

ACADEMICIA: An International Multidisciplinary Research Journal

ISSN: 2249-7137 Vol. 14, Issue 5, May, 2024 SJIF 2022 = 8.252

A peer reviewed journal

ACADEMICIA

ISSN (online) : 2249-7137

ACADEMICIA

An International
Multidisciplinary Research
Journal



Published by

South Asian Academic Research Journals

A Publication of CDL College of Education, Jagadhri

(Affiliated to Kurukshetra University, Kurukshetra, India)

ACADEMICIA

An International Multidisciplinary Research Journal

ISSN (online) : 2249 –7137

Editor-in-Chief : Dr. B.S. Rai

Impact Factor : SJIF 2022 = 8.252

Frequency : Monthly

Country : India

Language : English

Start Year : 2011

Indexed/ Abstracted : Scientific Journal Impact Factor (SJIF2022 - 8.252), Google Scholar, CNKI Scholar, EBSCO Discovery, Summon (ProQuest), Primo and Primo Central, I2OR, ESJI, IJIF, DRJI, Indian Science and ISRA-JIF and Global Impact Factor 2019 - 0.682

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VISION

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ANALYZING THE GEOPOLITICAL RELATIONSHIP BETWEEN JAPAN AND NATO

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ABSTRACT

Significant catalysts that alter the national conceptions of security often have an impact on international alliances and cooperation. Japan's relationship with the North Atlantic Treaty Organization (NATO) has been influenced by significant events such as the collapse of the Soviet Union, the September 11 attacks on the United States, and several other global disasters. As a result of these advancements, the concept of security has broadened to include unconventional dangers such as piracy and terrorism, which are exacerbated by globalization and interconnected political and security partnerships. Japan and NATO have synchronized their security goals, resulting in increased political engagement, provision of humanitarian assistance, and enhanced cooperation in post-conflict scenarios. These trends imply the potential for a more ambitious, formal, and engaged agenda for Japan's participation in NATO, which would benefit both NATO and the U.S.-Japan relationship. This article analyzes Japan's security policy and its connection to NATO. The first section of the text examines the dynamics of Japan-NATO relations. The second section delves into the historical background of these relations. The third section discusses Japan's desire for closer ties with NATO. The fourth section explains why NATO values Japan as a global partner. The fifth section highlights potential challenges in Japan-NATO relations. Finally, the conclusion focuses on the future of their political engagements.

KEYWORDS: *Global Partners, Political Engagement, And Security Linkage.*

INTRODUCTION

In recent years, NATO has started engaging with states outside the Euro-Atlantic zone(Gjoreski&Nacev, 2022). Referred to as "global partners," these countries share similar strategic concerns and significant Alliance principles. Japan is NATO's most prominent and long-lasting overseas ally. The NATO-Japan relationship initially consisted of infrequent and loosely focused conversations with little coordination. When NATO expanded its involvement in international security beyond its traditional geographic bounds, particularly in countries like Afghanistan, this had a significant and transformative impact. The alliance between Japan and NATO was established as a result of this expansion(Browne et al., 2022).

Enhancing Japan's alliance with NATO offers at least two benefits. Japan's pacifist Constitution, which historically limits active military engagements, aligns harmoniously with NATO's comprehensive strategy. Japan has had challenges in devising effective strategies for international peacebuilding due to the frequent necessity to make trade-offs between "security" and "reconstruction". Japan might enhance its involvement in this domain by establishing strategic alliances with NATO. To exemplify this partnership, let's examine the financial assistance and the mobilization of citizens to the Provincial Reconstruction Teams (PRTs) backed by NATO and ISAF(Marrone&Muti, 2022).

Furthermore, by engagement with NATO members, Japan acquires essential knowledge in a multilateral security framework, benefiting from their adherence to fundamental concepts such as democracy, the rule of law, and human rights. Japan lacks significant experience in institutionalized international security cooperation outside the scope of the United Nations. Japan benefits from enhancing cooperation with a coalition of democratic nations, as it gains valuable insights and knowledge on how to promote multilateral collaboration in the varied Asian region. This is particularly important now, since cross-border cooperation is more crucial in addressing global issues. As NATO shifts from being purely a military alliance to a hybrid crisis management organization, Japan now has the opportunity to strengthen its cooperation with European partners that share the values of freedom and democracy. This research paper examines the intricacies of the partnership between Japan and NATO(Doğrul, 2023a).

Japan's Security Strategy and its Relationship with NATO

Japan is becoming as NATO's most steadfast global ally. Discussions about common security concerns have been increasingly regular and organized since the early 1990s. Practical collaboration has been formed in several fields such as crisis management, peacekeeping, disaster relief and humanitarian assistance, cyber defense, counterterrorism, non-proliferation, and military involvement(Ashley, 2023).

NATO and Japanese officials have regularly engaged in visits and exchanges of views since the 1990s. In April 2013, NATO Secretary General Anders Fogh Rasmussen traveled to Japan to engage in discussions with Prime Minister Shinzo Abe and other senior officials about the potential for enhanced cooperation and shared concerns in the realm of security. The visit resulted in a joint political declaration that outlined shared strategic objectives in promoting global peace, security, and prosperity via an international framework based on established standards. Japan has forged diplomatic relations with NATO, along with other countries located outside the Euro-Atlantic area that share comparable strategic objectives and fundamental principles of the Alliance(Khattak, 2023).

NATO developed a more inclusive partnership strategy in its 2010 Strategic Concept, which allowed for fair possibilities for collaboration and communication among all partners. Japan and NATO successfully concluded an Individual Partnership and Cooperation Program on May 6, 2014. This endeavor establishes Japan's official engagement with the Alliance and is specifically focused on advancing its own interests. Due to the enhanced relations, Japanese officials and NATO Allies have engaged in several informal dialogues over shared security issues, including North Korea, assistance to Afghanistan, cooperation with Central Asia, missile defense, and counterpiracy(Galic, 2021a).

Current Collaboration between Japan and NATO on Security

Currently, Japan and NATO engage in extensive collaboration across many initiatives and contacts. Japan and NATO's Brussels headquarters are engaged in an ongoing high-level debate, taking turns in leading the conversation. Japan's backing for NATO programs has expanded, including financial assistance for an additional project under the NATO/Partnership for Peace (PfP) Trust Fund. In April 2009, Japan made a public commitment to provide help for Azerbaijan's efforts in clearing explosive ordnance (Kirchner & Dorussen, 2021).

The prospects for Japan-NATO ties remain uncertain as a result of domestic political challenges in Japan, notwithstanding the positive trend of cooperation. Following the 2009 elections, in which the Democratic Party of Japan (DPJ) achieved a significant majority, there was a renewed emphasis on interpreting the country's pacifist Constitution in a more literal manner. This led to the adoption of a new policy agenda that prioritized domestic matters. In January 2010, the Democratic Party of Japan (DPJ) followed through on its campaign pledge by terminating the refueling mission of the Maritime Self-Defense Force (MSDF) in the Indian Ocean. However, the DPJ did not fully withdraw support for NATO's ISAF mission. Instead, the DPJ opted to continue providing support to civilians in the form of donations (Brummer & Lindgren, 2023a).

In late 2009, the Japanese government pledged to provide \$5 billion in aid over the following five years to fund various efforts aimed at meeting human needs. These initiatives include education, infrastructure development, agriculture, and programs to reintegrate former Taliban soldiers into society. To effectively administer the aid package, the government established a new department inside the office of the prime minister. Despite changes in the DPJ leadership, Japan has always maintained its unshakable commitment to Afghanistan (Atanassova-Cornelis & Singh, 2021).

Presently, Japan has around 130 civilian personnel engaged in various capacities for corporate, non-governmental, and diplomatic organizations in Afghanistan. In addition, Japan has enhanced its collaborative endeavors with NATO by partnering with 12 Provincial Reconstruction Teams (PRTs) to implement 59 community-oriented programs in various sectors including as healthcare, education, and vocational training. Four personnel from the Ministry of Foreign Affairs (MOFA) in Chaghcharan, Central Afghanistan, are working with Croatian, Danish, American, Ukrainian, and Icelandic soldiers in a Provincial Reconstruction Team (PRT) led by Lithuania. Japan has agreed to participate in a NATO information security pact, a significant development that is expected to enhance future cooperation in Afghanistan. This agreement would facilitate the sharing of information to safeguard the increasing population of Japanese humanitarian workers presently present in the field (Galic, 2021b).

Ultimately, Japan's evolving security policy and its growing affiliation with NATO are indicative of the broader patterns in international security cooperation. Japan should enhance its involvement in global peacebuilding by aligning its goals with NATO's comprehensive strategy and using the alliance's proficiency in crisis management. This partnership not only improves Japan's national security but also promotes stability and prosperity globally (Panda, 2021a).

