., 2020), which is the aim Germany has with its policies. Nevertheless, ODA flows have impacted India in a positive way, as can be seen on the results of the specific projects such as the “Sustainable Urban Development – Smart Cities (SUD-SC)”, the “Integration of Renewable Energies into the Indian Electricity System (I-RE)” or of the “Sakri Solar Power Plant” (KfW Development Bank, 2020). All projects which have, with a certain degree of success, improved the quality of life due to the integration of renewables and digital infrastructures in day to day life. Also impacting

employment, since in their implementation jobs were created, health and the improvement of quality of future life, because they have had a positive impact on the environment.

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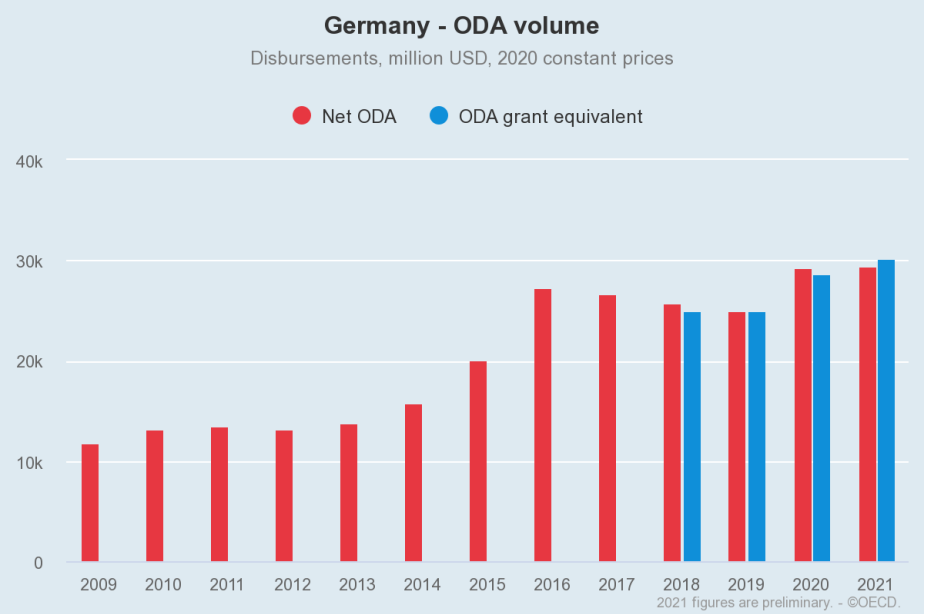
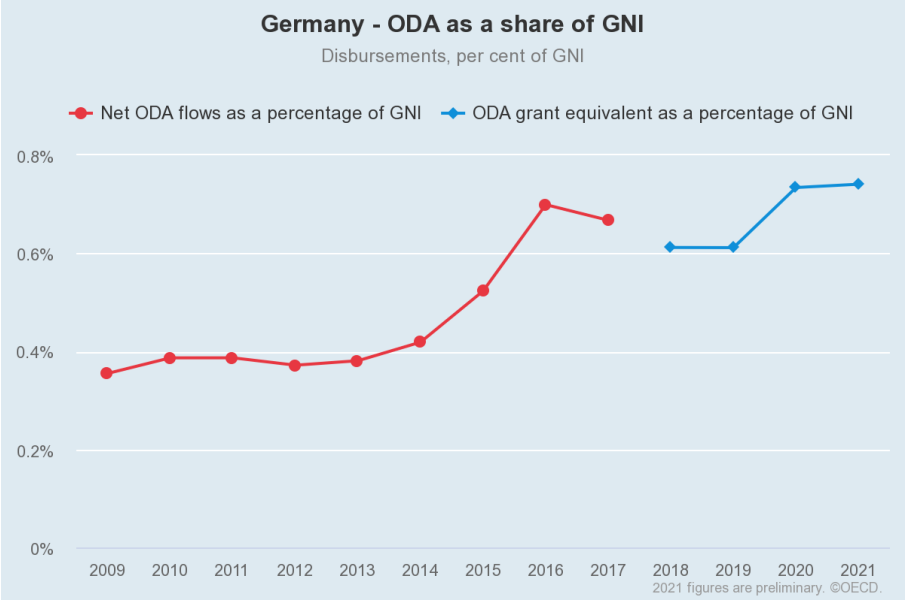
9. Annex

Figure 2: ODA allocation overview, Germany -ODA volume



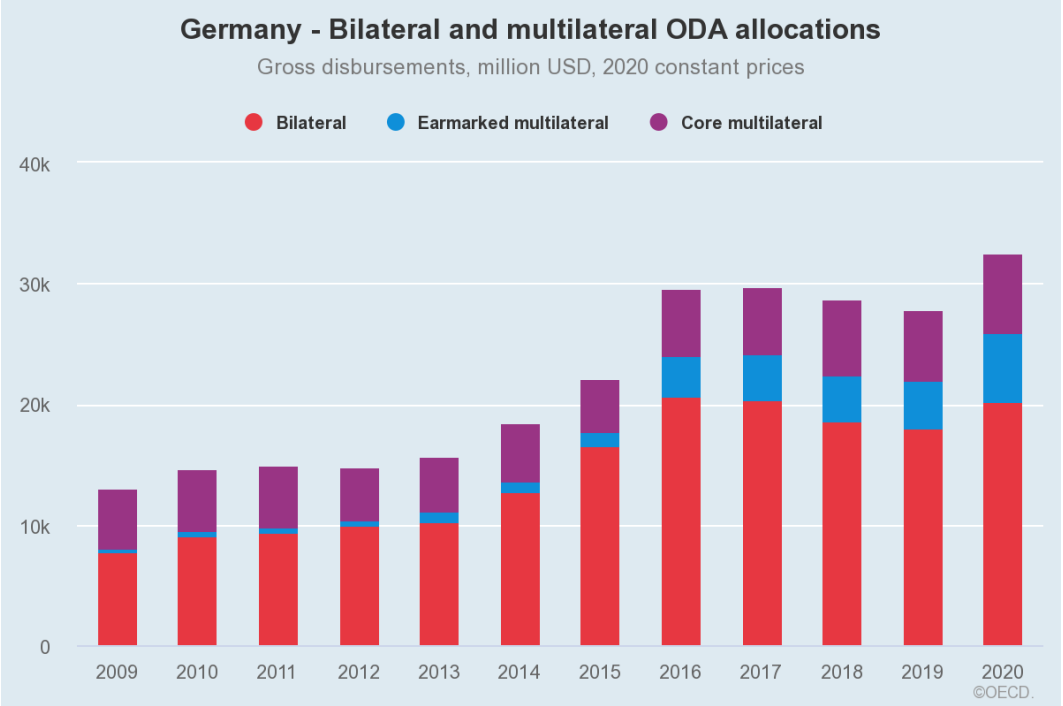
Source: OECD, 2022.

