tise transition, innovation and sustainability environments

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Enhancement of National Innovation Capacity in ASEAN:

Key Determinants and Prospects of Japanese Official Development Assistance in the Science, Technology and Innovation Field

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ABSTRACT

There are considerable debates concerning the effectiveness of foreign aid, and a research gap exists in innovation capacity building in the context of development assistance. Thus, this paper specifically focuses on the ASEAN region and investigates the effectiveness of Japanese Official Development Assistance (ODA) in the Science, Technology and Innovation (STI) field. The purpose is to identify key determinants of enhancing the national innovation capacity by STI ODA and to develop new approaches for a better quality of Japan ODA. In order to do so, the expert interviews (7 experts) and literature review incorporating items of a systematic review are employed as research methodologies. After exploring the progress of STI Japan ODA from a historical perspective and research implementation, the paper identified three major determinants: 1. human-centred approach, 2. the Japanese approach of capacity building, and 3. STI development with SDGs. Based on the result, the paper proposes four policy recommendations: a human-rights based approach, a transdisciplinary approach, an improvement of the evaluation process of STI ODA, and active involvement of the local private sector in the STI field. These findings and policy recommendations shed new light on the significance of inclusive and sustainable development targeting innovation creation through foreign assistance in the ASEAN region.

Keywords:

Official Development Assistance (ODA), Science Technology and Innovation (STI), Japan, ASEAN, National Innovation Capacity

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1. INTRODUCTION

International aid plays a pivotal role in forging peace and achieves reconciliation among countries in the globalised society. Global military expenditure is at a record high due to Russia's invasion of Ukraine, while global development aid spending is one-tenth of that amount, USD 204 billion (SIPRI, 2023; OECD, 2023). Military peace-building has become the dominant international political means as a current social tendency. Thus, the stability of an international order that does not depend on direct violence is more necessary than ever. The classic method of development assistance in the public sector is called Official Development Assistance (ODA). There has been growing public attention towards the effectiveness of foreign aid since the awareness of the Sustainable Development Goals (SDGs) spread worldwide. Above all, discussions centred on the Science, Technology and Innovation (STI) field have initiated in recent years, particularly in the context of ODA and the SDGs implementation. As digitalisation rapidly advances, donor countries are urged to tailor their assistance to the needs of the ODA recipient countries. Thus, the objective of this paper is to find out the primary drivers of increasing national innovation capability through STI ODA and to explore new approaches for improving the effectiveness of Japan's ODA.

The key determinants enhancing the national innovation capacity through Japanese ODA are 1. human-centred approach, 2.the Japanese approach of capacity building, such as *the kaizen* method, and 3. STI development with SDGs. The research identifies that these three elements had been positively influencing the capacity development of the Association of Southeast Asian Nations (ASEAN) region. Additionally, the policy recommendations are developed in order to improve the effectiveness of STI ODA under the current international political situation. They include four essential components formulated based on the finding: a human-rights-based approach, a transdisciplinary approach, an improvement of the evaluation process of STI ODA, and active involvement of the local private sector in the STI field. This paper begins by introducing research questions and fundamental concepts for the topic. The subsequent

sections that follow the introduction part explain the research designs, results and discussions of the research questions. This work aims to generate novel perspectives on the topic of the Japanese STI ODA for better development assistance.

1.1. Research Questions

One major controversial topic that has been dominated in the field of development economics for many years concerns the effectiveness of foreign aid. There has been much criticism and scepticism around the topic of development assistance regarding bilateral aid between high and low-income countries, which is discussed in the next subsection in detail. Therefore, this paper addresses the research question mentioned below for the sake of enabling a comprehensive analysis and narrowing down the research topic. The primary research questions are as follows:

RQ1. How has Japan's approach to STI (Science, Technology and Innovation) development in ASEAN countries evolved over time?

RQ2. What have been the key determinants for enhancing the national innovation capacity in Japan-ODA recipient countries?

RQ3. What approaches are needed for future ODA in ASEAN countries?

First of all, this paper closely looks into the case of Japan and ASEAN countries for in-depth analysis and effective research. Japan and ASEAN states have maintained robust and strategic partnerships for a long time, and there have been extensive and frequent monetary exchanges, including foreign aid, between the two parties. Therefore, these three research questions attempt to tackle finding out determinants to improve the effectiveness of foreign aid, explicitly focusing on Official Development Assistance and

formulating the policy recommendation for a better quality of Japan's overseas development policy in ASEAN.

With regard to the first research question, it is significant to look through Japanese ODA from a historical point of view to get insights into the prospect of further STI collaboration in the context of international cooperation and development. Uotani (2012) explains that it is crucial to comprehend the history of donor countries' economic development history and how the foreign assistance policy has been shaped in order to grasp the countries' assistance systems fully. With respect to the second and third research questions, examining which factors and approaches positively influence the innovation ecosystems of aid-recipient countries through ODA allows the paper to identify which areas to focus on and improve in formulating policy. Therefore, the paper attempts to combine the research outcomes of RQ1 & RQ2 and produce ODA guidelines as a policy recommendation, which leads to responding to RQ3. Each research question enriches the understanding of other questions and complements each other.

1.2. Relevance of Investigation

In spite of this massive flow of aid around the globe, there is wide disagreement and a significant deal of debate regarding the topic of foreign aid among scholars and practitioners. Nadeem et al. (2020) argue that the relationship between economic growth and foreign aid is extremely vague . They also say some scholars claim it has a negative correlation, whereas others argue the positive correlation. The call for assessing and monitoring aid effectiveness dates back to 2005 when the Paris Declaration on Aid Effectiveness was issued by the High-Level Forum consisting of over a hundred donors and developing countries (Deutscher & Fyson, 2008). Since then, A large piece of literature has also tackled exploring the effectiveness of the aid in the recipient country; however, they point out that a research gap still exists on the topic of innovation led by donor countries in aid-recipient countries. Easterly (2007) explains that measuring aid

effectiveness is challenging, especially in how aid agencies optimise development activities, as there is a lack of empirical evidence and theory.

Moving now to discuss why innovation capacity is critical in international cooperation and development. It goes without saying that innovation can be a key driver to boost the economy, change a conventional economic structure and increase a country's competitiveness. If countries prosper with innovation, it will have a large potential to improve the living standard of people. Hence, innovation should be the centre of focus when it comes to foreign aid. However, Ericsson and Mealy (2019) point out that measuring amounts spent supporting innovation through ODA could be arduous since recipient counties do not collect comprehensive information regarding the funding for the innovation capacity. ODA is often captured as a representation of innovation in delivering development assistance rather the actual activities to support innovation. Thus, this paper deepens down and analyses the pure impact and its effect on innovation capacity.

Lastly, this paper argues why ODA in ASEAN nations is examined in this dissertation. This economic and political regime in the south east Asia region, ASEAN, was established back in 1967, and Malaysia, the Philippines, Singapore, Thailand and Indonesia were the first founding members. After some political transformations in the region, Brunei, Vietnam, Myanmar, Laos, and Cambodia have participated in ASEAN community during the 1990s (Narine, 2008). Now that ASEAN countries have ten member states. In 2015 ASEAN members introduced the ASEAN Economic Community (AEC) to facilitate the unrestricted flow of services, investment, human capital and goods (Ishikawa, 2021). Coggan (2020), the author of *More: The 10,000-Year Rise of the World Economy*, mentions that the in the period from 1820 and 1960s, the enchainment of society's so-called "revolution" took place mainly in the Western world, but in the last 50 years, the breakthrough of industrialisation has started with Asian tigers such as Singapore and South Korea and moved on to China and India. He also predicts that "economic power is shifting away from Europe and North America, where it resided for the last three centuries, and back to Asia" (p.29). Lee and Shaun (2022) predict in the publication of the World Economic Forum that ASEAN is currently on track to be the fourth-largest economy,

following the US, China and EU by the end of 2030. They also say that 61% of the whole ASEAN population is below 35 years old, and they are adopting the use of digital technologies. Thus, enormous financial resources and investments are poured into the region, and ODA is one of them from Japan. Hassan (2003) indicates that the bilateral security cooperation between ASEAN countries and Japan is limited. However, massive Japanese ODA and technical assistance have been carried out and positively contributed to reinforcing the social and economic base of longstanding security in the ASEAN region. According to the survey conducted by ISEAS-Yusof Ishak Institute, the result shows that Japan and the EU are the most favoured and trusted strategic partners by people in ASEAN. Thus, choosing Asia, specifically this ASEAN region under this topic, is imperative and meaningful. All things considered, the originality of this paper is finding out the key drivers of national innovation capacity in the ASEAN region through Japanese ODA, focusing on the science, technology and innovation field. The paper sets out the basic understanding of these two crucial concepts in the following subsection, ODA and STI definition.

1.3. Background

1.3.1.ODA and STI Definition

According to the Organisation for Economic Co-operation and Development (OECD), ODA is defined as “government aid that promotes and specifically targets the economic development and welfare of developing counties” (OECD, 2023). The concept of ODA was often referred to economic and financial assistance provided for developing nations in most cases. ODA plays a critical role in backing up the economy of developing counties. Much of the investment goes into the social and economic infrastructure that covers transpiration, basic education and the healthcare system (MOFA, 2003). These economic infrastructures lay a foundation for the growth of recipient countries consequently. Also, it is noteworthy that foreign aid is not necessarily extended in the form of ODA. Private Finance Initiatives (PFI) such as Foreign Direct Investment (FDI)

often facilitates the enhancement of the economy and are considered one type of aid. Especially, greenfield investment, one of the FDI, is occasionally regraded an effective means for development; however, as it is purely funded by privately held firms, thus the thesis focuses on only the impact of a public funded ODA and formulating policy implications and recommendation on this topic.

With regard to the STI definition, according to Ericsson and Mealy (2019), the phrase "science, technology, and innovation" (STI) is a broad term and includes both research activities and the creation of new technologies as well as different kinds of innovation that aim to improve productivity and knowledge creation. Since STI activities can be seen across all sectors, it is frequently not considered as a sector in itself. The 2030 Agenda for Sustainable Development, which was adopted at the UN Sustainable Development Summit in September 2015, positions STI as the main implementation instrument for SDGs and launching the UN Technology Facilitation Mechanism (Nanjo, 2020). Thus, the STI concept naturally came into the spotlight in many areas with the adaptation of the SDGs. It also calls for a Technological Facilitation Mechanism, composed of a wide range of STI-related stakeholders, to promote international cooperation on access to science, technology, and innovation as well as improved knowledge sharing (Walsh et al., 2020). Walsh et al. (2020) also emphasise the need to take action and encourage the development, technological transfer, and dissemination of STI in developing countries in order to support them in achieving SDGs. Building STI capacity has also been drawing greater interest from the international community and developing counties, and many international organisations have been promoting various programs to build STI capability in developing countries (Choi & Cho, 2023). In the contemporary digital landscape, STI is crucial for the development and increase the competitiveness in the current digitalised world and has so much potential to bring robustness to the economy.

ODA has been playing a pivotal role in helping aid recipient countries achieve economic growth and improve people’s living standards, as explained in the previous subsection. Historically speaking, foreign aid is a relatively new concept in the economic

discipline (Edwards, 2014). The United States was one of the first countries to implement foreign assistance around 1948 and had strategically taken advantage of it as a diplomatic means. Since then, ODA has been initiated and promoted by the Development Assistance Committee (DAC), a working group for international development at OECD. The DAC, which was established in 1960, has coordinated donor policies and acted as an international hub for the ongoing monitoring process of assistance in more than 30 developing countries (OECD, 2006). Since its inception, the DAC has emphasises pre-investment technical support and obtained consensus on the framework under which DAC members could offer comparable data and decisions regarding the flow of funds to developing nations (OECD, 2006). As of 2023, there are 31 DAC members, and the ODA funded by DAC members has totalled USD 204 billion in 2022, which is 13.6% higher compared to 2021,186 billion, due to the increased amount of humanitarian aid and refugee crisis resolution due to the Ukraine situation (OECD, 2023).

1.3.2. STI Development through ODA

Before proceeding to closely examine the impact of ODA on STI development in recipient countries, it is necessary to understand the benefits and drawbacks of foreign assistance and aid from both the recipient and donor countries' perspectives.