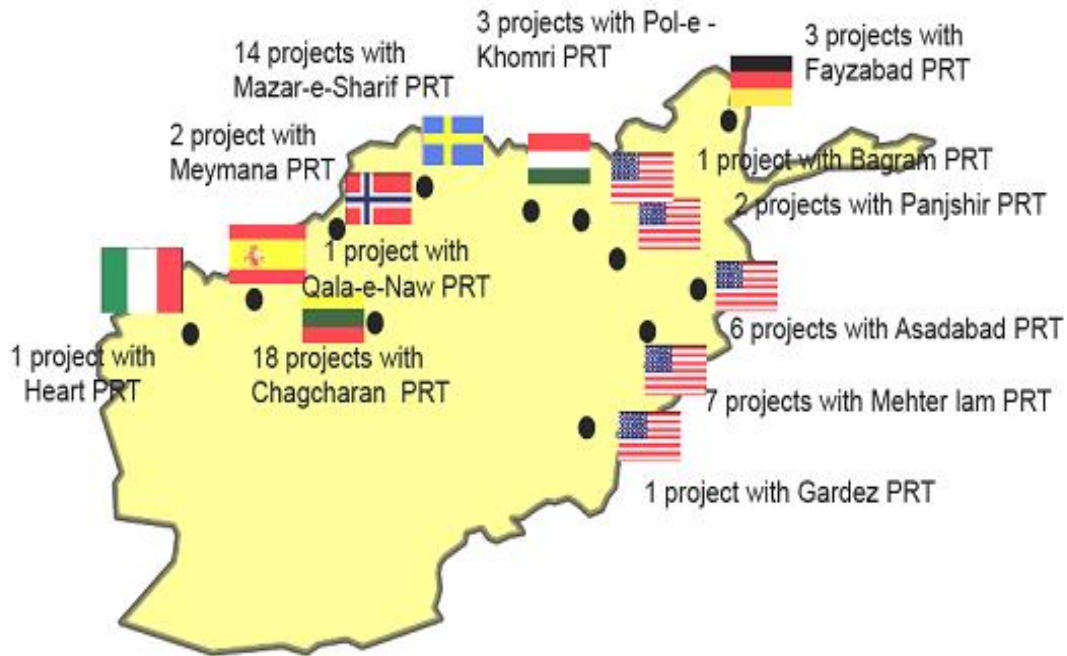


Figure 1: Japan's involvement in Afghanistan in conjunction with NATO Provincial Reconstruction Teams (PRTs) (Source: The Ministry of Foreign Affairs of Japan)

The Democratic Party of Japan (DPJ) has not offered much information in its public pronouncements about future partnership between Japan and NATO. In its 2009 platform, the Democratic Progressive Party prioritized the eradication of terrorism and vigorous participation in UN peacekeeping operations. However, actions often have a greater impact than words, which demonstrates the strategic calculations made by the DPJ leadership. While the DPJ ended non-combat naval support in the Indian Ocean, the Maritime Self-Defense Force (MSDF) of Japan has actively participated in anti-piracy operations around the Somali coast. Japan's enduring commitment to global security is shown by the inclusion of NATO vessels in this multilateral undertaking. Japan has shown its robust commitment to safeguarding maritime security by deploying two warships and two P-3C patrol aircraft to the area since 2009 (Takahashi et al., 2021).

Furthermore, Japan and Djibouti signed a Status of Forces Agreement to establish a site for Self-Defense Force operations. The DPJ government's decision to undertake security commitments internationally in response to emerging threats is a clear demonstration of their determined action. Tokyo has shown its dedication to addressing global security issues and pursuing common strategic objectives by maintaining its involvement in NATO member countries. Ultimately, the DPJ's actions demonstrate a refined approach to fostering partnership between Japan and NATO, effectively managing the delicate equilibrium between national interests and international security commitments. This ongoing partnership serves as a reminder of the congruence of strategic goals and the need of teamwork in addressing global issues (Ishii, 2021).

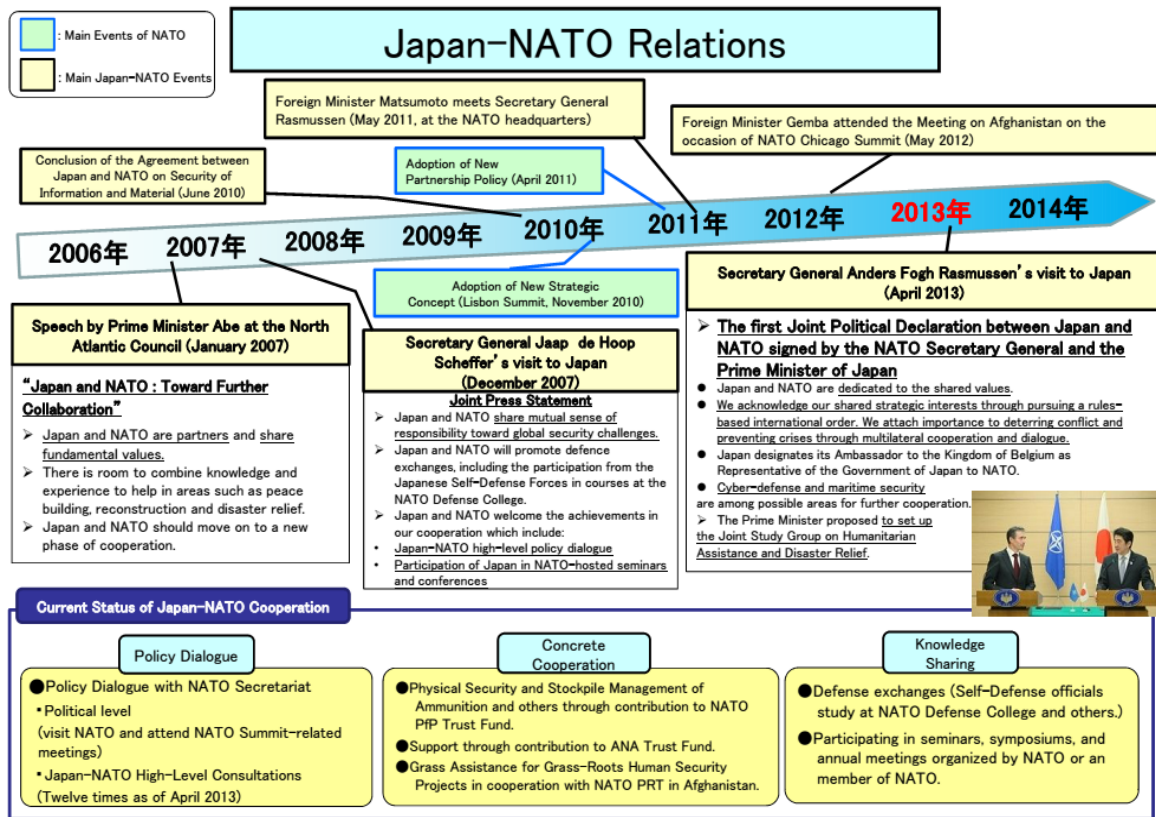


Figure 2: Japan – NATO Relations (Source: Japanese Ministry of Foreign Affairs)

What is the reason for Japan's pursuit of a more stringent alliance with NATO?

Japan's intention to forge robust connections with NATO may be understood by examining several crucial arguments:

The Political Function of NATO

Japan perceives NATO as a crucial political partner that provides a forum for deliberations on security-related issues. During their visits to NATO, both Foreign Minister Taro Aso in May 2006 and Prime Minister Shinzo Abe in January 2007 emphasized the security situation in Asia, specifically mentioning China's military buildup and North Korea's abduction fears. Abe explicitly requested that NATO partners demonstrate empathy for and officially support Japan's stance on these matters. This exchange exemplifies Japan's strategic use of communication with NATO to garner European comprehension and endorsement of its security and political interests in Asia. NATO, the most triumphant military alliance in history, brings together formidable states from North America and Europe, exerting a significant influence on global politics and security. Therefore, NATO is an important political partner for Japan (Yaniz, 2020).

The Role of NATO as an Operational Partner

NATO demonstrates its status as a "alliance in action" by its extensive operations in Afghanistan (ISAF), Kosovo (KFOR), the Mediterranean region (OAE) to combat terrorism, the Somali coast (anti-piracy measures), and the Iraq training mission (NTM-I). NATO engaged in military operations in Libya between March and October 2011. These operations include several non-

NATO states, showcasing NATO's readiness to accept support from capable and eager friends. Japan's partnership with NATO allows it to extend the geographical scope of its development assistance beyond regions where it currently has an Embassy or Japan International Cooperation Agency (JICA) presence. The 2010 security accord between Japan and NATO establishes the structure for more comprehensive dialogue and beneficial cooperation by allowing the exchange of classified information. Japan's involvement in many international security initiatives is facilitated by this operational alliance, which enhances Japan's global influence and impact (McGerty et al., 2022).

NATO as an Additional Forum for US Cooperation

Japan stands to gain strategic advantages via its collaboration with the NATO alliance, due to the United States' pivotal role within the organization. Being a member of NATO signifies a partnership with the United States that is supported by the North Atlantic Treaty's Article 5 pledge to collective defense. Given that the European Affairs Bureau of the Foreign Ministry oversees NATO, Japan tends to see NATO within a European context. The decision to deploy the Self-Defense Forces (SDF) abroad is mostly driven by domestic political considerations, with a significant emphasis on the relationship with the United States. The broader context of Japan-U.S. Japan-NATO cooperation will be advantageous as long as the "U.S. factor" remains crucial to Japan's security and military policy-making. Cooperation. This dynamic significantly enhances the potential for operational collaboration between Japan and NATO, particularly in relation to the Self-Defense Forces (SDF) (Credi et al., 2020).