Figure 3: ODA allocation overview, Germany -ODA as a share of GNI



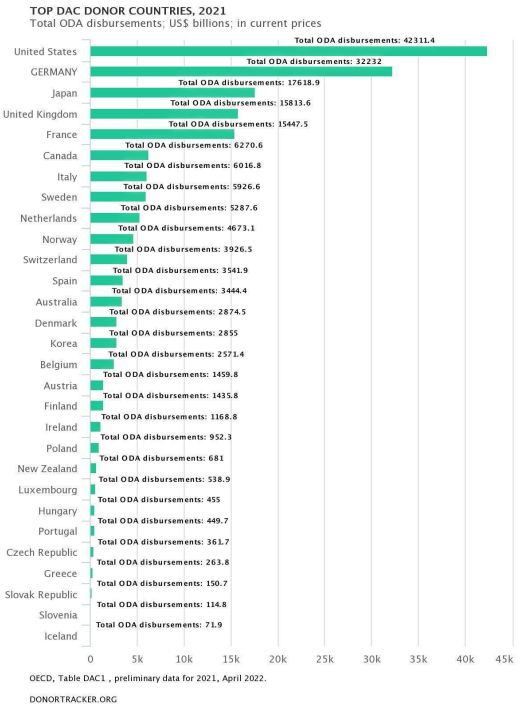
Source: OECD, 2022.

Figure 4: Germany -Bilateral and multilateral ODA allocations



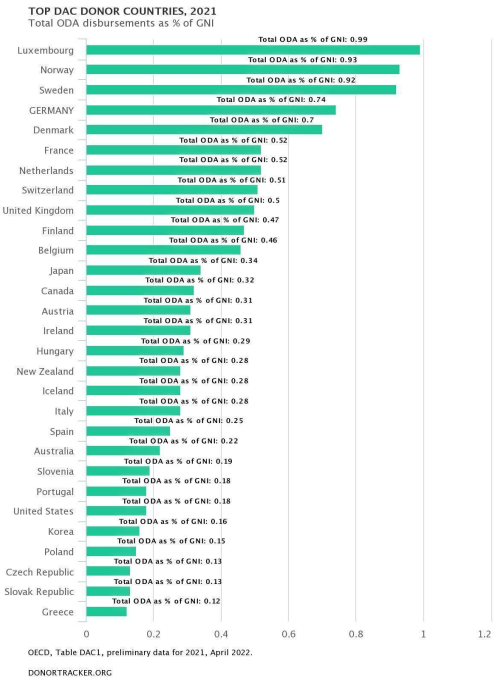
Source: OECD, 2022.

Figure 5: Top DAC Donor countries in 2021



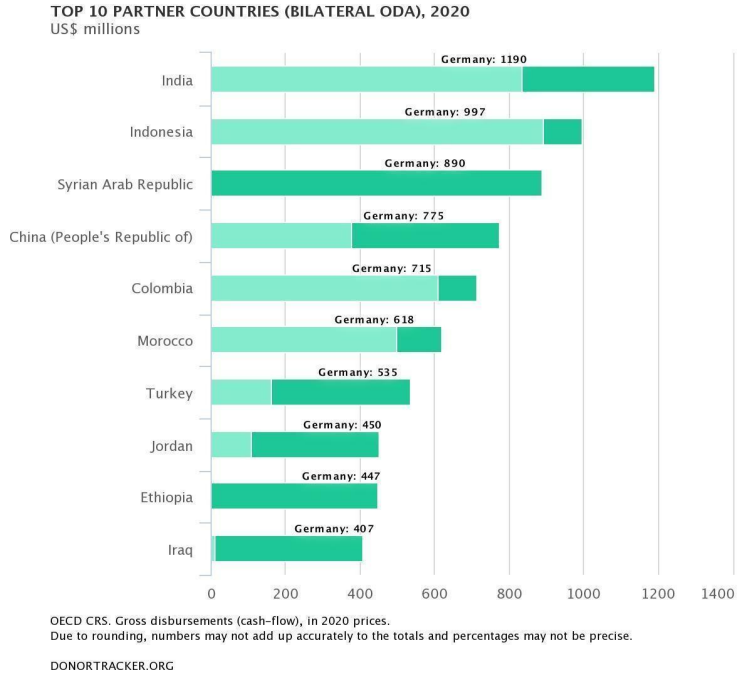
Source: Donor Tracker, 2022.