First of all, many developing countries tend to have difficulties with securing capital resources for the sake of countries economic development. This struggle is often referred to as the *two-gap model* in the development economics discipline. It indicates the constraints of two gaps which hinder countries' growth: one between domestic savings and required investment and the other between export revenues and the imports needed for development (Hashimzade et al., 2017). Thus, the ODA, one type of publicly funded financial aid, helps fill these gaps and comes as a budgetary surplus for a government-led economic initiative aiming for economic growth. On the contrary to the benefits of the recipient country, Kurosaki and Kurita (2016) refer to the issue of fungibility since money

is fluid and substitutable, the government of the recipient country puts the money saved by aid into the military and other expenditures due to corruption in the government, so the amount of public sector development investment does not grow as much as the number of aid inflows. Also, there is an economic phenomenon called *Dutch Disease*, which indicates that a substantial money inflow in a country leads to macroeconomic instability, especially by increasing inflation and appreciating the real currency rate (McKinley, 2009). It is also worth mentioning that from the colonial points of view foreign aid can be regarded as one of the representations of neo-colonialism. The post-colonial theory regards ODA as a system that reaffirms the hegemony of superpowers and the conventional hierarchy of North-South relations (Kim & Garland, 2019). Thus, the utilisation of ODA has the potential to lead an economic unfavourable state by which the recipient countries experience a disbenefit from receiving financial aid.

What are the motivations of donor countries in contrast to ODA recipient countries, and are there any potential disadvantages for them in providing ODA? The increased trade net flow and foreign policy objectives would be two of the substantial benefits donor countries could derive from ODA. According to the research conducted by Noh and Heshmati (2021), their quantitative analysis shows the loans and technical cooperation of South Korean ODA have a positive impact on South Korea's exports, whereas the grant type of ODA has a negative effect. These types of results are supported by many studies, such as Yasin (2005) and Kimura and Todo (2007). Yasin (2005) found that the bilateral ODA has a significant effect on Foreign Direct Investment (FDI). Furthermore, Kimura and Todo (2007) identified the correlation between Japanese ODA and the increase in FDI inflow in the ASEAN region. Thus, ODA promotes trade and investment between recipient and donor countries, and this capital outflow brings long-term increased inflow into the donor countries. With regards to the political aspects of ODA, for instance, Japan has been utilising the ODA to further its own interest because Japan had to rely on ODA as its means of foreign policy as a country that had abandoned any use of force after the World War Ⅱ (Yamamoto, 2016). As Japan has been utilising ODA as a diplomatic tool, ODA could enhance a country's soft power capability. This point is further discussed in section 4.1.

So far, this subsection has been discussing the advantages and disadvantages that donor and recipient countries gain through the ODA. Now the paper explains the ODA's contribution to Science, Technology and Innovation development from a general perspective. ODA substantially contributes to STI development in developing counties, positively impacting Research and Development (R&D) and local entrepreneurship. In their World Bank publication, Watkins and Ehst (2008, p.x-xi) explain that. "STI capacity building is about building the technical, vocational, engineering, entrepreneurial, managerial, and scientific capacity to solve each country's pressing social and economic problems, transform their societies, and have a positive impact on the standards of living and quality of life of the poorest strata of society. " It is estimated that between 2010 and 2016, total development finance to STI has reached around USD 14 billion on average and 10 billion USD of financial resources are provided by the Development Assistance Committee (DAC) members and international agencies (Ericsson & Mealy, 2019).

In light of the ongoing trend of digitalisation and technological innovation, the large amount of ODA inflow into the STI area is a clear indication of the symbolic societal transformation. Yun and Lee (2013) as cited in Choi and Cho (2023, p.4), analysed the impact of ODA on R&D expenditure. The number of domestic patent applications is selected as the dependent variable, and the independent factors were the recipient counties' R&D spending and R&D ODA. Their empirical analysis showed that recipient counties' R&D ODA and R&D spending had positive effects on boosting their capacity for innovation.

On the question of local entrepreneurship, Moore et al. (2020) carried out a panel analysis of 313 determinates from 49 countries to investigate how international monetary aid flows impact entrepreneurship in recipient countries. The study found out that there is a direct link between business development and international financial support, especially private and bilateral foreign aid. Above all, the positive impact of bilateral aid on creating new businesses is more profound in emerging and middle-develop countries, as they indicate.

Furthermore, Ericsson and Mealy (2019) explain in the OECD Development Co-operation Working Papers that there are three-tiered ways of identifying STI-related ODA (see Figure 1). As mentioned above, STI is such a broad term, so it can be demanding to distinguish STI-related ODA among others. Thus, the approach illustrated below serves to facilitate the identification of the STI ODA.

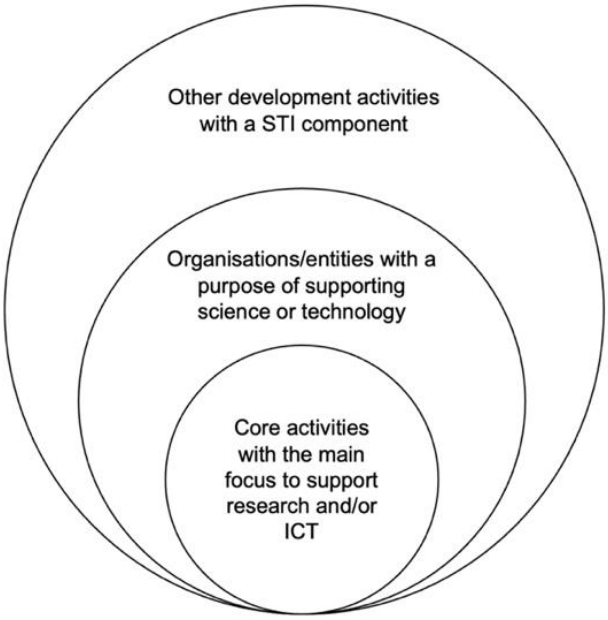

Figure 1. Three-tiered approach identifying Science, Technology and Innovation activities

Source: Ericsson and Mealy (2019, p.40).

1.3.3. National Innovation Capacity

Discussions with regard to innovation often start with a concept of *creative destruction* advocated by an Austrian economic, Josef Schumpeter (Hospers, 2005; Lundvall, 2016). This process describes the waves of innovation activity that impact the economic system at various times, leading to the dismantling of the existing economic structure and the emergence of a fresh one (Hospers, 2005). However, the author of *National Systems of Innovation: towards a Theory of innovation and interactive learning*,

Bengt-Åke Lundvall (2016) indicates “innovation as a cumulative process” (p.92) rather than as a disruptive one since under the modern capitalistic society “innovation is a fundamental and inherent phenomenon” (p.93) in a wide range of business activities. It connects to his argument that the competition of nations’ economies reflects their innovation capacity in the long run, and innovation is a “ubiquitous phenomenon” in modern society (Lundvall, 2016, p.93). Given this theoretical backbone and background of innovation, innovation can be understood as a formidable determinant dramatically impacting competitiveness and economic growth in a national context.

Thus, the question arises as to what elements constitute national innovation capacity. Furman et al. (2002) explain that it has three comprehensive components; “common innovation infrastructure”, “cluster-specific environment for innovation” and “quality of linkages” (see Figure 2). Firstly, common innovation infrastructure often encompasses critical investments and policy decisions that encourage innovation in a country. It also includes the endogenous growth theory, which highlights the importance of technological sophistication and the number of engineers and scientists that is possibly available for the production of new technologies. Secondly, cluster-specific environment refers to the microeconomic environment where a country’s industrial clusters developing and commercializing innovation have an influence over it. At the same time, the common infrastructure sets the fundamental framework for innovation in an economy. Lastly, the quality of linkages is generally understood to indicate the connection between the cluster-specific environment and common innovation infrastructure, according to Furman et al. (2002). They also emphasised that the rate of national R&D productively can be determined by the strength of linkages influencing creative output and input (Furman et al., 2002).

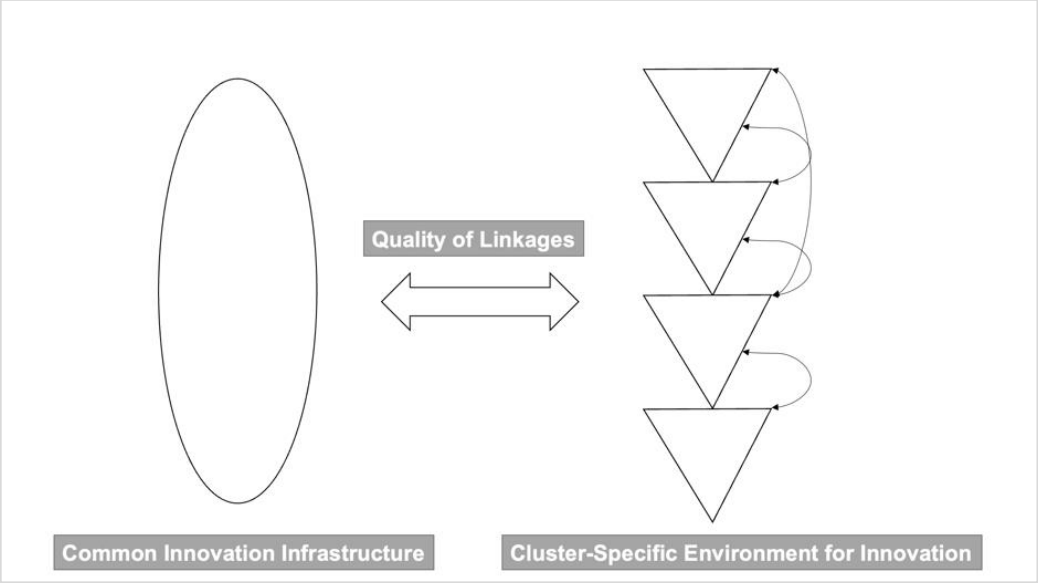

Figure 2. Determinants of national innovation capacity

Source: Furman et al. (2002, p. 906), and the figure was simplified by the author.

Having looked into the elements of national innovation capacity, there is still a degree of uncertainty around the terminology of national innovation capacity. Therefore, this dissertation primarily concentrates on national level of R&D. There are two reasons why the paper highlights R&D activities in recipient countries, among other indicators of national innovation capacity in the STI context.

The first reason is that R&D is a foundation of innovation activities from a macroeconomic point of view. Kurosaki and Kurita (2016) underscore the significance of enhancing productivity through technological advancement and fostering innovation. These accomplishments can be realised by means of R&D endeavours, potentially resulting in the emergence of new industries within a nation and creating the resilience of the economy. Lundvall (2016) also clarifies that R&D expenditure as a proportion of GDP is one of the most traditional metrics used to compare national systems. Even within the context of STI ODA, R&D has been regarded as a crucial factor. The research done by Choi and Cho (2023) explored the effect of STI ODA on innovation capacity. They found

that R&D investment should be prioritised along with STI ODA to be effective in a recipient country. Secondly, R&D data can often be quantifiable; thus, it can be a measurable indicator to enhance its efficiency and ease of research. R&D data is also used as a sub-pillar index of the Global Innovation Index, which the World Intellectual Property Organisation (WIPO) publishes every year. The WIPO (2022) incorporates a set of four indicators within the R&D dataset to quantify national innovation: Researchers, Gross expenditure on R&D, Global corporate R&D investors and QS university ranking.

These two reasons mentioned above support R&D as a central factor of national innovation capacity. However, it is worth mentioning that R&D indicators can capture only an input effort, which can be said that it cannot reflect innovation output results (Lundvall, 2016). Considering this problem, the analysis is carried out with a particular emphasis on assessing the outcome of R&D.

1.3.4. Overview of Japan ODA

Before moving to examine Japan's approach to STI development in ASEAN countries, it is critical to look through the comprehensive overview of Japan's ODA. Japan's ODA has two types of aid; Bilateral aid and Multilateral aid (see Figure 3). Japanese bilateral aid offers recipient countries Grant Assistance, Technical Cooperation and Yen Loans. Bilateral aid has the advantage of assisting developing regions and countries directly (MOFA, 2022). The Grant assistant refers to providing financial aid or project to governments without expecting monetary compensation and return. Grant aid serves as a highly effective tool as it promptly and directly addresses issues in recipient countries. It is noteworthy to mention that this grant aid is provided only based on a request from aid-recipient countries in the case of Japanese ODA (MOFA, 2022). Technical cooperation is generally understood as cooperation that aims to transfer knowledge, technology and experienced human resources in Japan (MOFA, 2015), which

is the most central form of STI ODA. Lastly, Yen Loans literally mean lending developing countries development funds, which they are obliged to repay borrowed funds with low-interest rates. On the other hand, multilateral aid indicates the joint economic cooperation between the Japanese government and other international organisations such as the UN and the World Bank (Kurosaki and Kurita, 2016).