Why is Japan a sought-after global partner for NATO?

One might analyze NATO's interest in Japan as a global partner from many perspectives:

Policy coordination and strategic discussions

Japan's collaboration with Australia enables it to provide NATO valuable policy coordination and strategic discussions, albeit without being an official member. Japan and NATO may collaborate on their policies of post-conflict peacekeeping, transnational crime, non-proliferation of weapons of mass destruction (WMDs), counterterrorism, disaster assistance, energy security, and environmental protection. Japan's potential as a strategic partner for NATO is underscored by its expressed interest in establishing frequent communication with the North Atlantic Council and determining the most effective manner of cooperation within its constitutional framework (Credi et al., 2020).

Cooperation in the execution and assistance of logistical operations

Japan's potential engagement with NATO includes providing logistical assistance to support the needs of NATO personnel. Although Japan and NATO nations had previously collaborated in Iraq and Northern Pakistan, they did not provide any logistical support. The establishment of a framework enables the SDF and NATO troops to mutually support one other in terms of logistics, with the US acting as the main point of coordination. This level of cooperation would enhance Japan's and NATO's operational capability and coordination (Williams, 2023).

Participating in NATO Military Exercises

Japan has elevated its degree of operational coordination by participating in NATO military exercises. Japan's Maritime Self-Defense Force now participates in the United States' biannual multinational naval exercise, often referred to as the Rim of the Pacific or RimPac exercise. The

Navy operates in the Pacific region, but just during joint exercises carried out in coordination with US troops. An examination of the compatibility between Japanese and NATO military equipment is essential to broaden participation in NATO multinational naval exercises. This increased level of engagement would enhance Japan's incorporation into NATO's operational structure, while simultaneously bolstering collective security initiatives (Banka & Bussmann, 2023).

Japan's aspiration for a robust collaboration with NATO stems from the organization's significance as a political, operational, and strategic ally. Japan gains advantages from NATO's political dialogue platform, opportunities for operational collaboration, and support for its stances on security issues in Asia. Japan and NATO's shared strategic objectives and ideals provide the foundation for this alliance, which is further enhanced by the involvement of the United States. The relationship between Japan and NATO is likely to further develop as global security challenges evolve, bringing mutual benefits to both nations and fostering peace and stability worldwide (Kubai, 2022).

The historical relationship between Japan and NATO

The convergence of interests has significantly impacted the partnership between Japan and NATO in ways that were unforeseeable by the architects of NATO in 1949 and the drafters of Japan's Constitution in 1947. Following World War II, Japan and the Allied occupiers prioritized the process of reconstruction during a new political age. The Japanese Constitution and the Potsdam Declaration both mandated that Japan must undertake a transition towards a liberal democratic system. Despite Japan's unconditional surrender, Article 9, a pacifist provision that prohibited the possession of armed forces capable of engaging in warfare, was inserted in the treaty because of concerns of the resurgence of militarism (Galic, 2021c).

Initially, Japan was not embraced as a collaborative liberal democratic institution by its Western counterparts. Currently, Russia was the only subject of European scrutiny. Despite the historically strained relations between Japan and Russia, cooperation proved challenging. Instead, European countries established a military coalition centered on the North Atlantic Treaty with the aim of preventing Soviet expansion. The twelve member states created a collective defense organization with the purpose of preventing Russian influence, maintaining American presence, and restraining German might. The text of the North Atlantic Treaty was specifically tailored to address the limited geographic concerns of Europe and North America, and there was no intention to include other regions in its membership. Although the Korean War transformed NATO into a formidable alliance focused on collective defense, it did not extend its influence to Asia (Brummer & Lindgren, 2023b).

Japan's rise to economic supremacy in the 1970s sparked a fresh interest in international politics, despite NATO maintaining a consistent strategic perspective during the Cold War. Japan sought to use its economic might in order to strategically position itself in response to a more advantageous China and evolving relations with the Soviet Union. Japanese military ministers made formal visits to Brussels in 1979, 1981, and 1984 with the aim of enhancing contact with the transatlantic community. However, except from the United States, NATO leaders shown no enthusiasm towards East Asia and prioritized the protection of Europe and the containment of Soviet influence (Panda, 2021b).

The Prospects for the Future of NATO

Following the collapse of the Soviet Union, NATO reassessed its position in the global community and extended its membership to include new partners, including former Soviet nations, under the Partnership for Peace project. These alliances have objectives that extended beyond mere protection of the organization's existence. The rapid growth in information technology, improved transportation, and the rapid integration of global markets led to NATO's interests being more intimately connected to formerly distant parts of the globe. NATO initiated an examination of possible areas of collaboration with Japan and other Asian nations due to the emergence of East Asia as a region characterized by swiftly growing economies and influential political entities(Coffey &Kochis, 2020a).

The present state of Japan-NATO Relations

A new era of partnership between Japan and NATO began in the 1990s. The first Japan-NATO Security Conference was held in Belgium in July 1990, and the first official visit of a NATO Secretary General to Japan took place in 1991, with Manfred Wörner visiting Tokyo. These developments align with a broader trend of strengthening Japan-European cooperation. In 1992, Japanese authorities sought to enhance their cooperation with Europe by forming a partnership with the Organization for Security and Collaboration in Europe (OSCE). Additionally, they signed a joint declaration with the European Community (EC) in 1991 and became an observer in the Council of Europe in 1996. Japan's leaders also redefined the country's capability to protect itself and promote global peace and security. Since 1992, the Japanese Diet has passed over 20 significant security-related laws, which have given Japanese forces the authority to take part in United Nations peacekeeping and humanitarian relief missions outside of Japan. These laws have also enhanced cooperation between Japan's Self-Defense Forces (SDF) and American forces, and have furthered Japan's geostrategic goals. Japan was able to actively support NATO operations in the Balkans due to these upgrades. Throughout the 1990s, Japan has provided assistance to education and healthcare projects in the Western Balkans. These measures have included programs aimed at ensuring the provision of clean water, facilitating the reintegration of returning soldiers into society, promoting democracy, and reconstructing infrastructure(Galic, 2021d).

Despite increasing exchanges, persistent obstacles hindered the establishment of a formal security alliance between Japan and NATO. NATO's focus on expanding its European membership posed challenges in extending collective defense obligations over long distances. Similarly, Japan's constitutional limitations precluded it from attaining full participation in any collective defense alliance. To address this issue, NATO recognized Japan, South Korea, Australia, and New Zealand as "Contact Countries" in 2004. This categorization facilitated the ability to work together to protect sea lanes and contribute to peacekeeping and counterterrorism efforts, even without being an official member. It encouraged closer cooperation with the trans-Atlantic community and gave NATO a presence in Asia(Doğrul, 2023b).

Post-September 11, 2001 Progress

The September 11, 2001, attacks on the United States ignited a surge in coordination between Japan and NATO. The NATO effort in Afghanistan benefitted greatly from an increasing recognition of the need of international cooperation in addressing emerging transnational threats like as terrorism, proliferation, and piracy. The International Security Assistance Force (ISAF),

led by NATO, had the responsibility of improving security and overseeing development projects in Afghanistan. This was the first instance in which NATO has used the Treaty's provision pertaining to collective defense. Japan has just entered a new phase of engagement in the global security landscape, as seen by its substantial dedication and proactive involvement in supporting initiatives. During an eight-year period, warships from twelve countries, mostly the United States, were supplied with almost half a million kg of gasoline by Japan's Maritime Self-Defense Force (MSDF) via their refueling operation in the Indian Ocean(Vandenbelt, 2021).

Japan has engaged in several collaborative operations with NATO partners worldwide, including Afghanistan, since 2001. Since 1996, Japanese troops have been involved in UN peacekeeping operations in the Golan Heights, with Canada and Poland. In 2002, they provided support for reconstruction and humanitarian operations in Iraq with Dutch and British soldiers. Additionally, they oversaw the electoral process in East Timor during the same year. After the 2005 earthquake in Pakistan, the SDF collaborated with NATO Response Force personnel to participate in rescue operations in South Asia. Recently, the SDF collaborated with other NATO nations to carry out humanitarian assistance efforts in Haiti as a component of the UN Stabilization Mission.They often encounter each other in non-NATO missions worldwide, as NATO increasingly participates in operations beyond its traditional region and Japan adopts a more comprehensive approach to security. This convergence is a result of the ongoing expansion of Japan-NATO relations and the global nature of modern security concerns(Garey, 2020).