Figure 6: Top DAC Donor countries in 2021, ODA disbursements as % of GNI



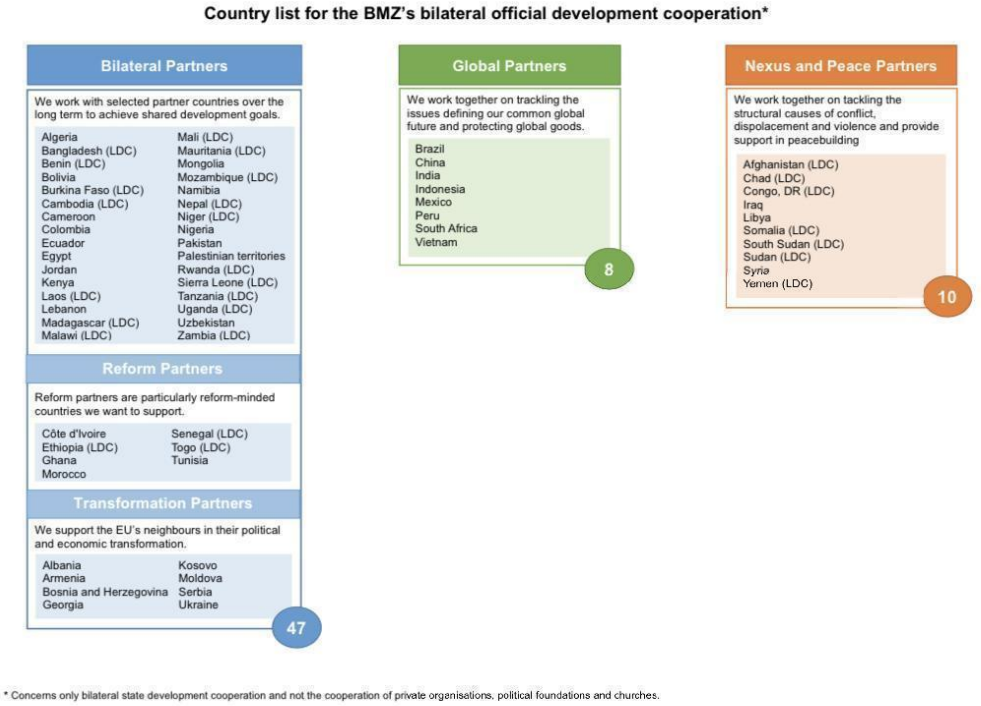
Source: Donor Tracker, 2022.

Figure 7: Top 10 Partner countries for bilateral ODA in 2020



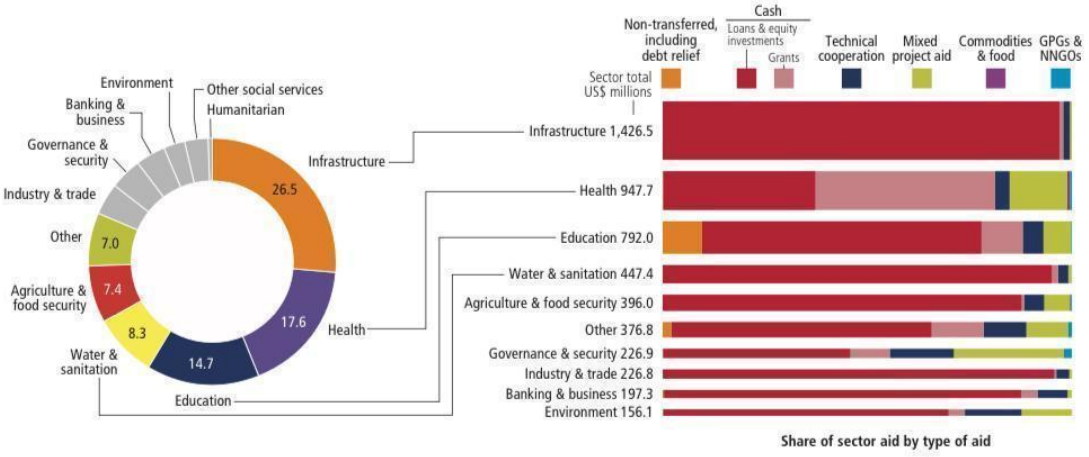
Source: Donor Tracker, 2022.

Figure 8: Country list for the BMZ's bilateral official development cooperation



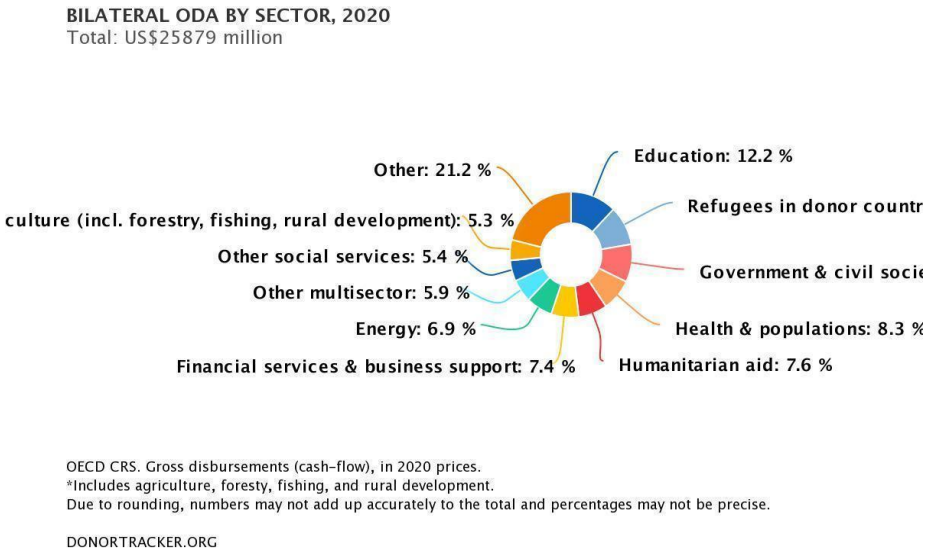
Source: BMZ, 2022.

Figure 9: Share of sector aid by type of aid.



Source: Development Initiatives, 2012

Figure 11: Germany's Bilateral ODA by sector



Source: Donor Tracker, 2022.