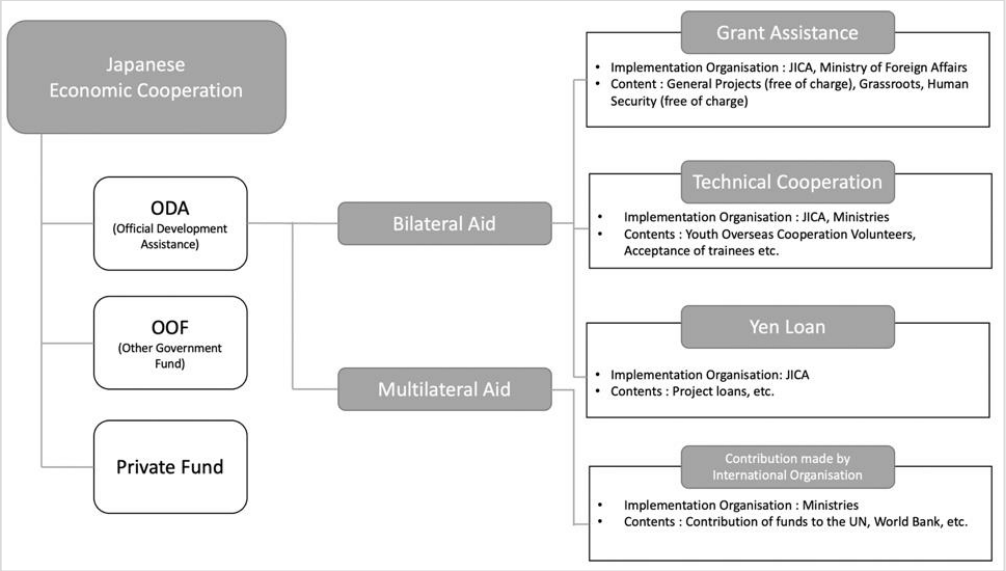

Figure 3.Japanese economic cooperation

Source: Translated by the author based on the figure shown in Kurosaki and Kurita (2016, p. 149).

According to the Ministry of Foreign Affairs of Japan (MOFA, 2021b), Japan's ODA performance in 2021 (USD base) increased by 8.4%, 17.6 billion USD compared to the previous year, ranking third among the 29 DAC members (excluding the EU) following the US and Germany. With regard to the ratio of ODA to the Gross National Income (GNI), the value was 0.34% ranked 12th among DAC. The UN sets the ODA target of 0.7% of GNI; however, there are only five countries achieved this target in 2022: Luxembourg, Sweden, Norway, Germany and Denmark (OECD, 2023).

Analysing Japan ODA from the political and diplomatic perspective, ODA has been recognised as the most accepted tool of Japanese diplomacy. It is utilised not only for the promotion of Japan's commercial interest but also for its security (Trinidad, 2007). Thus, Japan's ODA disbursement has been heavily based on its geoeconomics interests, and maintaining solid relationships with ASEAN countries has been a crucial facet of Japan's foreign policy (Trinidad, 2007). The characteristic of Japan ODA has always been the 'request-based' approach; however, recently, the government of Japan is planning to introduce a 'proposal-based' approach to counter China's foreign policy in the Indo-Pacific region, according to the Nikkei newspaper (Japan Economics Newspaper), with the highest readership in Japan (2023). The new approach is expected to set up projects that excel, such as maritime security and the health sector, and Japan's Development Cooperation Charter will be renewed by the end of 2023, reflecting the unstable international political situation (Nikkei, 2023). The more detail of Japan ODA focusing on STI development and national innovation capacity is argued in the discussion section (4.1.) to respond to RQ1. Having defined and explained the basic concept of the topic, the paper moves on to the research design section.

2. RESEARCH DESIGN

There are three primary purposes throughout the paper; firstly, the paper aims to grasp how Japan's ODA approach evolved in ASEAN countries from historical points of view. Secondly, it finds out the determinants of effective ODA policy strategies to increase the national innovation capacity of recipient countries. Thirdly, it explores a new type of approach needed for future ODA in ASEAN countries. The research question has been set to approach the three goals mentioned above. Regarding the second research question RQ2, the paper concentrates on the field of R&D, which is one of the crucial factors of the national innovation capacity in order to gain a deeper understanding; it is rephrased in the following way (RQ2+).

RQ1: How has Japan's approach to STI (Science, Technology and Innovation) development in ASEAN countries evolved over time?

RQ2: What have been the key determinants for enhancing the national innovation capacity in Japan-ODA recipient countries?

→

RQ2+: What have been the key determinants of STI ODA projects targeting an enhancement of national innovation capacity, specifically in the field of research and development (R&D)?

RQ3: What approaches are needed for future ODA in ASEAN countries?

As this research is a rather exploratory study, thus, the hypothesis would not be set for the research design of this paper. The present study employs combined qualitative methods to analyse the given research questions. The literature review and semi-structured interviews with experts are utilised for the paper. The descriptions of each methodology are explained in detail in the following subsection.

2.1. Method of Literature Review Incorporating Elements of Systematic Review

A literature review is one of the most practical and conventional ways of synthesising exciting research and comprehending the historical overview of Japan's ODA. In order to ensure the cohesiveness of the literature review, it incorporates certain elements and steps typically seen in a systematic literature review. Satalkina and Steiner (2020) explain that a systematic literature review is advantageous for accurately summarising the available information, categorising empirical academic outcomes into groups depending on the eligibility requirements, and responding to particular research questions. Specifically, this paper adopts some elements of the procedure of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses method (PRISMA method), which has been widely used in various academic disciplines in recent years (Satalkina and Steiner, 2020). PRISMA method offers 27-item checklists when reporting systematic reviews (Liberati et al., 2009), and the paper selects six items from checklists (#4,6,7,8,9,21). The descriptions of each item are cited and referred from the paper of Liberati et al. (2009). The five items,#4, #6, #7, #8 and #9, are picked up by the author. These five items set the clear and systematic process for the literature review. The reason behind limiting the number of items in the systematic literature review is connected to the aim of this research. It is to generate fresh insights into the future ODA policy of Japan incorporating the current geopolitical situation in Ukraine rather than producing a systematic review of existing literature in the past. However, gaining a systematic understanding of this topic is still crucial. Thus, applying the combination of a literature review with elements of the PRISMA method and an expert interview is regarded as the most suitable research design for this topic.

Table 1. **Selected PRISMA checklist**

TOPIC	ITEM #	CHECKLIST ITEM
OBJECTIVES	#4	Providing a statement of questions being addressed with reference to participants, study design interventions, and comparisons, outcomes.

ELIGIBILITY CRITERIA	#6	Specifying study characteristics and report characteristics (e.g., years considered, publication status, language) used as criteria for eligibility and rationale.
INFORMATION SOURCES	#7	Describing all information sources (e.g., databases with dates of coverage) in the search and date last searched.
SEARCH	#8	Presenting full online search strategy for at least one database, including any limitations employed, such that it could be repeated.
STUDY SELECTION	#9	Stating the process for selecting studies (i.e., screening and eligibility)
SYNTHESIS OF RESULT	#21	Presenting results of each meta-analysis done, including measures of consistency and confidence intervals.

Source: Author's compilation based on Liberati et al. (2009 p. e4).

1) Objectives

Firstly, the secondary research question RQ2+ mentioned above is adopted as an objective for the literature review. Based on the research question, the goal of the literature review is as follows. As stated in the subsection on 1.3.3.National Innovation Capacity, R&D is primarily focused on when referring to the national innovation capacity. The topic related to RQ1 and RQ2+ is mainly investigated with this methodology. The objectives are as follows.

1. *To grasp a comprehensive overview of how Japan's approach to STI development in ASEAN countries evolved over time.* ***RQ1***
2. *To examine and identify the key and successful determinants of STI ODA projects targeting an enhancement of national innovation capacity, specifically in the field of research and development (R&D).* ***RQ2+***

2) Eligibility Criteria

According to Liberati et al. (2009), eligibility criteria can be separated into study and report characteristics. Study eligibility includes study-specific elements such as the

design of interest, result and comparators. On the other hand, report eligibility refers to attributes of the report such as language, the timeframe of publication years and publication status. Having understood the differences, the paper arranges the eligibility criteria. The review considers the following study and report criteria:

Study Criteria

- Relevance: Literature must be relevant to the objective and the primary Research Questions.
- Scope of Research Methodology: Empirical Research with Qualitative or Quantitative methods such as Econometrics modelling Randomised Controlled Trial (RCT), Mixed-method
- Scope of Geographic: Japan and ASEAN countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam)

Report Criteria

- Language: English & Japanese
- Timeframe of publication: 1985 - 2023 (in order to capture the historical evolution of the ODA policy of Japan)
- Publication status: Published in a renowned journal or by the governmental entities

3) Information Sources

The third step of the literature review elucidates the information source from which the paper obtains data. With regard to the academic papers, OneSearch provided by University College Dublin Library, Web of Science, Google Scholar and J-STAGE are utilised for the collection of literature. Concerning the publications from public entities, the paper obtains information from the following four governmental institutions: ASEAN, Japan International Cooperation Agency (JICA), the Ministry of Foreign Affairs of Japan

(MOFA), and Japan Science and Technology Agency (JST), which is a Japanese governmental agency which runs a wide range of collaborative projects in the science and technology field internationally.

4) Search

Search terms for data collection are as follows: Japan ODA; ASEAN ODA; Technological Cooperation; Technological Transfer; Japan & ASEAN countries; Official Development Assistance; Science, Technology and Innovation (STI)

5) Study Selection

As a screening process of the study, the author carefully checks through the abstract in accordance with the study criteria and search terms. When the abstracts exhibit considerable relevance to the topic, the literature and articles are selected as potential contributors to the result synthesis of the literature review.

2.2. Method of Semi-Structured Interview

Turning now to outline the method of the Semi-Structured Interview (SSI) with experts. The SSI is adopted as a primary research method along with the systematic literature review as it helps the research gain profound and practical insights into the topic. Furthermore, as almost all of the literature is published before 2020, the expert interviews help to develop a more realistic prospect and insights for foreign aid incorporating current world situations and global issues. In addition to it, as mentioned above, Japan ODA has a strong diplomatic aspect, and there is some action within the government to change the Development Assistance charter by the end of 2023. The questions for experts are formulated in light of these current events. After obtaining the interview result, the

interview date is scrutinised by the content analysis methodology. The paper attempts to classify and code data through content analysis. Based on this analysis, a discussion of the research questions is undertaken. Contrary to the first research method, the SSI is carried out to obtain more profound and practical insights concerning RQ2+ and RQ3.

The benefit of SSI is that it offers a coherent structure for the discussion between interviewer and interviewee while allowing deviation to further elaboration or another topic (Kallio et al., 2016). Also, it requires sufficient knowledge and understanding of the topic of the interviewer (Polit & Beck, 2013). Thus, it is adequate to combine the SSI and literature review simultaneously. According to Kallio et al. (2016, p.2962), the qualitative semi-structured interview guidelines they developed make studies more neutral and trustworthy and increase the plausibility of research findings. The procedure of SSI has five steps, and the details are as follows. Step 1. Identifying the prerequisites for using semi-structured interviews. Step 2. Retrieving and using the previous knowledge. Step 3. Formulating the preliminary semi-structured interview guide. Step 4. Pilot testing of the interview guide. Step 5. Presenting the complete semi-structured interview guide(Kallio et al., 2016). Having understood the process of SSI, the paper moves on to discuss the criteria for interview participation, the development of interview questions and the ethical implications of conducting interviews.

1) Criteria for expert-Interview participation

These are the requirements for expert interview participation, and the author contacts the potential interviewees based on them.