Country/Operation	Japan's Responsibilities	Year Deployed	NATO Members Involved During Operation
Cambodia (UN Mission)	Election Observing	1991	Belgium, Canada, France, Germany, Poland, United Kingdom, United States
Mozambique (UN Mission)	Staff Assistance and Election Monitoring	1993	Canada, Hungary, Italy, Netherlands, Norway, Portugal, Spain, United States
Golan Heights (UN Mission)	Staff/Transportation Support	1996	Canada, Croatia, Poland
Turkey (Non-UN Mission)	Earthquake Relief	1999	All NATO nations
East Timor (U.N. Mission)	Infrastructure/ Reconstruction	2001	Canada, Demark, Norway, Portugal, Slovenia, Spain, Slovakia, Turkey, United Kingdom, United States
Iraq (Non-UN Mission)	Humanitarian Reconstruction Assistance	2004	Albania, Bulgaria, Czech Republic, Denmark, Estonia, Poland, Romania, United Kingdom
Countries Affected By Indian Ocean Tsunami (Non-UN Mission)	Tsunami Relief and Aid	2005	United States, Italy, France, Greece, Denmark, Turkey, United Kingdom
Pakistan (Non-UN Mission)	Earthquake Relief	2005	NATO Response Force which included 17 NATO countries
Indonesia (Non-UN Mission)	Earthquake Relief	2006	United States
Nepal (UN Mission)	Observing Ongoing Peace Process	2007	Canada, Croatia, Germany, Greece, Netherlands, Norway, Poland, Romania, Turkey, United Kingdom
Sudan (UN Mission)	Logistics/Information	2008	Belgium, Canada, Croatia, Denmark, Germany, Greece, Netherlands, Norway, Poland, Romania, Turkey, United Kingdom
Somalia (UN Mission)	Counter-piracy Operations	2009	Germany, Greece, Italy, Turkey, United States, United Kingdom, Portugal, Denmark, Canada
Haiti (Non-UN Mission)	Engineering/Logistics	2010	Denmark, Norway, Sweden, Finland, Estonia, Germany, United States
Vietnam/Cambodia (Non-UN Mission)	Medical/Disaster Relief Planning	2010	United States

Figure 3: Japan's participation in non-NATO initiatives with NATO countries since 1991 (Source: Japanese Ministry of Foreign Affairs)

In 2007, NATO enhanced its security measures in Asia by collaborating with the Contact Countries to establish personalized "Tailored Cooperation Packages" (TCP). NATO offers opportunities for capacity and skills development via the TCP framework to enhance interoperability and integrate partner nations into NATO-led operations. Japan's TCP facilitates

annual planning and coordination, providing a framework for practical cooperation. Recent collaborations between Japan and NATO have focused on several areas such as crisis management, counterterrorism, non-proliferation, and civil emergency preparedness, in addition to supporting ISAF operations in Afghanistan (Parameswaran, 2022).

Japan's Evolving Stance on NATO

An Expanding Outlook

Japan exhibited reluctance in engaging with NATO or participating in security dialogues with Western governments, except those of the United States, for an extended period after World War II. Japan proceeded cautiously, being mindful of international apprehensions that it may revive its military history if it achieved substantial economic prowess. When the Group of Seven (G7), included Japan, began its annual meetings in 1975, Japanese officials exhibited hesitancy in discussing matters related to security. Nevertheless, throughout the mid-1980s, there was a change in this way of thinking. Western Europe and Japan bolstered their economic interdependence and political collaboration via trade and investment. With the growth of its economic might, Japan began to see the need of assuming a larger political and security responsibility. As a supporter, the United States often advocated for or exerted pressure on Japan to take action. The Gulf War of 1990–1991 was a significant turning point for Japan. Japan's participation in the international peace assistance operation was hindered by constitutional interpretations that limited its military to self-defense. Consequently, Iran contributed \$13 billion to the U.S.-led Operation Desert Storm, although not receiving much recognition for its financial support (Doğrul, 2023c).

Japan's implementation of the International Peace Cooperation Law in 1992 was motivated by this incident and provided the legal basis for Japan to send its troops overseas to participate in peacekeeping operations (PKO). The country's recent dedication to jointly assuming obligations with allied states has significantly altered its association with NATO (Hughes et al., 2023).

NATO Ambiguity

Japanese security specialists and important government officials saw NATO as a powerful military and diplomatic entity during the Cold War, capable of effectively countering both the Soviet Union and the Warsaw Pact. NATO's capacity to maintain the equilibrium of power, its nuclear deterrence capabilities, and its capacity to attract individuals to the liberty of the Western world were highly regarded. The leadership of NATO was esteemed for its capacity to maintain cohesion among its diverse membership despite internal conflicts (Rynning, 2021).

However, throughout the Cold War, Japan saw Western Europe as a strategic competitor. Situated at distinct locations on the Eurasian landmass, Western Europe and Japan primarily engaged in military actions to protect the United States. Japan expressed concern that Moscow may redirect its military resources towards the Far East, so posing a threat to Japan's security, in the event of NATO adopting a resolute stance against the Soviet Union. During the 1983 G7 summit in Williamsburg, Virginia, Prime Minister Yasuhiro Nakasone expressed his opposition to the European approach that allowed the Soviet Union to deploy SS-20 missiles east of the Ural Mountains. He emphasized that global security is interconnected and cannot be divided (MacHaffie, 2024).

During the early years after the Cold War, Japan voiced concern about the reconciliation between Western Europe and Russia, considering the ongoing regional tensions in East Asia.

These tensions included the strained relationship between Taiwan and China, as well as the reported nuclear development by North Korea. Tokyo expressed concern over the potential escalation of Russian military forces in the Far East due to NATO's Partnership for Peace (PP) and improved NATO-Russia relations. Nevertheless, the competition between Japan and Europe for American protection diminished as their bilateral relations strengthened and NATO extended its membership to include countries in Central and Eastern Europe. Japan now regards NATO as a crucial partner in promoting and enhancing global peacekeeping efforts (Mumford & Carlucci, 2023).

Challenges that may arise in the relationship between NATO and Japan

There are significant concerns about NATO's aspirations to include Japan as a "global partner." The first challenges are associated with the evolving security landscape. The emergence of globalization, technological improvements, and economic modernization has given rise to new challenges that need international collaboration for successful resolution. In addition, they often transcend traditional geographical limits, including subjects like as energy security, human trafficking, cybersecurity, anti-piracy, counterterrorism, natural disaster assistance, and peacekeeping. Climate change-related challenges, including as forced migration and the security of food and water, also impact Japan, NATO, and the US. In order to address the growing security problems, modern economies and shared ideals need collaborative approaches. This may include sharing acquisition techniques and considering shared force structures (Galic, 2021e).

An other concern is that the collaboration between Pacific Rim states and NATO might potentially provoke China and Russia, leading to the formation of a retaliatory alliance. The expansion of NATO into Eastern Europe, the Baltic nations, and new partners in the Pacific Rim is generating apprehension among Beijing and Moscow. China's robust cooperation with Russia and Central Asia in establishing the Shanghai Cooperation Organization (SCO) may be driven by its image of being geographically encircled by Europe and the Pacific. NATO should avoid exerting pressure on the SCO to assume a role of counterbalance (Brummer & Lindgren, 2023c).

Both Japan and NATO face security challenges in the Arctic and space, which are emerging as new domains of concern. Japan, together with the other NATO countries, has the joint duty for the advancement of state-of-the-art technologies that may be used in military and security domains. Both countries are democratic and have modern economies. Additionally, they are at the forefront of advanced technology. The use of advanced technology in future warfare highlights the need for cooperation in emerging security domains (Coffey & Kochis, 2020b).

An Anticipated Framework for Japan-NATO Relations

In order to make changes to the constitution, Prime Minister Shinzo Abe is interested in amending Article 9 and interpreting Japan's "right of individual self-defense." This requires a two-thirds majority in both chambers of the nationwide Diet and a simple majority in a nationwide referendum. The government may expedite the process of interpreting Article 9 to allow Japan to exercise its inherent right to collective self-defense, although this will still take some time. By doing this action, Japan would enhance its engagement in its alliance with the United States and foster closer collaboration with NATO. Japan will remain an important and proactive ally of NATO in the foreseeable future. If a constitutional framework is established that adheres to Article 5 of the treaty, there will be more policy options available for joining a global NATO (Harold et al., 2022; Wenzhu, 2022).

CONCLUSION

The Japan-NATO cooperation has a greater amount of unexplored potential than has been recognized so far. It is essential to take proactive measures in order to establish shared responsibility and benefits, which may result in improved cooperation. The political leaders of Washington, Brussels, and Tokyo must take the initiative in establishing stronger connections with a well-defined long-term strategy. Both Japan and NATO must address the obstacles hindering closer collaboration, including Japan's constitutional limitations and NATO's divergent perspectives on actions outside its immediate region. An attainable approach for enhanced cooperation may be realized by prioritizing the importance of implementing appropriate measures to strengthen the Japan-NATO relationship.

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SOCIAL JETLAG- AN EXHAUSTING CONDITION IN 21ST CENTURY – A CONCEPTUAL FRAMEWORK

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DOI: 10.5958/2249-7137.2024.00011.3

ABSTRACT

Our lives are regulated by three types of clocks: the social clock, which schedules our interactions with others (local time); the biological clock, which manages our body's functions (circadian time); and the solar clock, which dictates natural light and darkness. When these clocks are out of sync, our risk of developing certain diseases increases. The term 'social jetlag' measures the disparity between local time and circadian time.

KEYWORDS: *Social Jetlag, Exhausting, disparity, anticipation.*

INTRODUCTION

Clocks everywhere, but what time is it?