Figure 12. ODA by sector -bilateral commitments by donor and recipient. Germany and India

GeoBook: ODA by sector - bilateral commitments by donor and recipient

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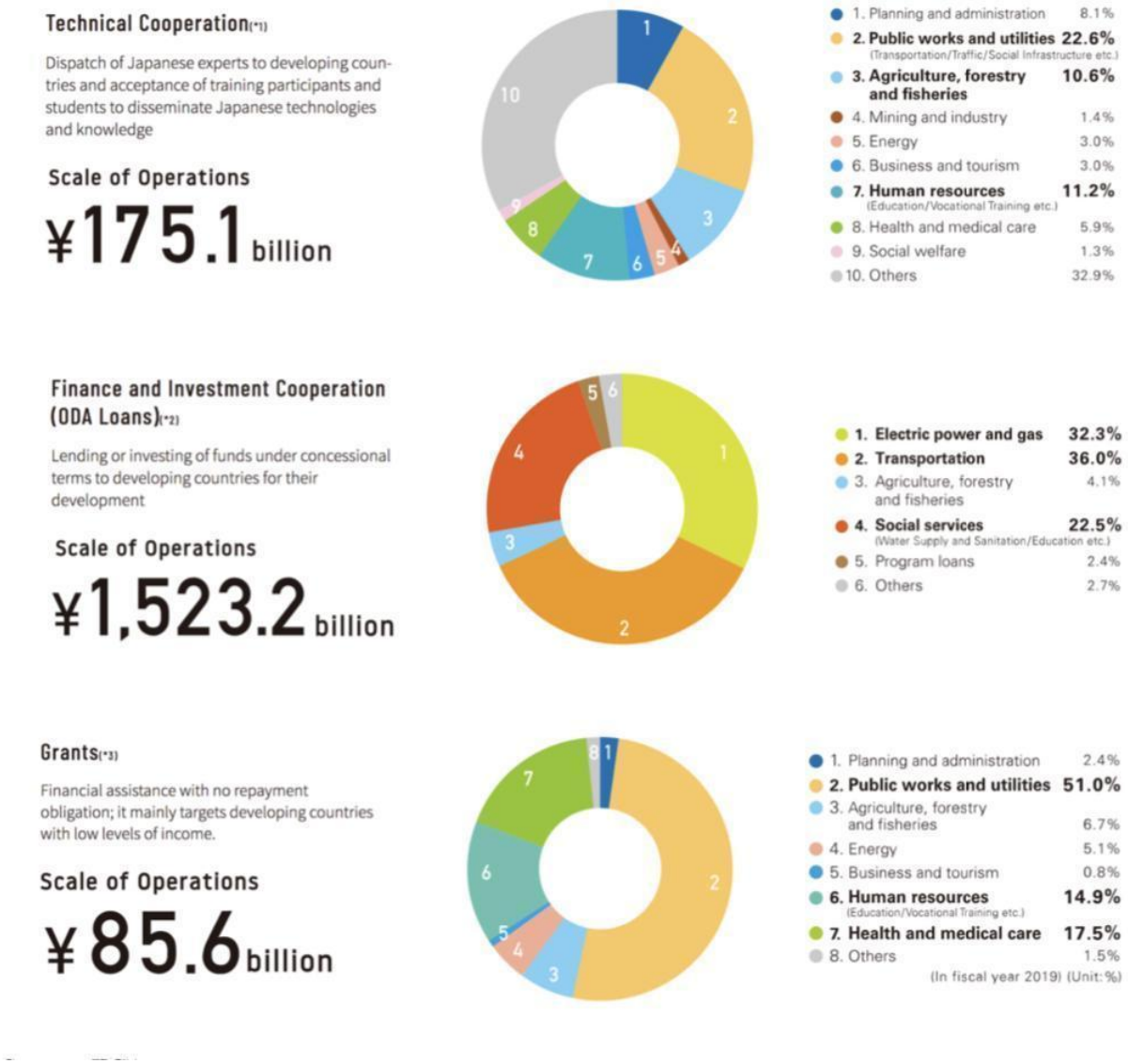
Donor	Germany									
Recipient	India									
Unit	US Dollar, Millions									
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sector										
1000: Bilateral ODA Commitments by Purpose (CRS)	860.73	962.95	916.01	1 541.49	1 009.35	1 397.48	1 122.13	1 020.09	1 885.15	1 832.31
100: SOCIAL INFRASTRUCTURE & SERVICES	125.67	239.51	153.23	145.19	142.74	150.53	512.69	339.51	221.62	842.59
110: Education	83.71	79.49	90.42	114.18	110.43	124.03	138.11	164.25	189.67	239.07
140: Water supply and sanitation	7.20	130.60	3.92	6.49	4.67	5.06	58.56	148.16	6.15	6.44
200: ECONOMIC INFRASTRUCTURE AND SERVICES	680.06	604.25	711.26	1 347.80	773.73	1 072.88	481.10	616.79	1 313.75	768.99
230: Energy	643.90	335.27	228.09	919.59	411.05	416.08	278.73	597.60	801.52	107.06
215: Transport and Communications	0.46	0.79	0.14	0.00	2.61	647.15	5.18	10.04	472.08	625.15
300: PRODUCTION SECTORS	9.15	77.05	10.50	14.60	7.03	22.71	35.12	7.64	119.91	18.42
310: Agriculture, forestry and fishing	6.61	74.18	9.82	8.62	6.86	21.29	29.86	6.52	114.09	17.93
320: Industry, mining and construction	2.54	2.87	0.50	5.98	0.05	1.42	5.26	1.06	5.70	0.49
330: Trade and tourism	..	..	0.18	0.00	0.12	0.00	0.00	0.07	0.11	0.00
400: MULTISECTOR	45.31	41.98	40.65	32.74	78.92	150.65	93.17	55.12	228.71	202.31
500: PROGRAMME ASSISTANCE	..	..	0.00	..	0.00	0.00	0.00	0.00	1.16	0.00
520: Food Aid	..	..	..	..	..	..	..	..	1.16	0.00
700: HUMANITARIAN AID	0.53	0.16	0.37	1.16	6.92	0.71	0.05	1.02	0.00	0.00
998: UNALLOCATED/UNSPECIFIED	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	..	..