- Have a minimum of 3 years of working or teaching experience in the field of economic development, international politics and policy formulation.
- Demonstrate an adequate understanding of the Official Development Assistance policy or Science, Technology and Innovation Policy in Japan.
- Have proficiency in using online conferences web services such as Zoom or Microsoft Teams.

- Fluent in either English or Japanese

2) Development of interview questions

The interview is around 30 to 45 minutes long; thus, the number of prepared questions is limited up to four. Keeping fewer questions allows interviewers to gain deeper insights by asking additional questions about the interviewee's response. Also, this SSI specifically aims to tackle the second and third research question and complement the insights from the literature review. Due to the characteristics of exploratory research and varying areas of experts' expertise, the interview questions are tailored to align with their specific research discipline and professional background. The questions asked during the interviews are mentioned in the result section.

3) Ethical Implications

Awareness of ethical implications is crucial for the interview participants to protect their privacy. Thus, a question regarding anonymity is asked in the early stage of setting up interview sessions with experts. If an expert wishes to interview with no identifiable information, all the interview content and opinions are anonymised. Also, the data regarding the experts is shared with only the authors' master's thesis supervisors. Even if experts agree to mention their opinions with their names, the ideas are considered individual opinions and do not represent their organisations' views. Finally, the author uses the tools for transcription of the interview content, and they are otter.ai (for the English language) and notta.ai (for the Japanese language). Two transcribing services both obtain the Service Organisation Control Type 2 certificate, which ensures secure data and privacy protection.

3. RESULT

3.1. Result from the Literature Review

Having defined and explained the research design in the previous section, the paper now presents the result of the literature review with systematic elements and semi-structured interviews (SSI). Firstly, the section discusses the synthesis of the result from the literature review, which is the last item of Table 1 (#21). The term “Japan”, “ODA”, and “technical cooperation” have been mainly utilised as search terms. There are around 4,130 academic articles found in relation to these search keywords on the following database: UCD OneSearch, Web of Science, Google Scholar and J-Stage, both in English and Japanese language. However, the literature volume drops to less than half of the total when explicitly looking for literature on the ASEAN regions as a research subject. Furthermore, the number of academic papers discussing and analysing the ODA policy from a macro perspective is considerably small.

In connection with RQ1, the author found six governmental publication and academic articles which discussed the progress of Japan ODA focusing on the STI development in ASEAN regions; Rudner (1989), MOFA (2004), Hirota et al. (2005), Nasu (2006), Trinidad (2007), Sunami et al. (2013).

With regard to RQ2+, almost no articles focusing on the determinants of ODA in the STI field were found throughout the author’s research; however, there are five articles which could potentially contribute to tackling RQ2+. These extracted determinants addressed in the five academic papers generally indicate the characteristics of Japan’s ODA, particularly technical cooperation. The crucial determinants found by the literature review are as follows.

Table 2. Key determinants found through the literature review

Author	Determinants
Takahashi and Sakano (1999)	• Humanitarian approach • Recognition of Interdependence among nations • Environmental Conservation • Support for the self-help efforts of developing countries
Kanda and Kuwajima (2005)	• Self-help support • Human development support • Participatory community development • Policies, institutions and governance
Asanuma (2016)	• Capacity Development • Multidisciplinary Approach • Social Implementation
Yamamoto (2016)	• Human resource development • Field-oriented approach
Kishi and Kishida (2018)	• Combination of STI and SDGs • Science and Technology Research Partnership for Sustainable Development Program (SATREPS)

Source: Author's compilation.

RQ1 is mainly tackled with the six-literature mentioned above. In response to RQ2+, the result of the literature review and the expert interviews is synthesised to generate a robust research outcome.

3.2. Result of Semi-Structured Interviews

The author conducted semi-structured and depth- interviews (1 on 1) with seven experts in the field of international development, the ASEAN politics and policy formation from 20 May 2023 to 1 June 2023. The experts were identified with a combination of authors' connections and extensive internet searches. The author's professional network

was used to establish initial contacts, and then targeted online search and screening were employed to find more potential experts for the interview. Five expert interviews have been carried out online , and one interview was conducted in person. One expert agreed to participate in the interview; however, due to the expert's tight schedule, the expert provided their responses via email in written form. The interview was conducted exploratory with the author's intention of allowing the experts to express their insights and perspectives freely. No hypothesis was put forward in order not to guide their answers. Questions for the interviewees were adjusted based on other expertise, and additional questions were asked based on their initial responses from the scope of the RQ 2 +: What have been the key determinants of STI ODA projects targeting enhancing national innovation capacity, specifically in the field of research and development (R&D)? and RQ 3: What approach are needed for future ODA in ASEAN countries?

1) Experts' attributes

The attributes of the seven experts are as follows. Information on the attributes of the experts who wished to be anonymised is described to the extent that they are not personally identifiable.

Table 3. A list of experts and their attributes

Expert A: Professor	PhD in International politics, expertise in ASEAN politics
Expert B: Consultant	First-hand experienced in bi/multilateral projects in the ASEAN region
Expert C: Professor	Expert with various SDG related experience in international development organisations in ASEAN
Expert D: Economist	Economist with a distinguished career in a various high-level position within the Asia-Pacific region
Expert E: Professor	PhD in International politics and development, experienced with SATREPS project previously
Expert F: Professor	PhD in political policy, an expert in ODA policy and Policy evaluation.
Expert G: Victor Munagala	Financial Economist at Mekong Economics (response received via email and consented to disclosure of personal data).

Source: Author's compilation.

2) Interview questions for experts

RQ 2 related interview questions

- What have been the successful or unsuccessful factors that have contributed to the collaborative international development project in your experience? (Expert B)
- What are the successful determinants of effective STI ODA? (Expert C)
- Can ODA donor countries help to stimulate innovation? If so, how can they help? (Expert D)
- Are there any unique characteristics of Japan's ODA or overseas aid in comparison with other countries? (Expert D)
- What is your experience with SATREPS? (Expert E)
- What were the challenges or successes of working with donor countries in the context of your SATREPS experience and international development? (Expert E)
- What is needed to improve the R&D capacity of donor countries? (Expert E)
- How can donor country R&D improvements through ODA lead to capacity development at the national level? How can donor countries best shape their institutions? Do donor countries also support institutional formation and legislation? (Expert F)
- What are the challenges ASEAN countries encounter in implementing ODA projects? (Expert G)

RQ 3 related interview questions

- What is the perspective and approach that ODA to ASEAN countries should take in the future in light of the current global situation? (Expert A, D, F, G)
- Is foreign assistance necessary from your perspective in the future? (Expert B)
- How can SDG and ODA be combined? (Expert C)
- What approach is needed for Japan's development assistance policy in the future, taking into account the 2023 revision of the Development Assistance Charter of Japan? (Expert E)

3) Content Analysis of Expert Interviews

The content analysis methodology is employed to further enhance the effectiveness of qualitative research and to understand the interview content from a more objective perspective. The analysis adopts the inductive approach firstly to categorise the interview data and identify patterns based on the response from the experts. The analysis utilises the transcribed verbatim transcripts of the interview interaction between an expert and the author as a main data. NVivo, a well-known tool for qualitative research, is used for coding of the interview data. Firstly, five categories are created based on the RQ2+ and RQ3 and interviewee responses: 1. Capacity development, 2. Challenges, 3. Future ODA perspectives, 4. Key determinants and 5. SDGs. The next step is that once the key content of the interviews has been categorised, the expert narratives are analysed to pick up keywords or key phrases that may be useful in responding to the RQ2+ and RQ3 and coded. Finally, to improve the objectivity and robustness of the analysis further, the word frequency of all interview data is investigated. Each category and key narratives are as follows.

Table 4. Category of interview data and key narratives

No.	Category	Key Narratives
1	*Capacity development*	*"In many cases, experts are dispatched in advance, so experts are dispatched to each government office to develop the capacity of ministries in the other country, and then technical cooperation projects are introduced to them, which is the traditional Japanese technical cooperation JICA approach." (Expert F)* *"What is used as an indicator for capacity development is institutional policy, how new laws are made, how organisations are set up. The question is how the system was created. This is a difficult point, as it is necessary to include the element of intervention." (Expert F)* *"Institutional capacity: Limited capacity in terms of human resources, governance, and financial management can hinder effective implementation of ODA projects." (Expert G)*
2	*Challenges*	*"Japanese ODA is based on a request-based approach, but it is difficult to know the true local needs." (Expert A)*

		"It's called the securitisation of ODA, or going back to the great old days of East-West conflict and division, and that's what ODA is being used for." (Expert C) *"Corruption: Corruption can lead to misuse of ODA funds and reduce the impact of projects. We see this in some countries, wherein funds have been misappropriated." (Expert G)* *"Engineers, you know. They are very hesitant until they get to the stage where they can try out the technology they have created." (Expert E)* *"Social inequality: Deep-seated social inequalities in some ASEAN countries can affect the implementation and impact of ODA projects. This includes disparities based on gender, ethnicity, and socio-economic status." (Expert G)*
3	*Future ODA perspective*	*"Whole tracking mechanism is function is monitoring and evaluation. So a lot of the most development projects that at least I've been exposed to or I hear about, really allocate substantial resources and efforts towards monitoring and evaluation, and they even call it monitoring, evaluation and learning or we'll think as accountability." (Expert B)* *"Not only in ASEAN, but also in Japan, and also in developing countries, we want to provide assistance with the SDGs, human security and other such issues at the forefront." (Expert C)* *"It is called localisation." (Expert C)* *"I think it would be good to have a project that is respectful of locals, and that will improve the lives of people whose lives are not keeping up with it." (Expert D)* *"Transparency: There should be transparency in the use of funds, decision-making processes, and project outcomes. This encourages accountability and enhances project effectiveness." (Expert G)*
4	*Key determinates*	*"It was an interesting project that brought together the humanities and sciences" (Expert E).* *"Basically, the basic precondition is the ownership of aid-recipients developing countries, so it is a question of how effective aid can be provided once there is ownership." (Expert F)* *"Japan has traditionally been a country where we enter the government line, work with the line and provide technical cooperation, which is different from the so-called Western-style stand-alone technical assistance." (Expert F)* *"It is true that we have been assisting mainly through people, but that, conversely, performance varies considerably depending on the quality of the people & experts that we can send to them." (Expert F)*

		"Building strong partnerships with local communities, NGOs, and the private sector can help to ensure that ODA projects are successful." (Expert G) *"In my experience, when there is a participatory approach to these interventions, not only do the interventions end up 'fitting' the problem a lot better, but the interventions are able to sustain themselves through civil society. "(Expert G)* *Private sector involvement: Leveraging private sector resources can amplify the impact of ODA. Encouraging public-private partnerships, fostering local entrepreneurship, and improving the business environment are key aspects. (Expert G)*
5	*SDGs*	*"A human rights-based approach to understanding the SDGs is important." (Expert C)* *"So, development was actually a combination of development and human rights, in this way, and the SDGs are being created." (Expert C)* *"If we understand the SDGs from a human rights-based perspective, it is clear that what is important from now on, whether in ASEAN or elsewhere, is this kind of human rights-based approach to development." (Expert C)* *"ODA should align with the UN's SDGs." (Expert G)*

Source: Author's compilation.

4) Coding & Word Frequency

After conducting the categorisation of the interview content, a set of codes is generated for each category. The codes help research carry out in-depth analysis in research questions and facilitate the identification of patterns and insights within the data of interview. Each code functions as a label or classification for specific elements of the interview responses. The codes are as follows;

Table 5. **A list of codes for each category**

Category	Code
Category 1	Experts dispatchment, System, Institutional Policy, Human resources
Category 2	Securitisation of ODA, Corruption, Hesitance, Social Inequality
Category 3	Monitoring and evaluation, SDGs, Human Security, Localisation, Respectful, Transparency, Accountability
Category 4	Combination of humanities and sciences, Ownership, Work with government, the quality of experts, Partnership, Participatory approach, Interventions, Private sector involvement
Category 5	Human rights-based approach

Source: Author's compilation.