Time carries a lot of power in itself...it has been rightly said that it is the most powerful warrior. We must value the time given to us on this earth and try to avoid the non-significant that surrounds us...Power of time has been felt by everyone in one way or the other...

The rotation of the earth on its axis and around the sun determines regular changes in the environment, namely the alternation of day and night and of seasons. Many organisms have developed an internal time keeping mechanism in order to synchronize to external time signals (zeitgebers) . “Zeitgebers” refer to environmental and social cues that provide input to the circadian system and help to synchronize biological rhythms (Aschoff, Hoffmann et al., 1975). Light is considered the most important zeitgeber for human entrainment (Duffy & Wright, 2005), (Pittendrigh, 1964), nonphotic stimuli, such as food intake and physical activity, can also influence circadian rhythms (Mistlberger & Skene, 2004; 2005).

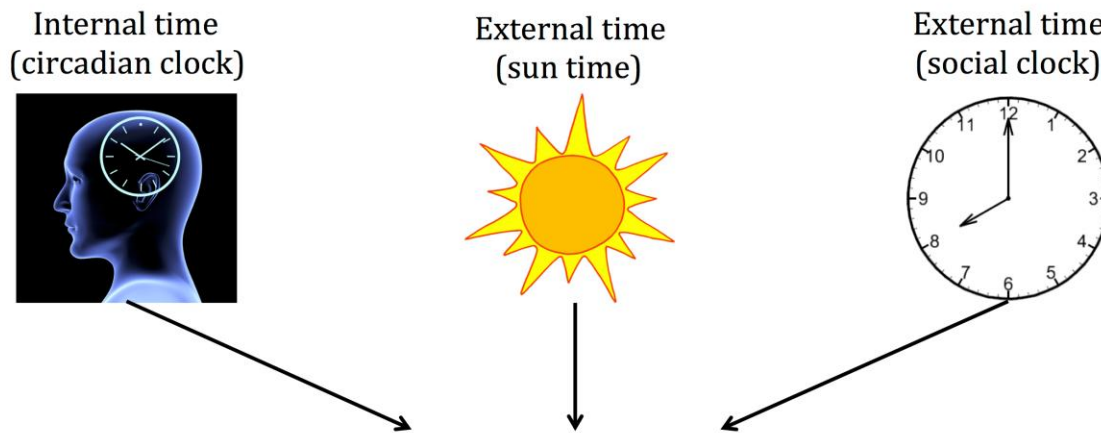
The process that maintains a stable phase relationship between two oscillators is called entrainment (Aschoff, Klotter, & Wever, 1964). Having an internal clock able to entrain is thought to be adaptive since it allows, for example, anticipation of the regular changes in the environment (Moore-Ede, 1986).

The internal clock has a period of about 24 hours (similar to the period of its zeitgeber) and is hence also called circadian clock (from Latin: circa diem = about a day).

Inconsistency in Internal Time

On top of the inconsistency between different external time signals, internal time can vary substantially between individuals. Like many biological traits, also circadian clocks vary

within individual characteristics such as sex, age, and genetic background (Hamet & Tremblay, 2006; Roenneberg, Kuehne, Juda, Kantermann, et al., 2007a; Roenneberg et al., 2004). The additional exposure to different light landscapes results into a wide distribution of phases of entrainment, which determines, for instance, differences in sleep timing (Roenneberg & Merrow, 2007). These individual differences have been described as a distribution of chronotypes (Roenneberg, Kuehne, Juda, Kantermann, et al., 2007a).



Conflicting clocks (some examples):

- Time zones: same social time but different sun times
- Daylight saving time: abrupt change in social time not in accordance to sun time
- Shift work: conflict between internal and social time

Figure 1. Internal time, sun time, and social time.

Source: Zerbini, G. (2017)

The image shows that Internal time, sun time, and social time. Internal and external time signals are not always perfectly synchronized in modern society, giving rise to several conflicts. Some examples of these conflicts are listed.

Chronotype and how to measure it

Chronotype is a feature of the circadian clock that can be easily measured via questionnaires such as the Munich Chronotype Questionnaire (MCTQ; Roenneberg, Wirz-Justice, & Merrow, 2003) and the Morningness-Eveningness Questionnaire (MEQ; Horne & Ostberg, 1976). Chronotype assessed via the MCTQ refers to sleep timing on work-free days, while the MEQ expresses chronotype as a diurnal preference towards morningness or eveningness. The majority of the working population (80%) needs alarm clocks to wake up on workdays (Roenneberg, Kantermann, Juda, Vetter, & Allebrandt, 2013); hence most people are chronically sleep deprived, showing sleep rebounds on work-free days to compensate for the lost sleep. Because of this tendency to oversleep on work-free days, midpoint of sleep on work-free days (MSF) has to be corrected for the confounding influence of sleep debt accumulated on workdays, resulting in MSF sleep corrected (MSFsc). This difference in sleep duration between workdays and work-free days is particularly evident in late chronotypes (if they have to attend early school/working

schedules). Generally, the later the chronotype, the shorter the sleep duration on workdays and the longer the sleep duration

on work-free days will be (Roenneberg, Kuehnle, Juda, Kantermann, et al., 2007a).

Characteristics of Chronotype

Chronotype varies with age and sex. The prevalence of morning types is higher in the toddler age, but a progressive delay in chronotype is clear already during the first years of age (Randler, Faßl, & Kalb, 2017). Males on average are later than females, and this becomes particularly evident during adolescence (Randler et al., 2017; Roenneberg et al., 2004; Roenneberg, Kuehnle, Juda, Kantermann, et al., 2007a). Based on the MCTQ database, males reach their maximum in lateness at the age of 21, whereas females, who mature earlier, reach their maximum in lateness at the age of 19.5. After that age, both gradually become earlier chronotypes. When using another questionnaire to assess chronotype as diurnal

preference (Composite Score of Morningness; Smith, Reilly, & Midkiff, 1989), these peaks in lateness are observed earlier (at the age of 18 for males and at the age of 15 for females; Randler et al., 2017).

Chronotype varies also with light exposure as shown by the correlation between chronotype and time of dawn described in a German population (Roenneberg, Kumar, & Mellow, 2007b). Moving from east to west, dawn was shown to progress continuously and the same was true for chronotype that was found to delay from east to west, although local clock time was the same within the given time zone. The correlation was stronger for smaller towns (less than 300,000 inhabitants), where people hypothetically experience a stronger zeitgeber since they spend more time outdoors and are exposed to more natural light than people living in bigger cities. This finding suggests the importance of considering sun time as well as total

outside light exposure since the circadian clock seems to entrain to natural light rather than social schedules.

Genetic influences on chronotype have been also described in relation to extreme sleep behaviors, such as advanced and delayed sleep phase syndromes (Archer et al., 2003; Hamet & Tremblay, 2006).

Chronotype and Other Tools to Assess Phase of Entrainment and Sleep Timing

In addition to forcing social jet lag, the modern lifestyle also contributes to an extreme expression of the so-called chronotypes – the classification of individuals according to the preferences of their body regarding the time they perform daily activities such as sleeping, waking up, working out and exercising the mind.

There are two main chronotypes: the “morning people,” who sleep and rise early, and reserve the night period to sleep; and the “evening people,” who prefer to sleep and wake up late, even if that means dedicating part of the day to sleep.

In terms of their circadian behavior, these two chronotypes are growing farther and farther apart because of how the patterns of exposure to natural light are changing in the modern age. According to him, throughout the course of evolution, our biological clock was synchronized with a light/dark cycle regulated by exposure to sunlight: “The environment in which we were synchronized during the last thousands of years was one of much light during the day and no

light at all at night. The morning and evening chronotypes existed, but the distance between them was not significant.”

However, the dissemination of electric lighting and the habits of modern life have imposed different levels of exposure to solar and artificial light. Indeed, the luminous signals that help synchronize internal body rhythms and external environment rhythms are being minimized. In daytime, when people should normally be exposed to the Sun, participants were confined indoors, with little natural light; at night, on the other hand, when the body should be in the dark, they were exposed to a prolonged period of artificial light. “We are darkening the day and illuminating the night. And this light is increasingly turning us into evening people,” Roenneberg

According to him, exposure to artificial light at night would hardly make a farmer become an evening person, because, when working outdoors, under the Sun, he would signal to the biological clock that sunlight, stronger and natural, was the real light. “It is the *contrast* between light and dark that synchronizes our biological clock, making us sleep from 10 pm to 6 am,” he said.

In Roenneberg’s view, unlike what is commonly thought, being an evening person does not imply any type of pathology. “There is no innate timing of the circadian clock,” he explained, pondering that sleeping and waking up later is “a natural reaction to the environment where one lives, a normal way for the circadian clock to synchronize a body that is not being sufficiently exposed to light.”