Data extracted on 19 Oct 2022 10:40 UTC (GMT) from OECD.Stat

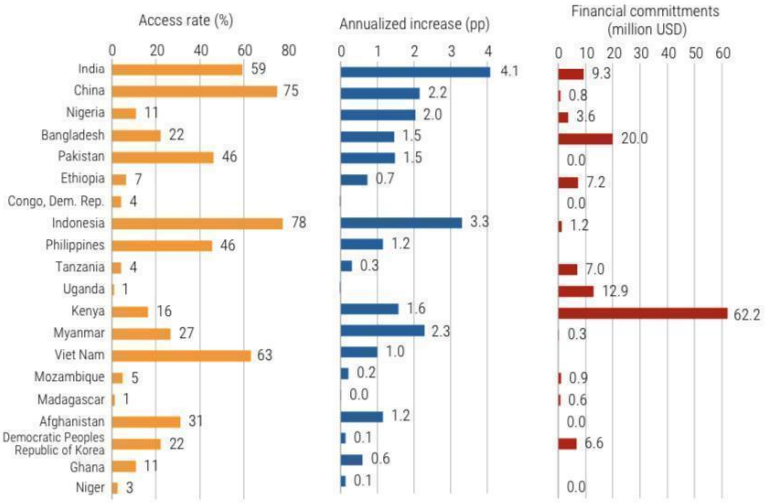
Source: OECD.Stat, 2022.

Figure 13. Japan's International Cooperation Agency's ODA



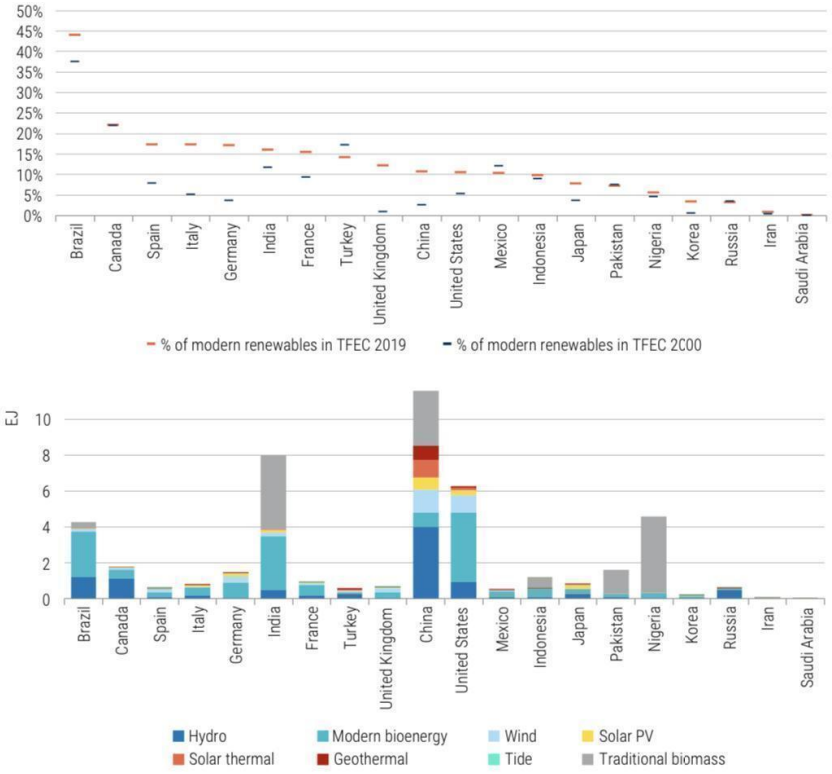
Source: JICA, 2020

Figure 16. Twenty countries with largest number of people lacking access to clean fuels and technologies (average for 2016–20)



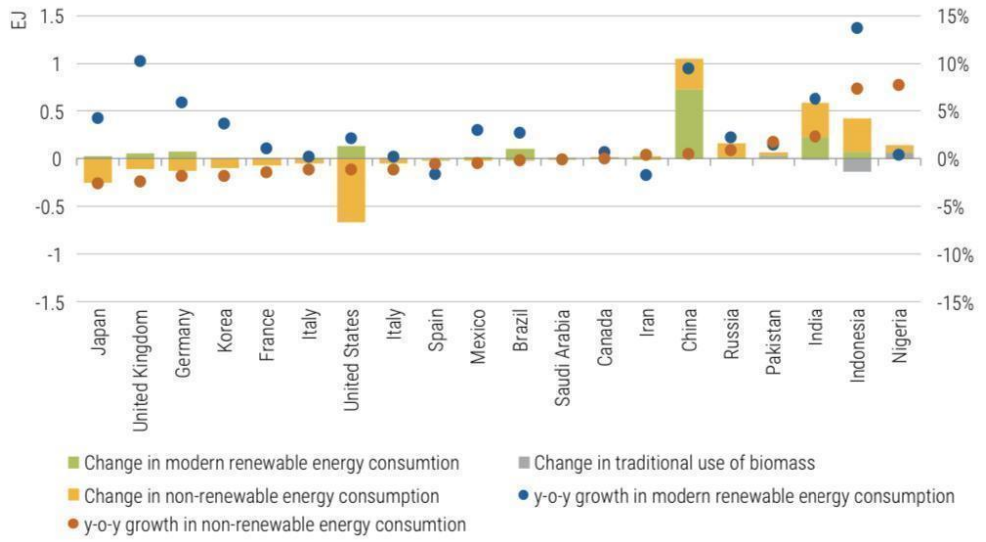
Source: United Nations, 2022b.