Moving on now to present the result of word frequency. It was examined by employing the function of NVivo, and these are the keywords repeatedly mentioned during the interview. Numbers in the parentheses indicate the frequency of the keywords concerning RQ2+ and RQ3; *SDGs* (24), *Human* (21), *Innovation* (16), *Security* (12), *Cultural* (9), *Capacity* (9), *Monitoring* (8), *Ownership* (8), *Corruption* (7), *Evaluation* (7). As a result, the frequency, such as SDGs, capacity and innovation, is naturally higher than others since these keywords are repeatedly mentioned as interview questions for experts. Also, the word 'security' is often mentioned, revealing ODA's diplomatic aspects. The rest of the terms, such as ownership and monitoring, need further investigation to get more insights.

3.3. Synthesis of Results

So far, this paper has been discussing the result of the literature review and the semi-structured interview. The last subsection of the result part attempts to synthesise and merge each result and to find common attributes. The research found four main findings worth noting when it comes to RQ2+

. Firstly, multiple works of literature and a few experts have pointed out the humanitarian approach. The ODA thought human development has been the centre of attention and focus for the Japanese government. Secondly, Capacity Development (CD) is a critical concept in achieving a profound impact in the recipient countries. When considering CD, it is crucial to balance CD with institutional policies. Thirdly, the awareness of environmental sustainability and the UN's SDGs plays a pivotal role in enhancing the national innovation capacity. Lastly, multidisciplinary can also be an influential factor in leading the ODA projects successfully, which expert E has also indicated during the interview. All things considered, these four findings can be deemed as the enablers for the effective STI ODA. The paper moves on to the discussion part based on these four findings and thoroughly tackles the research questions.

4. DISCUSSION

Thus far, the thesis has addressed the research result, method, and basic concepts such as ODA, STI and national innovation capacity to tackle the research question and gain a profound understanding of the topic. The major objective of this discussion section is to scrutinise the result obtained from the research method mentioned above and to formulate policy recommendations incorporating insights for the future ODA. This section has three subsections. Each subsection responds to research questions 1, 2 and 3 accordingly.

4.1. Historical Transition over ODA Policy in Japan and Overview of Japan's Approach to STI Development in ASEAN Counties (RQ1)

Firstly, this subsection discusses how Japan's approach to STI development evolved towards ASEAN countries, which is the first research question: How has Japan's approach to STI development in ASEAN countries evolved over time? To enhance the organisation of the thesis, the following subsection is broken down into four different periods, which MOFA (2004) categorised in their official paper. Also, this subsection chronicles the momentous events and political decisions influencing Japan ODA activities while tracking the progress of STI ODA in the ASEAN region. The 4-time segments are as follows;

Table 6. Four categories of periods to explain the history of Japanese ODA

Period	Name
1954-1976	Institutional development period
1977-1991	Planned expansion period
1992-2002	Policy and philosophy enrichment period
2003-	Present

Source: Author's compilation based on MOFA (2004).

1) Institutional development period (1954-1976)

It is imperative to mention that Japan's involvement as an ODA donor towards ASEAN nations has historically started as a reparation of the post-second world war arrangement (Rudner, 1989). The WW2 reparations for Japan's occupation of Southeast Asian countries, including Singapore, Burma, Indonesia, the Philippines and other Asia/Pacific Rim countries, were essential and played a significant role in the process of rebuilding the new relationship with these countries. The reparation agreement concluded in the 1950s (Rudner, 1989) and marked an important milestone in the onset of ODA in 1954 when Japan joined the Colombo Plan and started technical cooperation (MOFA, 2023). Financial cooperation with Asian countries in the form of reparations and quasi-reparations totalled around USD 1.5 billion, and yen loans were initiated in 1958, at which time a new objective of export promotion was added to ODA (Hirota et al., 2005; Nasu, 2006). Three main types of STI-related ODA assistance were initiated around 1954: Trainee reception projects, Expert exchange and technical cooperation projects. Technical cooperation projects combine the elements of expert exchange, trainee acceptance and equipment provision in a single cooperation project, from planning, formulation, implementation and evaluation (JICA, 2019a). In total, approximately 654,000 trainees from 187 countries and regions have been accepted between 1954 and FY 2019, with 220,000 in the Asian region and in the field of technical cooperation alone. In addition, a total of approximately 200,000 experts and 54,000 JICA Overseas Cooperation Volunteers have been dispatched from Japan (MOFA, 2021a; JICA, 2019b). Knowledge transfer through Japanese ODA was the core feature of STI development at that time.

In 1961, the Overseas Economic Cooperation Fund (OECF) was established to serve as an implementing agency for yen loans (Hirota et al., 2005). Since its start, most yen loans in this period were tied-aid, meaning all the required material and human resources are limited only from an aid-providing country, in this case, Japan. However,

Japan changed its policy in 1972 to make the most untied loans, allowing open competition in the international market (Nasu, 2006). In 1974, Japan International Cooperation Agency (JICA) was established as a central agency to promote ODA (Hirota et al., 2005; Nasu, 2006). These are notable events during the institutional development period from 1954 to 1976. The legal framework was put in place, and various international-related agencies were set up to lay the foundation of the ODA.

2) Planned expansion period (1977-1991)

With the completion of Japan's final reparations payment to the Philippines in 1976, Japan's ODA entered a new era: in 1977, Japan announced a "Five Year Doubling Plan" (5 年間倍増計画 in Japanese) to double its ODA over five years, providing the impetus for a steady quantitative expansion of ODA (MOFA, 2004). As can be seen in figure 4, the amount of ODA assistance increased, and Japanese ODA gradually expanded from Asia-centric assistance to Africa and the Middle East from the 1970s to the 1980s.

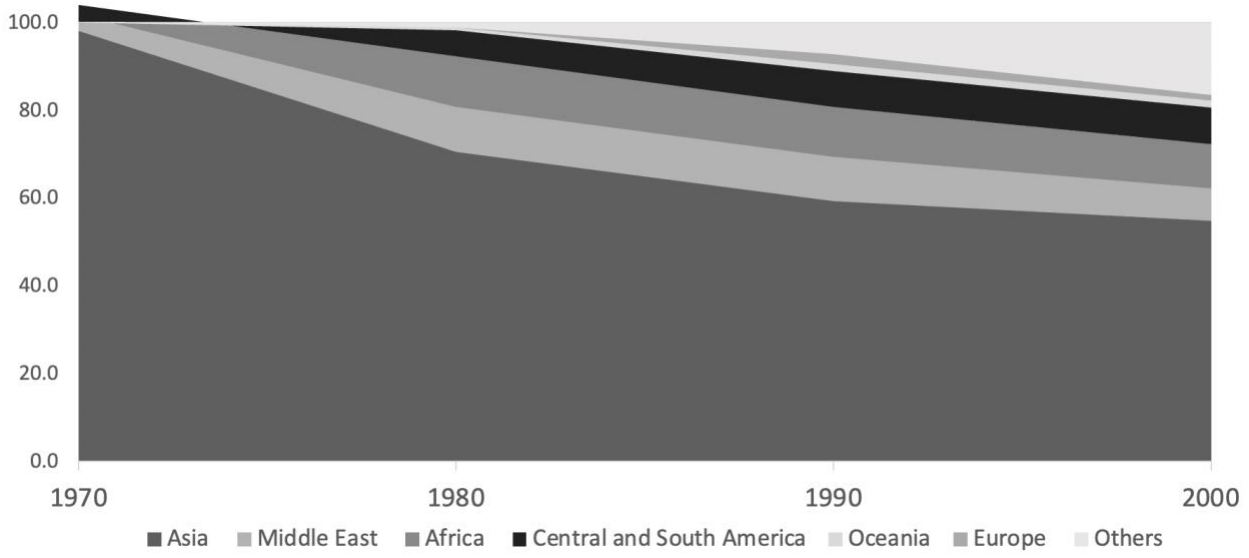

Figure 4. Distribution of bilateral ODA by region from 1970 to 2000

Source: Created by the author based on data from MOFA (2004).

*The region of "Asia" here indicates ASEAN countries + India, Sri Lanka, South Korea, China, Nepal, Pakistan, East Timor, Bhutan, Mongolia, North Korea, Taiwan, Hong Kong, and Macau.

From 1978 onwards, partly as a result of the Japanese economy entering an abnormal economic boom period, often called *a bubble period*, Japan increased its ODA budget every year. By 1989, the amount of ODA executed reached approximately USD 90 million, surpassing the USA to become the world's largest aid donor, and this position continued until 2000 (Nasu, 2006; Hirota et al., 2005; MOFA, 2004).

Japan's ODA is not only expanding quantitatively but is also beginning to focus on improving the quality of aid. The international aid trend has shifted from aid focusing on the economic growth of one country to aid focusing on poverty alleviation in developing countries, and this trend also began in Japan. Japan's aid strategy focusing on human development has been emphasised since this period, and the Japanese Government has announced that it would actively provide assistance in the Basic Human Needs (BHN) sector. Aid to the BHN sector, such as agriculture, forestry and fisheries, education, social infrastructure and welfare, health, food aid and emergency aid, had been around 10% until 1977, rose to 23% in 1978 and has remained in the 20% to 30% range since then. (MOFA, 2004)

The Japanese Ministry of Foreign Affairs (MOFA), in its official document "Official Development Assistance: 50th anniversary 1954-2004." (2004), mentions the following two points as Japan's economic cooperation is not only an international responsibility but also has special significance due to the international political environment in which Japan is placed.

> [1] As a peaceful country, which prohibits using military force to settle international disputes, Japan has no other proactive means than to provide economic assistance.
>
> [2] Since Japan does not have plenty of natural resources, the interdependence between developing nations is critical for its trade and import. Thus, maintaining a strong relationship with countries is extremely significant for economic development in Japan.

Given this essential diplomatic background during the Planned expansion period from 1977 to 1991, Japan's ODA has evolved in terms of its political aspects. In addition

to it, Japan was urgently required to pursue not only the interest of Japan but the international one right after Japan became the top donor of ODA in 1989.

3) Policy and philosophy enrichment period (1992-2002)

With the quantitative expansion of Japan's ODA and the increase in its status and responsibility in the international community in the 1990s, there was an increased demand for a transparent policy to be presented internally and externally regarding Japan's approach to aid. In particular, the debate about the aim of Japan's international contributions in the post cold War was raised. It was of great significance in the history of Japanese aid that the Cabinet approved the ODA Charter in 1992 for the first time and presented Japan's aid policy in this way to the outside world (MOFA, 2004).

The ODA Charter emphasises the principles of (1) humanitarian considerations, (2) more profound interdependence, (3) environmental protection, (4) nation of peace, and (5) support for self-help and fairness (Nasu, 2006). Japan also strengthened its policy responses in its region-specific aid policies during this period, including active efforts to develop the Mekong region, with the ASEAN region as the primary target (MOFA, 2004).

With regard to the STI development, in FY2001, the Private Sector Outsourced Project Method of Technical Cooperation was introduced, which actively utilises the knowledge and human resources of the private sector and outsources the entire project operation to a private organisation (JICA, 2019a).

4) Present (2003-)

Since 2003, Japan has been promoting responsible aid as one of the major aid donor countries, and in 2003, for the first time in 11 years, the ODA Charter, the fundamental rules of ODA policy, was revised again. Its objectives were set based on two pillars: contributing to the development of the international community and ensuring Japan's national security (MOFA, 2004). The ODA Outline was again revised in 2015, changing its name from the ODA Charter to the Development Cooperation Charter, which remains the foundation of Japan's aid policy as of May 2023, as approved by the Cabinet. The charter has been incorporating SDGs promoted by the UN. The main points of its contention were concerning that ODA would be diverted to the military, reflecting the positive pacifism advocated by the Abe administration, and that aid would be made more nationally interest-oriented than in the past (Dan, 2016). With an understanding of the political context for the domestic ODA policy since 2003, there have been two major changes that largely influence STI development. They are the Science & Technology diplomacy and the introduction of new concept: Capacity Development (CD).

With regard to the first change, Science & Technology diplomacy (S&T), Sunami et al. (2013) argue that S&T is significantly effective in building up trust among other countries as a diplomatic tool. Also, they explain that officials and politicians started recognizing the importance of S&T diplomacy after the government's Council for Science, Technology Policy (CSTP) emphasized the need for S&T support for developing nations. This rise of S&T diplomacy in Japan led to a new type of STI development project in 2008, such as the Science and Technology Research Partnership for Sustainable Development Program (SATREPS). SATREPS is an international development programme which promotes joint research projects between developing countries and Japan, and it focuses on global issues that are linked to the needs of developing countries, such as scarcity of bio-resources, natural disaster prevention, and infectious disease control (Sunami et al., 2013). This programme has been highlighted in several scholarly works as a brand-new turning point in Japan's STI development (Asanuma, 2016; Kishi and Kishida, 2018), and one of the interviewees (Expert F) used to engage with SATREPS as a researcher.