Chronotype can be used to estimate an individual’s phase of entrainment. Although

chronotype is assessed with questionnaires (subjective measurement), the MCTQ asks about sleep timing that is usually reported quite objectively. The greatest advantage of using chronotype to assess phase of entrainment is the possibility to collect data in large populations in a quick and cost-effective way; the MCTQ online database has in fact reached over 200,000 entries so far. Alternatively, biological (objective) phase markers can be used in human research to determine phase of entrainment, especially in relatively small-sample-size studies. Dim-light melatonin onset (DLMO) is often the first choice because melatonin has a robust and stable

rhythm under the direct control of the circadian clock (Arendt, 2006; Klerman, Gershengorn, Duffy, & Kronauer, 2002). Melatonin is suppressed by light and therefore needs to be assessed in dim-light conditions. Other markers of the melatonin rhythm can be used, such as the peak in expression, but the advantage of DLMO is that it is accepted as a proxy for a full, overnight melatonin curve in most experiments (less expensive and time consuming). Another biological phase marker mainly used in laboratory studies is core body temperature. Core body temperature also shows a strong circadian rhythm with a peak in the evening and a trough at night, but is more variable and influenced by external factors such as physical activity more than is melatonin (Klerman et al., 2002). Sleep timing can be assessed both with daily sleep diaries (subjective measurement) and with acti-watches (objective measurement) that usually record activity together with light exposure. Actigraphy data can give also insights about sleep quality based, for instance, on awakenings and the time spent asleep in relation to time spent in bed (sleep efficiency). Actigraphy can also be used to assess other phase markers such as center of gravity (the time point when the amount of activity before and after is the same).

Natural Rhythms/ Daily Rhythms

Daily rhythms in fundamental aspects of physiology and behavior are controlled by an endogenous biological clock. They persist in temporal isolation experiments with a period of approximately 24 h (hence circadian, about 1 day) and have been shown for many biological functions, ranging from the sleep/wake cycle and physiology, e.g., temperature, melatonin, and cortisol (Bailey and Heitkemper, 1991, 2001; Duffy et al., 2001; Waterhouse et al., 2001) to gene expression (Clayton et al., 2001; Young and Kay, 2001).

Poor scheduling, combined with unhealthy attitudes about the need for sleep, can cause major problems for who do not take proper sleep during weekend. That's because working at night runs counter to the body's natural circadian rhythm, says Charmane Eastman, PhD, a physiological psychologist at Rush University in Chicago. The circadian clock is essentially a timer that lets various glands know when to release hormones and also controls mood, alertness, body temperature and other aspects of the body's daily cycle. Our bodies and brains evolved to relax and cool down after dark and to spring back into action come morning. People who work the night shift must combat their bodies' natural rest period while trying to remain alert and high functioning. It doesn't matter whether they get enough sleep during the daytime, she says. All the sleep in the world won't make up for circadian misalignment.

What is Social Jet Lag?

Social jet lag, a term coined by German researcher Till Roenneberg in 2006, is the discrepancy in a person's sleep pattern between the weekday and the weekend, which can cause a person to feel "jet lagged" or tired and fatigued. Researchers in Europe have coined the term "social jet lag" to describe the all-too common practice of following a different sleep schedule on weekdays versus the weekend. Our circadian rhythms are out of sync with our hectic work schedules, the theory goes, so each weekend we're effectively flying back and forth between time zones without ever leaving the ground.

An Important difference in between Travel Jet lag and Social Jet lag is that travel jet lag is lighter in intensity. When we arrive in a different place, the sun is coming up and setting at different time and your body can reset its own clock to match. With Social jet lag, the schedule disruption is chronic a person staying in the same place.

According to recent researches, in last few decades people are facing problem of social jet lag because of constant work pressure, going late to bed for sleep, getting up early or normal to complete the tasks (personal and professional) and losing out 1-2 hrs. of sleep. A disrupted sleep schedule can increase your risk of Diabetes and heart diseases, a new study revealed.

How Social Jet Lag Impacts Health

Social jetlag has been found to be associated with several health issues. Social jetlag significantly increases the probability of overweight and is positively associated with weight gain within this specific sub population (Roenneberg, Allebrandt, Merrow, & Vetter, 2012). Furthermore, stimulant consumption is related to social jetlag and, in particular, the greater the social jetlag, the more likely someone is a smoker (Wittmann et al., 2006). A positive correlation between social jetlag and depressive symptoms has also been found in a rural population in Brazil (Levandovski et al., 2011). Social jetlag is particularly high in shift workers and is positively correlated with heart rate, considered as a marker for cardiovascular diseases

(Kantermann et al., 2013). Since social jetlag arises from a discrepancy between two clocks, there are two possibilities to decrease it: delay the social clock or advance the

circadian clock. Several schools and working places have introduced delayed or flexibleschedules, but still there are many situations in which late chronotypes need to perform at anearly (non-optimal) time of day. Therefore, more studies investigating interventions todecrease social jetlag by modifying (advancing) phase of entrainment are needed.Basically, there are two forces that determine when we are awake or asleep at any point in time. The first is how long we've been awake, and the longer we're awake the more tired we feel and it's easier to fall asleep.But, there's this other force that keeps us awake during the day, which opposes that sleepy force or sleep debt that is building up. This is called our internal body clock or circadian rhythm. Intensely adjusting the circadian rhythm confuses the body and brain - no longer knowing what time to go to sleep and what time to get up, which makes us feel horrible. This is exactly what happens to teens that sleep in for multiple hours on the weekends. In fact, teens who go to bed two or more hours later on the weekends (compared to teens who went to bed within two hours of their weekday bedtime) reported having difficulty falling and staying asleep, falling asleep in school and/or while studying, feeling cranky/irritable and sleepy during the day and more difficulty getting along with family members. These kids also drank more caffeine, had worse grades and reported more depressive mood symptoms.

Other potential side effects of social jet lag include:

- Disturbed sleep (insomnia, early waking or excessive sleepiness)
- Daytime fatigue
- Difficulty concentrating or functioning at your usual level
- Stomach problems (constipation or diarrhea)
- A general feeling of not being well
- Behavioral problems
- Metabolic risk

Research Context and Relevance

Social jet lag is “the discrepancy between what our body clock wants us to do and what our social clock wants us to do,” says Till Roenneberg, Ph.D., a professor at the University of Munich’s Institute of Medical Psychology, in Germany. “It almost looks as if people on a Friday evening fly from Paris to New York, and on Monday morning they fly back again.”

Even though light is considered the main signal that entrains inner biological rhythms according to circadian environmental rhythms, social organizations have the capacity to take the body “out of sync”. An emergent field of research on the topic refers to what has been described as social jetlag, the biological misalignment that arises from alternated work and free days. However, to the present moment, there is still controversial evidence on the effects of such a phenomenon to human health.

There are 400 new Facebook notifications, 548 unread emails, 20 missed calls and you’ve just discovered that the white shirt you had planned to wear to the conference tomorrow has a terrible coffee stain down the front of it.

In our modern day world, where everything is all go-go-go and no slow, we ignore our body's whispers for rest – often forgetting that in order to help others, we must first help ourselves.

According to Dr Patricia Wong of the University of Pittsburgh, : ‘Social jet lag is a habitual form of circadian misalignment, when individuals have to essentially sleep and wake at times that are out of sync from their internal, biological clock and shift back and forth in their sleep schedules due to social obligations.’

"Sleep plays an important role both in the physiological and psychological development of an individual's body," says sleep expert Dr Preeti Devnani. "Our body has a preferred time for sleep and activity, which when hampered, causes various changes in your body," she adds.

Further understanding entrainment: The Role of Season and Weekly Schedule

Light is the primary zeitgeber for human behavioral entrainment, and therefore many studies have investigated the (isolated) effects of light on the circadian clock, often in highly controlled laboratory conditions. However, entrainment is a complex phenomenon resulting from the integration of many different internal and external time signals. Therefore, more field studies investigating entrainment in real life conditions may be useful to understand the problems and possibilities of giving sound advice to people who are not institutionalized.

The social clock also influences human behavior, in particular the sleep-wake cycle. Sleep is usually later and longer on work-free days compared to workdays (social jetlag), and this difference is greater in later chronotypes (Wittmann et al., 2006).

CONCLUSION

In the current scenario, due to modernization and development in technology people are forced to work late at night, working in shifts, late-night use of electronic gadgets, eating late at night, and mismatch timings of various other activities. This misalignment of various daily activity timings with the natural day/night environmental cycle tends to misalign the circadian rhythm. As a result, people suffer from several circadian disruptions such as social jetlag, eating jetlag, obesity, depression, etc.

The Centers for Disease Control and Prevention (CDC) in the United States has declared insufficient sleep a ‘public health problem’, with more than one-third of American adults not getting enough sleep on a regular basis. However, insufficient sleep is not exclusively a US problem; it equally concerns other countries.

There are studies which shows that Social Jetlag is also hat adults with higher levels of social jetlag were more likely to be overweight or obese and have metabolic syndrome (which is associated with the development of type 2 diabetes) compared with those with more regular sleep patterns – even after controlling for how much sleep they got.

While reading various studies it was found that most of the studies are done on students, teen agers who spent lot of time on screens, shift workers who works in night shifts. Also, studies done on to find out the corelation between social jet lag and health aspects such as diabetes 2, Cardiovascular disease . Some studies explored and got corelation between social jetlag and behavioural aspects such as smoking, depression and mood swings etc.