Figure 17. Share of renewables in total final energy consumption, 2000 and 2019, and renewable energy consumption, by source, in the top 20 energy-consuming countries, 2019,



Source: United Nations, 2022b.

Figure 18. Annual change in renewable and nonrenewable energy consumption, top 20 countries with the largest total final energy consumption, 2019.



Source: United Nations, 2022b.

Figure 19. Aid activities targeting Global Environmental Objectives

Aid activities targeting Global Environmental Objectives (CRS)

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Donor	Germany
Sector	1000: Total All Sectors
Allocable	Bilateral Allocable
Marker	Climate Change Adaptation
Amount type	Constant Prices
Year	2020
Unit	US Dollar, Millions, 2020

Score / Recipient	Principal	Significant	Screened, not targeted	Not screened
India	158.997	38.445	1 432.148	0.342

Data extracted on 19 Oct 2022 10:44 UTC (GMT) from OECD.Stat

Source: OECD.Stat, 2022.

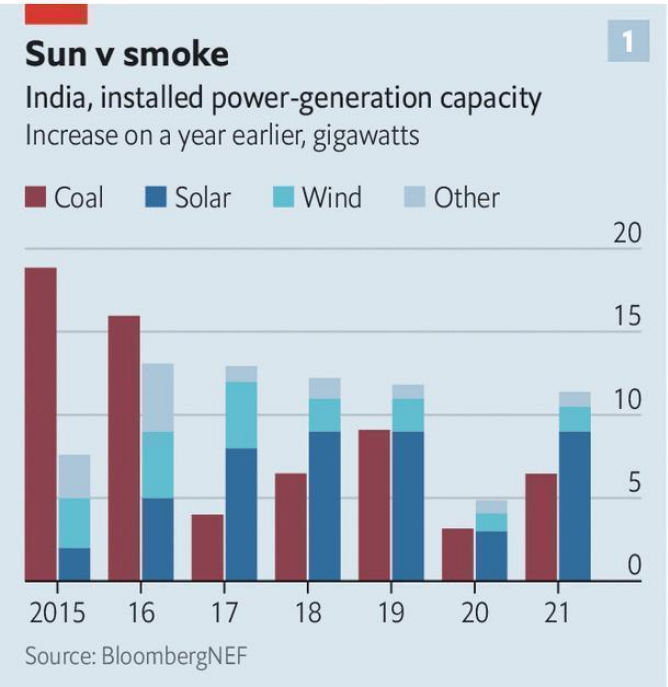
Figure 20. ODA by sector -bilateral commitments by donor and recipient. Japan and India. OECD.

Donor	Japan									
Recipient	India									
Unit	US Dollar, Millions									
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sector										
1000: Bilateral ODA Commitments by Purpose (CRS)	2 286.15	3 327.35	3 177.22	2 880.88	701.24	3 235.39	4 423.46	6 571.07	612.25	4 242.65
100: SOCIAL INFRASTRUCTURE & SERVICES	430.48	858.29	164.93	402.79	141.45	661.17	32.07	689.13	8.52	1 361.28
110: Education	10.12	9.65	7.85	224.93	3.07	4.00	4.19	4.15	4.98	4.53
140: Water supply and sanitation	412.81	842.33	152.32	160.49	134.77	419.88	5.43	682.60	1.70	795.89
200: ECONOMIC INFRASTRUCTURE AND SERVICES	1 097.16	2 374.07	2 864.67	2 069.26	263.23	2 057.68	3 534.42	5 514.56	453.55	2 553.85
230: Energy	844.54	765.34	3.20	538.16	181.44	145.39	2.66	319.12	2.56	0.68
215: Transport and Communications	252.53	1 608.32	2 861.34	1 531.02	81.70	1 912.21	3 531.73	5 195.40	450.57	2 552.85
300: PRODUCTION SECTORS	642.28	8.18	140.32	398.47	286.98	50.62	504.80	356.58	9.28	195.72
310: Agriculture, forestry and fishing	264.83	4.92	5.56	113.51	285.56	48.66	502.95	353.34	6.69	100.97
320: Industry, mining and construction	377.40	3.14	134.62	284.89	1.38	1.22	1.08	1.62	1.15	94.06
330: Trade and tourism	0.05	0.12	0.14	0.06	0.04	0.75	0.77	1.61	1.45	0.69
400: MULTISECTOR	115.83	84.42	6.07	9.32	8.39	465.83	4.37	10.46	3.34	131.78
500: PROGRAMME ASSISTANCE	..	..	..	..	..	..	347.38	..	137.56	..
700: HUMANITARIAN AID	0.39	2.40	1.23	1.04	1.20	0.09	0.42	0.35	..	..
998: UNALLOCATED/UNSPECIFIED	..	..	..	..	..	..	..	..	..	0.02

Data extracted on 29 Dec 2022 10:18 UTC (GMT) from OECD.Stat

Source: OECD.Stat, 2022.

Figure 21. India, installed power-generation capacity.



Source: The Economist, 2022.

Figure 22. New providers as independent donors.

NEW PROVIDERS AS INDEPENDENT DONORS

New provider	Independent Development Programme	Number of German TCo projects
Chile	✓	22
Brazil	✓	9
Mexico	✓	9
Indonesia	✓	2
Malaysia	✓	2
Thailand	✓	5
China	✓	Under negotiation
India	✓	Under negotiation
Costa Rica	n.a.	2
Colombia	n.a.	1
Tunisia	n.a.	1
South Africa	n.a.	11

Source: Lengfelder, 2016.