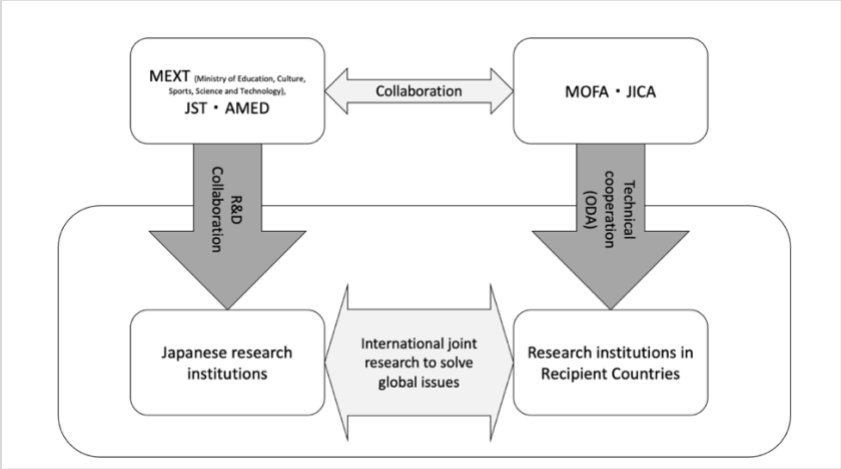

Figure 5. SATREPS implementation system

Source: Translated by the author based on the figure shown in the *History of the International Cooperation Agency 1999-2018*, JICA (2019a).

This SATREPS programme is deeply connected to SDGs implementation in developing countries and is recognised as a state-of-the-art STI development approach. As a social background of its transition, Japan's government and private sectors have both been going through a stagnation in R&D expenditure. Also, the future S&T capacity of Japan might be declining due to the decreasing number of researchers and scientists derived from the hyper-ageing society (Sunami et al., 2013). This shift should be clearly underscored that the STI development approach has evolved from technology and knowledge transfer to research collaboration. It is essential to take into account that "developing counties are no longer just the recipients of technology but are on an equal footing" (Sunami et al., 2013, p. 4). Thus, this programme positively impacts recipients and Japanese R&D capacity. According to the official website of SATREPS (JST, n.d., https://www.jst.go.jp/global/index.html), in ASEAN countries, 81 projects have been conducted in all ASEAN Member States except Singapore and Brunei since the programme began in 2008 as of May 2023.

SATREPS has four research areas: the first is environment and energy, the second is bioresources, the third is disaster management, and the fourth is infectious diseases. Each project has a budget of around 100 million yen (USD 710K as of 25 May

2023), and projects are funded and implemented jointly by JST and JICA based on requests from the partner country. More than 2,900 papers and 9,000 conference presentations were published and reported by 2016. The Programme must not only focus on research activities, but also on social implementation to return research results to society from a development perspective (JICA, 2019a).

Moving on to discuss the second milestone, as a foundational concept in Japan's current technical cooperation, JICA advocates the concept of Capacity Development (CD) under the leadership and initiative of *Sadako Ogata*, who served as the first female UN High Commissioner for Refugees for ten years from 1991 and became JICA's President in 2003 (Uotani, 2012; JICA, 2019a). JICA (2019a, p.156) defines CD as "the process of improving the capacity of developing countries to cope with challenges at three levels, including individual, organisational and social levels" and emphasises the importance of the concept of CD in coordination with the development strategies of recipient countries and the aid programmes of other donors.

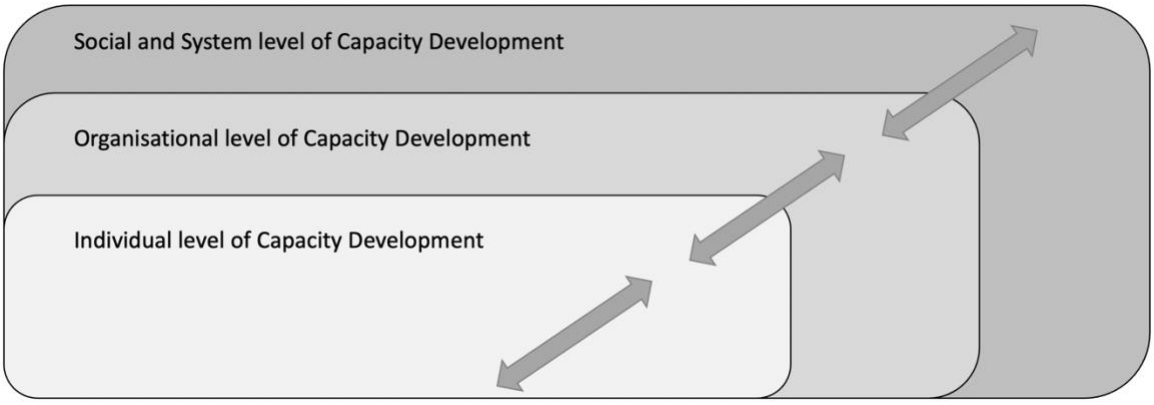

Figure 6. Three levels of capacity development

Source: Translated by the author based on the figure shown in Uotani (2012, p.16).

The idea is positioned as an approach that contributes significantly to the effectiveness of Japan's current STI development approach (JICA, 2019a). At the same time, the introduction of concepts such as CD has seen a shift towards assistance that improves the autonomy and ownership of the recipient country. In addition, the

hierarchical structure of the donor and recipient of aid has changed to an equal footing, and aid has become more collaborative, with both countries pursuing their national interests through Japan ODA. The transition of technical cooperation also shows that the Japanese ODA has focused on the human resource development of people, and assistance has been provided based on local needs. In this respect, Uotani (2012) also argues that the two main characteristics of Japan's ODA are 'human resource development' in aid recipient countries and a field-oriented approach through expert exchanges.

In this subsection, it has been explaining the progress and changes in Japan's approach to STI development, along with reviewing the history and major events which had influenced shaping the ODA policy in Japan (see Figure 7). It is worth mentioning again that the STI development approach in Japan has shifted from knowledge and technology transfer to a collaborative approach. It is also found that Japan utilises its ODA as a means of attaining diplomatic objectives due to the lack of efficient international power in terms of security due to the lack of military forces. Interestingly, the robustness of the research findings has been strengthened by looking through the historical transition of Japan's ODA policy since certain characteristics mentioned in this subsection overlapped with the insights gained during the interview and literature review. Thus, it is now clear that having a comprehensive understanding of the historical aspects of ODA through RQ1 would adequately facilitate addressing RQ2+ and RQ3. The following subsection analyses the RQ2+ based on the research result of the literature review, the SSI and insights obtained from this subsection (4.1).

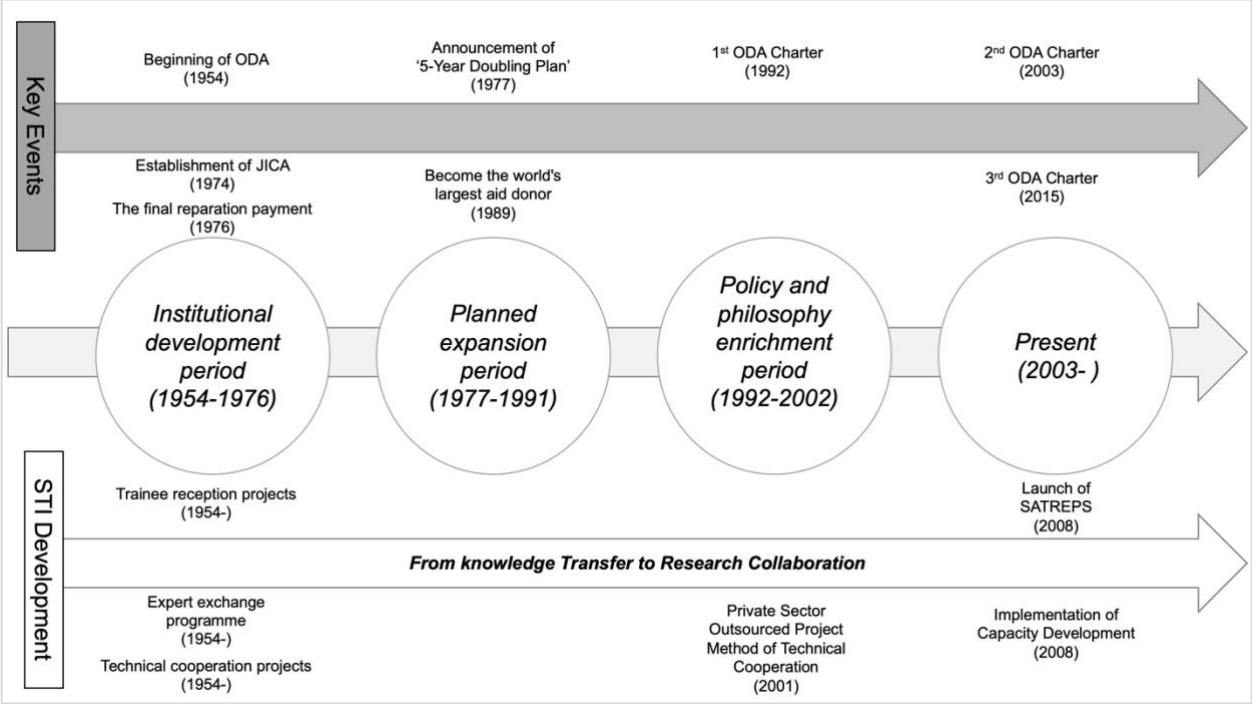

Figure 7. Summary of key events related to ODA and the transition of Japan's approach to STI development

Source: Author's work.

4.2. Key Determinants for Enhancing the National Innovation Capacity (RQ2+)

So far, this paper has focused on discussing the progress of STI Japan ODA from a historical perspective to tackle the first research questions. This subsection addresses the second research question RQ2+ : What have been the key determinants of STI ODA projects targeting an enhancement of national innovation capacity, specifically in the field of research and development (R&D)? The research found that there are mainly three determents to be analysed intensively based on the result from the literature review and semi-structured interviews with experts: the human-centred approach, the Japanese approach of capacity building, and STI development with SDGs.

4.2.1. Determinant 1: Human-Centred Approach

One of the determining factors to positively impact the national innovation capacity is Japan's human-centred approach to the STI ODA. This concept has been featured and highlighted in a substantial body of literature (Uotani, 2012; Kanda & Kuwajima, 2005; Takahashi & Sakano, 1999). From the perspective of Capacity Development (CD) mentioned above, individual-level competence is also a fundamental part of improving the national innovation capacity, and Japan has been striving to strengthen it through the human-centred approach as a donor country. This point has been referred to by expert F as well, and expert F argued that Western aid is more characterised by a stand-alone project-based approach. On the other hand, Japan is characterised by people-mediated aid by collaborating with ministry officials, locals and other stakeholders.

The essence of this approach lies in the mutual partnership established between Japan and recipient countries. "Partnership" is one of the critical codes extracted from the interview data, and expert G also specifically mentions that "*Building strong partnerships with local communities, NGOs, and the private sector can help to ensure that ODA projects are successful."* With regard to one of the supporting pieces of evidence of this approach, Kaneko (2012), a former JICA director, cites the King Mongkut's Institute of Technology in Thailand (KMITL) as a representative example of a human resource development cooperation project. In collaboration with JICA, Japan initially supported the establishment of the Nonthaburi Telecommunications Training Centre in 1960 to increase the number of local experts in the ICT sector. In 1971, this training centre was re-organised as King Mongkut's University of Technology. Since its onset of supporting KMITL, Japan has been supporting and collaborating with this institute for a long time. Today, it is known as one of the top engineering universities in the ASEAN region, with 16,000 engineering students (JICA, 2011b). (See Picture 1 & 2 in the index) Also, talking about the SATREPS projects mentioned above can also be positively evaluated in terms of working in partnership in the field of R&D. Both countries cooperate together to mitigate

the issues in the recipient countries and jointly aim for the co-creation of new solutions and values.