Although, there are various studies on social jetlag, still there are need to explore the awareness level of a common person about the social jetlag and it's impact?

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CARBON NEUTRALITY, CARBON FOOTPRINT AND CIRCULAR ECONOMY INDIAN INITIATIVES TO COMBAT CARBON FOOTPRINT

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DOI: 10.5958/2249-7137.2024.00012.X

ABSTRACT

The digital revolution has surpassed the interdependency of business to a greater height. Business organizations are involved in various interactive activities. Transition to digital technology through the extraction of resources has made businesses, widen the scale of operation. With positive developments, the global climatic environment has impacted India, the country is in 3rd place next to China and the USA. The government needs to build better policies for better lives. The man-made industrial revolution has pushed positive productive activities, as well, as caused a negative environment, and imbalance. Activities are measured based on emissions and carbon footprint. Carbon footprint is caused by to overall consumption of materials and energy, flora and fauna confiscation, as well as direct and indirect emissions caused by import and export of trade. World mineral extraction has manifolded 4 times, from 28 Gt to 101 Gt as of 1971 to 2021. This extraction is expected to move 6 times higher, by 2050. Based on this background, the study objectives are, to examine actions taken by India through policy developments to combat the carbon footprint, in aligning the domestic policy to cooperate with global agreements. Secondly, the readiness of Indian business organizations, to develop a systematic sustainable model, to mitigate environmental hazards. Selective case instances are taken from the Indian context to understand green industrialization. Lastly, a study has analyzed using statistical infographics with trend and time series, to understand the cumulative average rise in carbon footprint based on sector-wise variation.

KEYWORDS: Carbon Footprint, Neutrality, Circular Models, Policy.

1. INTRODUCTION:

Primitive economy follows a linear model, with waste of resources, but the circular economy model, has its parameters, giving much emphasis on reusing and recycling materials. Right from the 18th century during the Industrial Revolution, industries were practicing the take, make, and dispose of the model, but in a digitized system circular model is the design with a recent version to reduce carbon footprint to achieve sustainability. The goal is to retain the maximum value of resources through effective management of resources and goods, in particular, to lessen waste and maximize the reusing, remanufacturing, and recycling of materials. The circular system has

initiated seven principles that benefit companies in day-to-day operations. Each of these principles is well suited to mitigate carbon footprint.

- Design of the Circular Economy
- Build a circular supply chain
- Reduce environmental impact
- Preserve and extend resources and asset life cycles
- Using regenerative and renewable resources
- Turning waste into resources
- Adapt innovative technologies

1.2 Carbon-negative initiative taken by Indian Organizations via Green Industrialization

Is it time for green industrialization? An accountability matrix for climate action is noted with good transparency, this lies in making every nation accountable, to facilitate smooth interaction, and aligning internal policies, with those of the global attainment of each country's goals. Representatives and decision leaders at the global Conference of Parties (COP) meet, join hands, and commit on behalf of each nation. All signed striking agreements, so promises need not be discontinued. Escalating heat across countries in the globe, transformation serves as a plain reminder that Earth is experiencing thoughtful and probably irreversible changes. So, what is the demand needed for these changes to climatic conditions? Better to shift towards green industrialization, a mindful and sustainable approach for the economy to grow. Green industrialization visualizes the widespread adoption of circular economy principles, encouraging resource efficiency and minimizing environmental impact. This change requires a planned shift from old-style brown assets, which heavily rely on fossil fuels, to innovative green industrial assets. The importance of this idea is the combination of renewable energy sources, such as solar and wind, into industrial processes, to reduce carbon footprints and support non-renewable resources. Green industrialization envisages the basic reshaping of manufacturing developments and economic structures to influence cutting-edge technologies to blend industrial growth with environmental sustainability. This combination of spotless energy sources, such as solar, wind, and green hydrogen becomes the pillar of this change, steering industries away from fossil fuels and diminishing their carbon footprint. With equal access to these advancements, green industrialization can become a shared global endeavor empowering nations to forge a collective path toward a resilient carbon future. Organizations have joined hands with the government to take India towards the path of lower greenhouse gas emissions, almost more than 24 top private companies including Tata, Reliance, Mahindra, ITC, ACC, Adani, and Dalmia Cement signed an agreement on climate change. Each nation voluntarily pledges to, move towards 'carbon neutrality'. To make carbon neutral management of carbon in its form becomes essential. Nature-based solutions such as afforestation or investment in clean energy technologies capture, store, and/or use carbon dioxide (CO₂) emissions to optimize biological and industry processes. One such (Victoria Masterson, April 2022) technology is **Carbon, Capture, Use, and Storage**

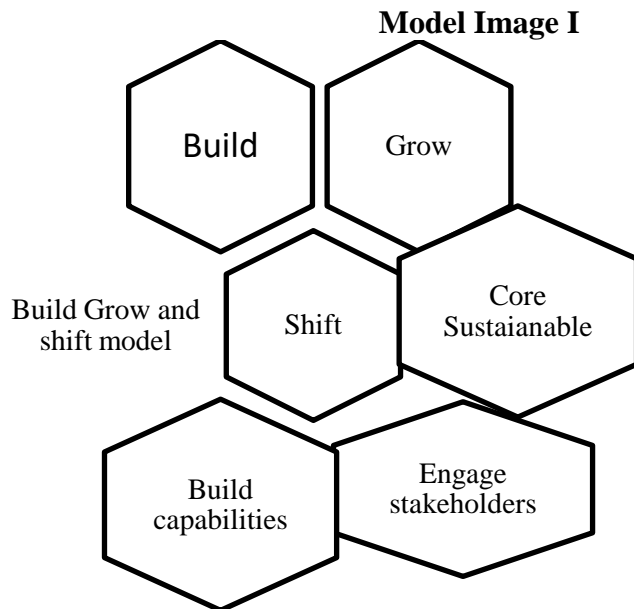
(CCUS). To achieve climate goals, however, the CCUS arrangement is to reach 5.6 Gigatonnes (Gt) of CO₂, according to the Global CCS Institute (GCCSI), accounting for a fifth of emissions reductions needed by 2050(IEF, 2020). CCUS, the cost of energy sector transitions could increase by more than 70 percent and several countries view CCUS as a "mitigation and adaptation"

2. Review of Literature

2. Theory and Model

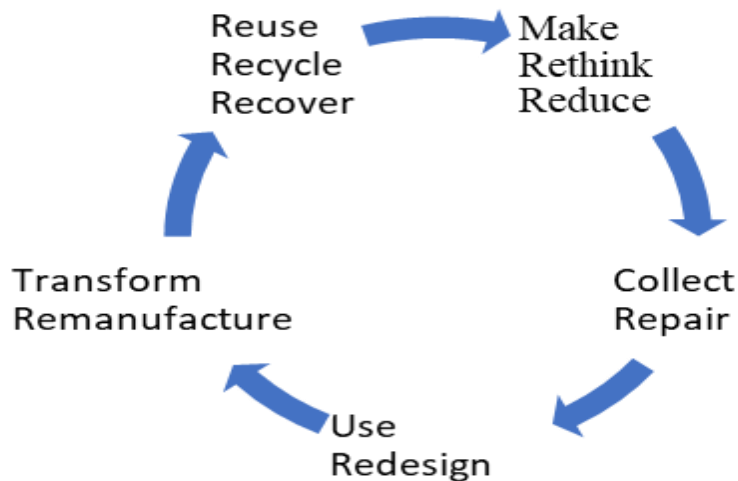
What does the carbon dioxide theory state? As the amount of carbon dioxide rises, the surface becomes muddier over a larger frequency interval. The impacted indicator is that the environment heat rises. So carbon footprint is an ecological indicator that represents the amount of greenhouse gases, that are expressed as CO₂ equivalents, that are emitted directly or indirectly as a result of a specific activity. A Planned agenda applied in sustainability changes is through examining various approaches and models. The theory outlines a methodical approach for companies to include sustainability in their core business operations and create a competitive advantage. Organizations need to start by developing a sustainable strategy secure in purpose. Need to take into account material environment, social, and governance areas and identify, where outperformance can contribute significantly to long-term success. Grow captures business value (Murdie, 2013), *Image 1 Model*, through sustainable practices firms need to explore opportunities. This growth channel could be implemented through cost savings from means competence, new revenue streams from sustainable products or services, or improved brand reputation due to responsible practices. Firms also seek to build new sustainable businesses. Aligning sustainable goals through marginal improvements and innovation totally into new business. As firms work progressively to participate in progressive processes, products, and services, developing capabilities is important. Progressive companies are investing in building skills, knowledge, and infrastructure. Of late companies have made it transparent to engage investors, customers, employers, and stakeholders to advise and guide in positioning sustainability initiatives. A central concept in sustainability is the circular economy. This model supports that products and resources are to be used that minimize the degradation of the environment. The model reinforces closing loops and determines to reduce waste and maximize resource utilization. Does not consider the conservative traditional linear model. The key focus is on the durability of products longevity and reuse, so that the designing of products, is reusable. This could enhance repair, recycling, and redesign that can be used again and again. The circular economy model further stresses its key principle's restorative and regenerative design. Through this principle circular model aims to achieve the highest utility and value in the product lifecycle.