Figure 23. India: Selected Social and Economic Indicators, 2015/16–2020/21 1/

Table 1. India: Selected Social and Economic Indicators, 2015/16–2020/21 1/

I. Social Indicators

GDP (2018/19)		**Poverty (percent of population)**	
Nominal GDP (in billions of U.S. dollars):	2,719	Headcount ratio at $1.90 a day (2011):	21.2
GDP per capita (U.S. dollars) (IMF staff est.):	2,038	Undernourished (2015):	15.3
Population characteristics (2018/19)		**Income distribution (2011, WDI)**	
Total (in billions):	1.33	Richest 10 percent of households:	30.1
Urban population (percent of total):	34.0	Poorest 20 percent of households:	8.1
Life expectancy at birth (years, 2015/16):	68.3	Gini index (2011):	35.7

II. Economic Indicators

	2015/16	2016/17	2017/18	2018/19 Est.	2019/20 Projections	2020/21
Growth (in percent)						
Real GDP (at market prices)	8.0	8.2	7.2	6.8	6.1	7.0
Prices (percent change, period average)						
Consumer prices - Combined	4.9	4.5	3.6	3.4	3.4	4.1
Saving and investment (percent of GDP)						
Gross saving 2/	31.1	29.6	29.1	29.2	29.3	29.5
Gross investment 2/	32.1	30.2	30.9	31.3	31.3	31.8
Fiscal position (percent of GDP) 3/						
Central government overall balance	-4.1	-3.7	-3.9	-3.8	-4.5	-4.2
General government overall balance	-7.2	-7.1	-6.4	-6.2	-7.4	-7.1
General government debt 4/	68.8	68.8	69.4	69.1	69.8	69.1
Cyclically adjusted balance (% of potential GDP)	-7.2	-7.3	-6.5	-6.2	-7.2	-6.9
Cyclically adjusted primary balance (% of potential GDP)	-2.5	-2.6	-1.7	-1.2	-2.2	
Money and credit (y/y percent change, end-period)						
Broad money	10.1	10.1	9.2	10.5	9.7	11.3
Bank credit to the private sector	10.6	8.0	9.5	12.7	8.4	11.1
Financial indicators (percent, end-period)						
91-day treasury bill yield (end-period) 5/	7.4	7.2	6.2	6.2	5.3	...
10-year government bond yield (end-period) 5/	7.5	6.7	7.4	7.4	6.7	...
Stock market (y/y percent change, end-period) 5/	-9.4	16.9	11.3	17.3	4.9	...
External trade (on balance of payments basis)						
Merchandise exports (in billions of U.S. dollars)	266.4	280.1	309.0	337.2	346.0	358.9
(Annual percent change)	-15.9	5.2	10.3	9.1	2.6	3.7
Merchandise imports (in billions of U.S. dollars)	396.4	392.6	469.0	517.5	534.4	567.7
(Annual percent change)	-14.1	-1.0	19.5	10.3	3.3	6.2
Terms of trade (G&S, annual percent change)	5.7	1.4	-2.3	-1.8	0.1	0.9
Balance of payments (in billions of U.S. dollars)						
Current account balance	-22.1	-14.4	-48.7	-57.2	-57.8	-73.5
(In percent of GDP)	-1.0	-0.6	-1.8	-2.1	-2.0	-2.3
Foreign direct investment, net ("-" signifies inflow)	-36.0	-35.6	-30.3	-30.7	-36.7	-40.0
Portfolio investment, net (equity and debt, "-" = inflow)	4.1	-7.6	-22.1	2.4	-14.7	-14.4
Overall balance ("-" signifies balance of payments surplus)	-17.9	-22.4	-43.6	3.2	-21.1	-15.1
External indicators						
Gross reserves (in billions of U.S. dollars, end-period)	360.2	370.0	424.5	412.9	434.0	449.1
(In months of next year's imports (goods and services))	8.8	7.6	7.9	7.4	7.3	7.0
External debt (in billions of U.S. dollars, end-period)	485.0	471.3	529.3	513.1	560.9	613.6
External debt (percent of GDP, end-period)	23.1	20.6	20.0	18.9	19.1	19.2
Of which: Short-term debt	9.2	8.8	8.3	8.1	8.6	8.9
Ratio of gross reserves to short-term debt (end-period)	1.9	1.8	1.9	1.9	1.7	1.6
Debt service ratio 6/	8.8	7.8	7.9	8.3	8.5	8.3
Real effective exchange rate (annual avg. percent change) 7/	5.2	1.9	3.0	-3.5	6.1	...
Exchange rate (rupee/U.S. dollar, end-period) 8/	68.3	64.8	65.0	69.2	71.8	...
Memorandum item (in percent of GDP)						
Fiscal balance under authorities' definition	-3.9	-3.5	-3.5	-3.3	-3.7	-3.8

Sources: Data provided by the Indian authorities; Haver Analytics; CEIC Data Company Ltd; Bloomberg L.P.; World Bank, *World Development Indicators*; and IMF staff estimates and projections.

1/ Data are for April–March fiscal years.

2/ Differs from official data, calculated with gross investment and current account. Gross investment includes errors and omissions.

3/ Divestment and license auction proceeds treated as below-the-line financing.

4/ Includes combined domestic liabilities of the center and the states, and external debt at year-end exchange rates.

5/ For 2019/20, as of September 2019.

6/ In percent of current account receipts, excluding grants.

7/ For 2019/20: the change in the average for April-August 2019 from April-August 2018.

8/ For 2019/20, as of end-August, 2019.

Source: International Monetary Fund, 2019.

Figure 24. Ex post evaluation report: 2020 of the Sakri Solar Power Plant.

Ex post evaluation report: 2020

		Planned	Actual
Investment costs (total)	EUR million	370.00	199.00
Counterpart contribution	EUR million	120.00	41.00
Funding	EUR million	250.00	158.00
of which BMZ budget funds	EUR million	35.00	27.30

*) Random sample 2019

Source: KfW Development Bank, 2020

Figure 25. Effectiveness of the Sakri Solar Power Plant.