This human-centric approach focusing on the human resource development increases the number of highly skilled individuals and upgrade national industries while facilitating a country's self-help efforts. Likewise, researchers and scientists are part of the key elements of the common innovation infrastructure and the forerunners of innovation, particularly in the field of national innovation capacity R&D as explained in the subsection of 1.3.3. National Innovation Capacity (Furman et al., 2002) (see figure 2). This example clearly shows that the human-centric approach to ASEAN region can be considered as an effective aid method and one of the determinants. These constant efforts could potentially be regarded as an explanatory factor for comprehending Japan's high level of trust among ASEAN member countries.

Having said that the human-centred approach contributed to enhancing the national innovation capacity of ODA recipient countries within the context of Japan, and it is significant to acknowledge that the overall outcome of aid projects is critically influenced by the quality of human resources and expertise from the donor country. This argument was initially advocated by expert F during the interview also, and expert F also mentioned that consultants from donor countries often lack local knowledge, which leads to the reverse effect of aid effectiveness, citing Easterly (2007). Thus, ensuring the competence and development understanding of experts from donor countries is a must to pursue a better assistance outcome.

The ASEAN region has also undergone rapid economic development since the 1950s when aid began to the present day. The donor-recipient structure has been transforming into one of the equal partners. Given this aspect of equal footing between Japan and ASEAN, this human-centric approach becomes even more important in understanding the needs and challenges of the partner countries in the context of international development, which enables a more tailored and inclusive approach to development.

4.2.2. Determinant 2: The Japanese Approach of Capacity Building

Another critical determinant contributing to R&D development is the unique Japanese method of capacity building. As mentioned in 4.1*. 4) Present*, JICA has incorporated the concept of capacity development into the core of its aid policy since around 2000. Japan has operationalized its approach to the individual and organisational levels through the dispatch of experts and expert exchange and acceptance of trainees as part of its technical cooperation effort, which highlights the human-centred approach. Cooperation that values the ownership of the recipient country is also a feature of Japan, and ownership has been mentioned a total of eight times in the expert interviews. Ownership in recipient countries is an essential concept when considering capacity-building. Lopes and Theisohn (2003) say in the UNDP publication that "ownership is a pre-condition for commitment and capacity development" (p.2). Expert G also mentions that *"The recipient country must take ownership of the ODA project for it to be successful. This means they are actively involved in designing, implementing, and monitoring the project. The involvement of civil society is incredibly important. In my experience, when there is a participatory approach to these interventions, not only do the interventions end up 'fitting' the problem a lot better, but the interventions are able to sustain themselves through civil society."* Thus, it is critical to formulate aid agreements that prioritise and ensures ownership in recipient countries and foster collaborative efforts to retain long-term engagement. Japan employs two distinctive capacity-building methodologies in its efforts to enhance the capacity of recipient countries: the *Kaizen* method and legislative support.

The *kaizen* method is a uniquely Japanese concept for increasing productivity, and kaizen literally means improvement in Japanese. It is known to have supported Japan's period of rapid economic growth, and JICA has incorporated it into its technical assistance and aid to improve capacity at the organisational and individual levels. The idea is frequently presented as one of the core concepts of total quality management (TQM) and lean production (Brunet & New, 2003).

JICA (2010) mentions that large companies such as Toyota, Sony and Honda have implemented this *kaizen* method in their manufacturing operations, and it has been adopted by more and more Japanese companies since the 1980s. This concept, simply put, means a series of small efforts and daily improvement activities (Kodama, 2018). The most fundamental aspect of *kaizen* in the production of goods and services is the 5Ss: Sort, Set, Shine, Standardise and Sustain. It is a rather bottom-up approach and is implemented at the organisational level with the cooperation of many people, regardless of their ranks and position. It improves the quality of work and strengthens the organisational structure, and is considered an effective corporate management tool (JICA, 2010). JICA has implemented *kaizen* through expert exchange and technical cooperation projects, and the concept of *kaizen* has become widely known in companies and research institutions in developing countries (JICA, 2010). It is also said to be effective for human resource development, such as fostering teamwork, employee independence and creativity, and JICA, in particular, has implemented 5S in various fields to strengthen capacity development at the individual and organisational levels (JICA, 2010). Kodama (2018) also advocates the great impact of *Kaizen*. He says JICA has been incorporating this method in projects aiming to elevate SME development.

In addition to the *kaizen* method, another way of capacity building is recipient countries' legal support. Expert F, an expert in ODA policy and policy evaluation, said during the interview that "*what is used as an indicator for capacity development is institutional policy*" and put emphasis on policy development along with capacity building. The Japanese government has demonstrated a strong awareness of this aspect in implementing the ODA projects, particularly throughout its engagement and commitment to providing legal support to recipient countries since the 1990s (JICA, 2011a). Sato, a lawyer and international cooperation specialist at JICA, additionally states that the process of the Japanese legal system, which has a traditional Japanese legal culture but is also strongly influenced by the western legal systems, particularly those of France, Germany and the United States, is beneficial for developing countries in order to adapt the global standard while including long-established legal culture and value in their own countries (JICA, 2011a). He also notes that JICA provides legal system support while

respecting their autonomy to the maximum extent possible and that advisory groups consisting of jurists and lawyers are set up for each project (JICA, 2011a). One of the examples of legal support in Viet Nam shows that laws and rules in the field of innovation, such as competition law and intellectual property law, have been developed with the assistance of JICA and Japanese legal teams. Such legislation is a fundamental pillar of innovation capacity building, and there may be a strong correlation between legal support and innovation capacity building. Kanda and Kuwajima (2005) also point out that JICA's interest in technical cooperation is more in line with the Capacity Development framework, as it has expanded from individual relationships to organisational strengthening as a human-centric approach and finally to institutions and policies related to social structures and setting social rules to build the capacity in a system level.

This subsection has attempted and investigated to find out the second determinant. Japan's *Kaizen* method and legislative support positively contributed to building the national innovation capacity, *kaizen* for individual and organisational levels and legal framework for the national level of capacity development. In the chapter that follows, the last determinant is examined.

4.2.3. Determinant 3: STI Development with SDGs

The third determinant effectively contributing to the national innovation capacity, especially in the R&D field, is the STI development incorporating the SDGs perspective. In contrast to the other two determinants mentioned in the previous section, which have exhibited long-term significance and impact, this determinant recently emerged, coinciding with the heightened awareness of sustainability and the onset of SATREPS initiated by JICA and JST in 2008. This insight has been yielded by experts and literature work, as seen in the 3.3 Synthesis of Result. Kishi and Kishida (2018) mention that the SDGs implementation through focusing on STI is critical, and SATREPS has been playing a key role in achieving SDGs and S&T diplomacy. As mentioned in the section above,

SATREPS is not a simple research collaboration between Japan and recipient countries but rather a research collaboration project to solve global issues in a specific field. Moreover, SATREPS is an initiative aimed at achieving the SDGs while aiming to enhance the CD of partner countries, as all the projects are mandated to specify which goal of the SDGs they contribute to for all issue studies (Koyama et al., 2018). SATREPS, a combination of SDGs implantation and research collaboration, leads to the enhancement of the R&D environment in partner countries owning to two reasons.

Firstly, this type of project helps the local resarchers accumulate their social capital, which often refers to the number of connections a person has. Collaborative and cross-border research projects often expand researchers' networks not only locally but also globally. For instance, JST initiated a registration-based social networking service called "Friend of SATREPS" for researchers and people interested in this programme (JST,2011). This service is used to promote interaction among users in the online community. The researchers' social capital indeed contributes to R&D productivity, and this argument is supported by Reagans and Zuckerman (2001). Their research suggests that a research group with a high level of network heterogeneity increases the productivity of R&D. Also, another study conducted in Indonesia by Juhro et al. (2022) reveals that social capital positively impacts the local Total Factor Productivity. This positive impact emerges via the R&D and innovation channel. Therefore, it can be analysed that SATREPS builds the social capital of researchers and leads to high productivity of R&D outcomes(Juhro et al., 2022).

Secondly, the project structure of SATREPS connects to recipient countries' strong ownership and motivation. SATREPS is anchored on collaboration rather than technology and knowledge transfer. As Sunami et al. (2013) pointed out, especially ASEAN countries are not just recipient countries of technologies anymore; they are Japan's equal strategic partners, referred to as "equal footing" in their work. Also, going "beyond the traditionally hierarchical, one-way relationship between donors and developing countries" (Silva, 2021, p.152) incentives them to build their capacity autonomically. Also, the topics of SDGs are highly relevant to not only Japan but also ASEAN nations as well. Thus, the nature of the

structure and SDGs theme of SATREPS could effectively strengthen their intrinsic motivation.

Overall, SATREPS has received a positive reputation for fostering the human resources of researchers and improving the level of R&D in both Japan and partner countries. However, Koyama et al. (2018) say there has never been an assessment of how much SATREPS research results have had a social impact at the end of the research activities quantitatively and qualitatively. Therefore, they argue that there is a need to establish an industry-academia collaboration platform and incorporate consultants with more practical experience for better collaboration with academic institutions. Although there are several critics on this topic, Japan is responsible for promoting the SDGs in any form as one of the major donor countries to the United Nations. Overall, SATREPS is a successful initiative and STI ODA from the standpoint of recipient countries and Japan. It contributes to the increase of STI capacity and better human development.

4.3. Future Prospect of ODA and Policy Recommendation (RQ 3)

The previous section has shown three determinants of Japan's STI ODA, contributing to the ASEAN region's national innovation capacity. This paper has demonstrated that the human-centred approach, the Japanese approach of capacity building, and STI development with SDGs highly influence enhancing the R&D capacity of ODA recipient countries. The last discussion section of this paper attempt to formulate constructive policy recommendation based on the research finding, which is directly related to RQ3: What approaches are needed for future ODA in ASEAN countries? The policy recommendations are discussed from the scope of innovation capacity building on a national level.

4.3.1. Human-rights Based Approach

Policy Recommendation 1*: Human-rights based approach should be fully incorporated into the ODA policy*

The objective of the first policy recommendation is to strengthen the human rights aspect of Japanese ODA. As explained in the introduction, the concept of ODA as a diplomatic tool is increasingly intensified due to the current geopolitical situation in Russia and Ukraine; however, the main purpose of development is to improve the quality of life of individuals, not to pursue the interests of donor countries. Surely, the diplomatic outcome and implication are vital under the current unstable international political situation; however, it should be a secondary objective, not the primary target.

Expert C advocates the necessity of "*institutionalising a cycle that the voices of those who are left behind bring them to the government, and the government responds to these voices."* Expert E during the interview points to ethnic prejudice in recipient countries, which is one factor that negatively affects the effectiveness of development projects. In addition to these biases towards ethnic minorities, the inclusion of women researchers is also an issue. According to the author's research, 31 SATREPS are currently underway in ASEAN countries, but only three projects have a female representative researcher. Such projects led by male-dominant groups or majority ethnic groups may hinder the human development of vulnerable individuals and communities and diminish the perspective of the minority group. From an innovation perspective, a development that takes into account individual rights is also linked to inclusive innovation. Inclusive innovation is defined as "the development and implementation of new ideas which aspire to create opportunities that enhance social and economic wellbeing for disenfranchised members of society" (George et al., 2012, p.663). Inclusive innovation must be a fundamental concept for a country aiming to build resilience and comprehensive innovation capacity.

Having summarised the critical evidence and justification for the first policy recommendation, it now discusses an implementation step and how this approach should be monitored and evaluated in a practical manner. About its implementation phase, this approach should be explicitly mentioned in the Development Cooperation Charter, which specifies the policy trajectory concerning ODA. As stated above, the charter is currently being revised in the national diet of Japan, and this human-centric approach should be included as a core principle of ODA policy. Regarding the monitoring process and evaluation process, the UN-Habitat (2014) suggests in their official briefing note that stakeholders from a wide range of gourds should participate in the intervention's implementation, and human rights-related details should always be noted in a result or progress update. Other pivotal points regarding the evaluation are that the indicator of this approach should be "relevance, efficiency, effectiveness, sustainability and impact", and project outcome should be assessed based on the theory of change to systematically evaluate the designs, planning, and implementation (UN-Habitat, 2014).