Indicator	PA target value	Ex post evaluation
(1) Annual **production of electrical energy** by the Sakri solar power plant	180 GWh p.a.	196 GWh p.a. (Average April 2013–March 2019)
(2) The State of Maharashtra's policy-based requirement to increase the **share of purchased energy generated from solar power to 0.25%** of the purchase of fossil energy sources by 2013 is **achieved by at least 50%**.	**Financial year 2010/11:** Solar requirement: 0.25% Target: 259 GWh photovoltaic Actual: 1.1 GWh photovoltaic **Achievement rate: 0.4%**	**Financial year 2013/14:** Solar requirement: 0.5% Target: 589 GWh photovoltaic Actual: 311 GWh photovoltaic **Achievement rate: 53%**

[9]Sources: (1) Mahagenco, internal project monitoring. (2) MEDA 2014: DISCOM Cumulative Report of FY 2010-14.

Source: KfW Development Bank, 2020

Figure 26. Sustainable Development Goals. India. No Poverty.

Sustainable Development Goals (SDGs): India

SDG 1: No Poverty

Filter by SDG: SDG 1: No Poverty

Sustainable Development Goal	Statistic	Year	Value
1.1.1	Proportion of Employed Population below $1.90 PPP a Day (Age 15+), Female	2019	**9,5 %**
	Proportion of Employed Population below $1.90 PPP a Day (Age 15+), Male	2019	**8,3 %**
	Proportion of Employed Population below $1.90 PPP a Day (Age 15+), Total	2021	**7,6 %**

Source: Asian Development Bank. Basic Statistics 2022 (April 2022)

Source: Asian Development Bank, 2022

Figure 27. Comparative data for the global partners using selected indicator

Table: Comparative data for the global partners using selected indicators

Countries/index	Brazil	China	India	Indonesia	Mexico	Peru	South Africa	Viet Nam	Germany
Per capita income (USD)[5]	8,717	10,216	2,100	4,135	9,946	6,977	6,001	2,715	46,445
Per capita income, %-age growth rate[6]	0.38	5.57	3.13	3.88	−1.14	0.51	−1.18	6.0	0.3
Gross national income PPP (USD)[7]	14,890	16,760	6,920	11,970	20,340	12,790	12,670	7,910	59,090
Human Development Index[8]	0.765 (high)	0.761 (high)	0.645 (medium)	0.718 (high)	0.779 (high)	0.777 (high)	0.709 (high)	0.704 (high)	0.947 (very high)
Corruption Perception Index (ranking)[9]	94/180	78/180	86/180	102/180	124/180	94/180	69/180	104/180	9/180
Doing Business Index (ranking)[10]	124/190	31/190	63/190	73/190	60/190	76/190	84/190	70/190	22/190
CO_2 emissions (in Mt)[11]	466	10,170	2,620	618	439	55	479	248	702
Per capita CO_2 emissions (in t)[12]	2.32	7.75	1.80	2.43	4.07	1.98	8.01	2.82	9.11
Forest area (in km^2)[13]	4,990,514	2,162,190	716,272	933,442	659,476	726,760	171,228	144,912	114,190
Natural resources as a %-age of GDP[14]	4.6	1.6	2.3	4.8	3.5	8.9	5.2	4.3	0.1
Sustainable Development Report (ranking)[15]	53/166	48/166	117/166	101/166	69/166	61/166	110/166	49/166	5/166
Political Stability (ranking)[16]	143/195	116/195	151/195	137/195	152/195	108/195	113/195	84/195	60/195
Human Rights Score[17]	−1.17	−1.3	−1.39	−0.43	−1.42	0.74	−1.06	-0.37	2.93
Fatalities as a result of crimes (per 100,000 inhab.)[18]	27.4	0.5	3.1	0.4	29.1	7.9	36.4	15	0.9

Source: BMZ, 2021.

Figure 28. German TriCo Projects with anchor countries

GERMAN TRICO PROJECTS WITH ANCHOR COUNTRIES

	Recipient	Activity/ Project	GPG
Mexico	Ecuador	Environmental protection	✓
Mexico	Dominican Republic	Environmental protection	✓
Mexico	Guatemala	Environmental protection	✓
Mexico	Bolivia	Water Protection	✓
Mexico	Colombia	Biodiversity	✓
Mexico	Colombia	Sustainable housing (Infonavit)	✓
Mexico	Peru	Management support for polluted areas	✓
Mexico/ Panama	Nicaragua	Sustainable Agriculture in the Corredor Biológico Mesoamericano (CBM)	✓
Brazil/Mexico	Bolivia/Peru	Natural gas	✓
Brazil	Paraguay	Environmental promotion	✓
Brazil	Various	HIV/AIDS prevention	✓
Brazil	Mozambique	Institutional strengthening of quality control (INNQ)	No
Brazil	Mozambique	Strengthening of the cooperate credit association	No
Brazil	Mozambique	Disaster Prevention	✓
Brazil	Peru	Support for creating an environmental technology center	✓
Brazil	Paraguay	Technocological center for Environment	✓
Brazil	Haiti	Fostering South-South cooperation	No
Indonesia	East Timor	Democracy, Human Rights	✓
Indonesia	Myanmar	Vocational Trainings	No
Thailand	Laos	Water Management	✓
Thailand	Laos	Fostering National GAP Standards	No
Thailand	Laos	Value Chain Management	✓
Thailand	Vietnam	Strengthening of Rural Cooperatives	No
Thailand	Vietnam	Technological Service	✓
South Africa	African Countries	Governance and Administration (at least 10 projects)	✓
South Africa	Tanzania	Energy and Climate/Protection of Public Goods	✓

Source: Lengfelder, 2016