ODA should be implemented based on the central principle of human dignity and individual rights. Japan has adopted a human-centred approach for a long time, which has formed the foundation for a focus on people. A human rights-centred approach is, therefore, highly feasible. This approach might be potentially effective in building more lasting trust with ODA recipient countries from the diplomatic perspective.

4.3.2. Transdisciplinary Approach

Policy Recommendation 2: *Transdisciplinary approach should be implemented as a part of Japan STI ODA*

The second policy recommendation to aim for the national innovation capacity in the ASEAN region is to incorporate the transdisciplinary approach into implementing ODA in the STI field. Scholz and Steiner (2015, p.531) explain that transdisciplinary is a

facilitated “mutual learning” process between science and society that combines a “targeted multidisciplinary or interdisciplinary research process” and a “multi-stakeholder discourse” to produce “socially robust orientations” about a global and emergent real-world challenge. They also indicate that this transdisciplinary approach can be used as a means of capacity building by integrating science and practical knowledge, referred to as knowledge integration in their article (Scholz & Steiner, 2015).

Talking about the key insights and finding throughout this research, the importance of having experts and stakeholders from different professional and academic backgrounds has also been pointed out during the interviews. As the code of result suggested, the combination of humanities and sciences, partnership, and participatory approach are critical elements in enhancing the innovation capacity. However, as Koyama et al. (2018) critiqued in the previous section, there is a call for an industry-academia collaboration platform for such international collaborative research projects in a development context. Thus, the transdisciplinary approach effectively contributes to addressing this issue.

One of the implementation strategies that Japan can employ is that they include this approach in the SATREPS framework. It is difficult for the public to participate in SATREPS, as only researchers are principally involved in SATREPS. Therefore, as suggested by Koyama et al. (2018), the transdisciplinary process could be embodied and mediated by incorporating at least one development consultant from the Japanese side and the partner country into the project who would take care of communications between diverse stakeholders from the Japanese side and the partner country. Concerning the monitoring process, the number of stakeholders involved in this process could be one indicator of measuring the progress of the transdisciplinary approach.

All things considered, the transdisciplinary approach could effectively combine with the first approach, the human-rights based approach. It has a strong correlation with capacity development; thus, it has enormous potential to foster innovation capacity in recipient nations through both approaches.

4.3.3. Improvement of the Evaluation Process of STI ODA

Policy Recommendation 3: *STI ODA should develop a longer-term evaluation system, including the third party from partner countries, and use more quantitative data to carry out the evaluation process.*

The third policy recommendation is the improvement of evaluation quality for STI ODA. The importance of an evaluation system has been pointed out by literature and experts since the research started, and especially in the ICT sector, it is critical to have an objective and inclusive evaluation system to ensure people stay updated and not leave no one behind in the rapidly digitalised society. The evaluation system can be more advanced by frequent follow-up assessments highlighting the quantitative check.

MOFA and JICA's ODA evaluations are based on the five OECD DAC evaluation categories (relevance, effectiveness, impact, efficiency and sustainability) (Muraoka, 2019). However, there is a lack of enough quantitative data for the ODA evaluation. For example, a review of the official reports in which SATREPS follow-up evaluations shows more qualitative and less quantitative evaluations. When Koyama et al. (2018) interviewed four SATREPS researchers for their input, all pointed out that no concrete action plan had been developed for the social implementation of the SATREPS projects. In addition, all follow-up evaluations were evaluated by only researchers from Japan, potentially connecting to the biased impact assessments.

Specific Implementation steps to pursue this policy are firstly to establish a system to continuously collect the micro-data for quantitative evaluation over a long period of time for an econometrics approach, according to Todo (2008, mentioned in the RIETI's website). He also says it is indeed a difficult task to appraise the effectiveness of aid quantitatively; however, it is still crucial to assess the impact by gathering the data of individuals and companies. Secondly, the involvement of a third party from the recipient country in the evaluation process should be mandated in assessing projects to measure the social impact. Currently, many ODA projects are measured by only the Japanese side,

as mentioned above, the inclusivity of evaluation could enhance by incorporating the partner country. By doing this, it is possible to analyse efficacy from diverse perspectives. So far, the necessity of evaluation improvement of STI ODA has been argued for the better quality of foreign assistance as the third policy recommendation. The evaluation part should be treated and monitored as equally as the project's implementation phase.

4.3.4. Active Involvement of the Local Private Sector in the STI Field

Policy Recommendation 4: *The government should promote the involvement and participation of the local private sector in the R&D and ICT field.*

When considering the relationship between the private sector and ODA, some would argue that promoting investment through FDI, particularly by mega-firms and enterprises from donor countries, can largely contribute to economic growth and innovation systems. Therefore, since the beginning of this study, the author has been questioning and challenged by the doubt whether ODA is still required in the future in the ASEAN region, which is currently achieving rapid economic growth at the moment. However, it is only through ODA, which emphasises the 'development' aspect, that it is possible to assist with a human-centred approach and not only just monetary gain. Therefore, the fourth policy recommendation is to increase national innovation capacity, such as national R&D capability, by involving the local private sector, such as SMEs and start-ups (especially the ICT sector), through Japan ODA.

Expert G also offered this suggestion: "*Encouraging public-private partnerships, fostering local entrepreneurship, and improving the business environment are key aspects*." Furthermore, expert F also accentuated during the interview that ODA has to combine the Private Finance Initiative (PFI) and the private sector in order to maximise the effectiveness of ODA. JICA has already been initiating two programs for private sector development as a part of JICA's global agenda; 1. Project NINJA (Next Innovation with

Japan) 2. Asian investment promotion and industrial development. These two projects aim to increase local start-up investment and to strengthen the business linkages between international firms, including Japanese companies and local ones in Asian regions (JICA, 2022). The two projects can be highly evaluated from the perspective of innovation capacity enhancement and creation. However, mixing the current STI ODA programmes already in place with local companies could further encourage the cooperation with the private sector in the STI sector.

Japan ODA can enhance the national innovation capacity in the regions, for instance, by collaborating with local start-ups for the social implementation phase of SATREPS projects so that the start-ups and research institutes boost the connections, which could be the quality of linkages between the cluster environment for innovation and the innovation infrastructure (Furman et al., 2002) (see Figure 2). Thus, a robust innovation ecosystem can be established by encouraging and supporting the involvement of the local private sector through STI ODA.

Table 7. Summary of the policy recommendations

Human-rights based approach should be fully incorporated into the ODA policy
Transdisciplinary approach should be implemented as a part of Japan STI ODA
STI ODA should develop a longer-term evaluation system, including the third party from partner countries, and use more quantitative data to carry out the evaluation process.
The government should promote the involvement and participation of the local private sector in the R&D and ICT field.

Source: Author's compilation.

5. CONCLUSION

Since the research gap exists on the effectiveness of foreign aid, especially in the innovation field in recipient countries, measuring the impact of development assistance led by major donor countries is also challenging due to the absence of empirical evidence and theoretical frameworks. Therefore, this paper has set out to investigate the effectiveness of foreign aid focusing on Japanese Official Development Assistance in the Science, Technology and Innovation field and to develop policy recommendations for the future prospect of Japan ODA. Three research questions are framed in order to attain the research objectives: RQ1. How has Japan's approach to STI (Science, Technology and Innovation) development in ASEAN countries evolved over time? RQ2+. What have been the key determinants of STI ODA projects targeting an enhancement of national innovation capacity, specifically in the field of research and development (R&D)? RQ3. What approaches are needed for future ODA in ASEAN countries?

The literature review incorporating elements of a systematic review and a semi-structured interview with experts in international politics and economics discipline are employed as research methodologies for responding to the research questions. After conducting seven depth and expert interviews and a literature review in a systematic manner, the paper has identified three determinants effectively enhancing the national innovation capacity of ODA recipient countries. 1. Human-centred approach, 2. the Japanese approach of capacity building, and 3. STI development with SDGs. Japan has been initiating development assistance in ASEAN regions, prioritising cultivating human resource development and fostering a collaborative approach that respects local ownership and partnership. Also, Japan has been adopting the kaizen method and incorporating SDG values into STI development, especially in the R&D field. Japan's ODA towards ASEAN has shifted from a hierarchical structure to one valuing equal footing, emphasising the significance of this fundamental concept across all development projects.

Four policy recommendations from the scope of innovation capacity building are developed based on the research result. Their pivotal aspects are 1. Human-rights-based approach, 2. Transdisciplinary approach, 3. Improvement of the evaluation process of STI ODA, and 4. Active involvement of the local private sector in the STI field. These four points should be integrated and enhanced within the ODA policy so that ODA recipient countries continue to achieve sustainable and inclusive economic development.

This paper contributes to understanding the key determinants of Japanese STI ODA in the ASEAN region and setting a trajectory for more effective quality of ODA targeting the enhancement of national innovation capacity. This study is restricted by the limited number of experts participated in the interviews from the ASEAN regions and the absence of other major donors' STI ODA policy guidelines and actual cases in recipient countries. Significantly more work would also have to be done to evaluate the impact of ODA with quantitative methodology. Further research could apply cross-country analysis among donor countries by using the microdata to measure the effectiveness of STI ODA. Furthermore, carrying out research that encompasses the ASEASN countries' point of view on ODA and utilises sentimental analysis among the local community would contribute to the richness of the study.

The dissertation concludes by incorporating a quote from *Ogata Sadako* (2013), a leading figure in the development sector in Japan and the first Japanese woman to become the UN Commissioner for Refugees;

"Be humane."

This quote once again emphasises and reminds us of the essence of a human-centric approach to foreign aid.

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TABLES

FIGURES

ABBREVIATIONS

AMED: Japan Agency for Medical Research and Development

ASEAN: Association of Southeast Asian Nations

BHN: Basic Human Needs

CD: Capacity Development

CSTI: Council of Science, Technology and Innovation

DAC: Development Assistance Committee

FDI: Foreign Direct Investment

GNI: Gross National Income

JICA: Japan International Cooperation Agency

JST: Japan Science and Technology Agency

MOFA: Ministry of Foreign Affairs of Japan

OECF: Overseas Economic Cooperation Fund

ODA: Official Development Assistance

OECD: Organisation for Economic Co-operation and Development

PFI: Private Finance Initiative

RQ: Research Question

R&D: Research and Development

S&T: Science and Technology

SATREPS: Science and Technology Research Partnership for Sustainable Development Program

SDGs: Sustainable Development Goals

SSI: Semi – Structured Interview

STI: Science, Technology, and Innovation

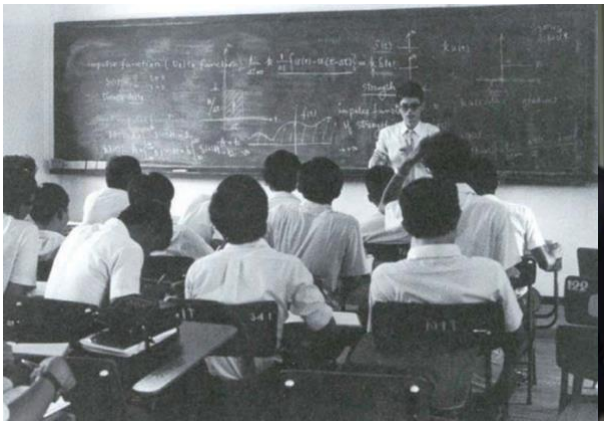
UN: United Nation

UNDP: United Nation Development Plan

INDEX

Interview Transcripts: Transcripts of the expert Interviews are available in the links below**.** All the personal information is anonymised and deleted from the transcripts. Due to the lack of expert A' audio recording, the transcript was substituted for the note which the author took during the report.

Pictures 1 & 2: Japanese ODA to the King Mongkut's Institute of Technology. The prime minister of Japan, Fumio Kishida, paid an official visit to the KMITL in May 2022. The profound relationship between Japan and KMITL has lasted to the present.



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Picture 2: MOFA. (2022). *Prime Minister Kishida's visit to King Mongkut's Institute of Technology, Lakabang, College of Technology. 岸田総理大臣のキングモンクット工科大学ラカバン校高等専門学校視察 (in Japanese)*. Ministry of Foreign