By enhancing the life of products and minimizing waste, the circular model guides to reduction of carbon emissions associated with manufacturing and disposal.



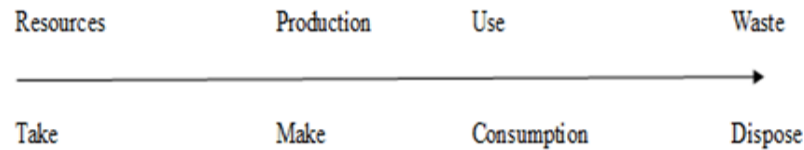
One of the strong reasons to embrace the circular economy model is the linear take-make-use-waste model results in value leakage at every stage of the value chain. The World Economic Forum, moving on to a circular model could foster manufacturing companies to unlock greater opportunity, redefine the design, can operate within the framework, that could position businesses for long-term success. In this way, circular economy model could be made achievable, scalable, and profitable.

The pillars of the Circular Economy are basically to encircle change. This is based on three transformations of technology that redefine product design, materials used, and the way the industries operate. While prioritizing materials to weave and develop through durable, recyclable, and bio-gradable materials.



One of the observations made by the circularity gap report by Circle Economy around 90% of materials are wasted, lost, or unavailable for reuse and recycling. According to (MacArthur)Foundations, the circular system illustrates the continuous flow of materials in a circular economy through two main cycles one, is technical and the second is a biological cycle. In the former cycle, materials are kept in circulation through reuse, repair, remanufacture, and recycling processes. In the latter cycle, biodegradable materials are returned to the soil through composting and anaerobic digestion.

Model Image 3



Take-make-dispose model, can be also referred to as the linear economy model, (Lewis, 2022) an old method for resource consumption and production in the economic system. As the resource is extracted from nature, the company designs and processes the needed product. After use consumers discard it as waste. This method does not take into account the long-term impact on the environment. The linear model is unidirectional and accumulates heaps of waste all including metals, plastic, and chemicals. The linear model lacks concerns about the environment.

2.1 Carbon Neutrality

(Garima Vats, 2022) have discussed due to heavy freight charges would make decarbonization of the Indian power sector by 2050 a challenge. Residual emissions require carbon sequestration options, that include nature-based solutions as well as technology. To reduce temperature below 2 ° C, India needs to find a path unlike others as well to contain budgets for a sustainable development path. (Saritha S Vishwanathan, 2018) the study has discussed the various opportunities and challenges, and authors have projected endemic transformations, to achieve emissions reduction, and to manage high economic growth. (Gabrial Anandarajah, 2014) their study reveals renewable energy plays a significant role in decarbonizing the Indian economy, especially the power sector. A greater role for biomass, solar, and wind energy can be deployed through carbon capture storage as well as through appropriate technology. (Palaniappa Krishnan, 2022) have recorded and discussed in their document note, that both the countries India and USA, fill up early achievements of net zero emissions. Tools have been suggested to achieve a command-based and market-based approach have been decided. Through these tools and approaches, both countries want to achieve equity, efficiency, liberty, and sustainability. (Lin Chen, 2022) have proposed that the best strategy is to move from fossil fuel to renewable, develop low-carbon technology, change dietary habits, and change the value of food and agriculture waste. to develop resilient buildings and cities, decentralized energy systems, and electrification of the transport sector.

2.2 Carbon footprint

(Divya Pandey · Madhoolika Agrawal, 2011; Gabriel Anandarajah, 2014) their study concern is to voice on development of standard footprint calculation. Have mentioned that there is no compulsory footprint verification. Carbon footprint is a tool to guide emission cuts and

verification. With high intercountry interaction, studies have raised that standardization is the need of the hour. (Tao Gao, 2014) have conducted a study on the assessment standards, their differences, similarities, and deficiencies. Have found that with commercialization of carbon footprint, has made business organizations count down on emissions, to reduce waste, encourage opportunities to improve productive efficiency, promote corporate social responsibility, and achieve sustainability. Have suggested that global cross-border assessments on the standardization of carbon leakages and tax adjustments need to be addressed within the global scope. (Yahaya Hassan Labaran, 2022) has done a thorough analysis of greenhouse emissions from industry, a green building concept a thorough review examined has found that there is inadequate research on interconnectedness. That is the relationship between different drivers that links to low carbon construction and identification of parameters to measure carbon footprint by the international rating system. (Elfriede Penz, 2018) has found ecological sustainability

2.3 Circular economy

(Hemant Bherwani, 2022) integrated Resolve strategy framework has focused on reducing carbon footprint and material footprint. The study has predicted to influence policymakers to achieve and practice sustainable development. Policy involvement to solve capital decrease and environment deprivation challenges to produce Gross domestic product. (Poonam Kumari, 2020) study has asserted that the reduction of carbon footprint can enhance financial performance. Policymakers need to standardize carbon emissions and control them to reduce them both in direct as well indirect ways. The study further suggests that technology adoption could lead to an expensive side, instead adoption of green technology with effective cost efficiency would be advised. (A K Kurchania, 2014) have discussed business development and corporate social responsibility. Renewable energy system in urban peri-urban areas. This could be well maintained by residents with appropriate training given. Authors are of the view that businesses will make positive changes to improve the socio-economic lot of the less empowered. Increasing the use of renewable energy sources and conservation would make a sustainable energy supply. (Chakraborty, 2021) has conducted a study on carbon footprint estimation using a life cycle analysis approach. Study analysis reveals that the burning of coal occupies the lion's share in the total carbon footprint of the plant. Studies have recommended green alternatives to achieve sustainability. (Morseletto, 2020) study proposes actions and policy execution based on the author's investigation of circular economy targets. The study demarcates that recovery and recycling may not promote a circular model, but rather insists on circular strategies. The author emphasizes that new and current targets could reduce waste, increase efficiency, close production loops, and maximize the retention of the economic value of materials and products. (Maria Barreiro Gen, 2020) has analyzed the implementation of the 4Rs in organizations with the help of a survey. The study highlights and reveals that organizations have a low level of use of 4R, more of reduce and recycle but repair and remanufacture is of less use. Results reveal that the practice of circular economy principles is not fully utilized, where there is a gap between practices and implementation. (Haigh, 2022) Preventing and reducing resource use and reusing materials in a global circular economy are key strategies to protect the Earth's environment, as well as its capacity to provide for current and future generations. A variety of metrics are needed to understand progress alongside valuable data, analysis, guidance, and examples. The Circularity Gap Report has provided insights on these topics over the past five years, and it continues to inform progress and the action required to accelerate the circular transition.

3. Methodology Study has referred to multiple sources. Data references were taken from Global Statista and Indstatista. Raw data were categorized and analyzed applying CAGR, graphical presentation were used to capture an immediate birds-eye view. Various models were re-designed based on an original reference made. Statistical tools like percentages and regression to test the relationship between the quantum of emissions and cumulative growth of sectors were analyzed.

4. Data Analysis This section will discuss the data analysis based on the framed objectives and supposition underlined. Firstly, global-level emissions are analyzed based on metric tonnes. Secondly, from the nation's perspective emissions are dissected. Over the years sector emissions have been studied to understand the correlation with industry as well increase in emissions. Further study has looked upon the need for extraction and exploitation of resources that leak CO₂ emissions. The details have been analyzed in the way emissions are embodied while taking, resource process, producing, and providing. Subsequent sections from 4.6 onwards explain the measures taken to combat emissions, in the last section details of government efforts based on budget allocation and scheme relevance are looked upon.

Country	Emission in CtCO ₂ e
China	15.7
USA	6
India	3.9
EU-27	3.6
Russia	2.6
Brazil	1.3
Indonesia	1.2
Japan	1.2
Iran	1
Mexico	0.8

Source: Statista World

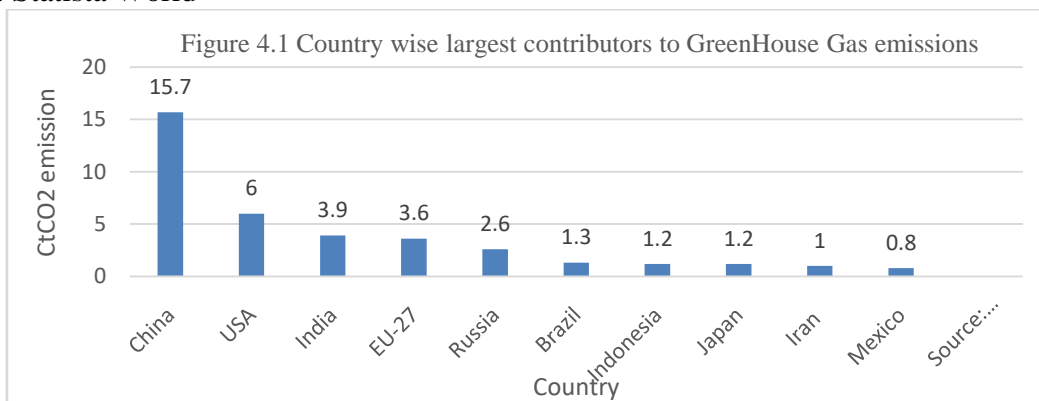
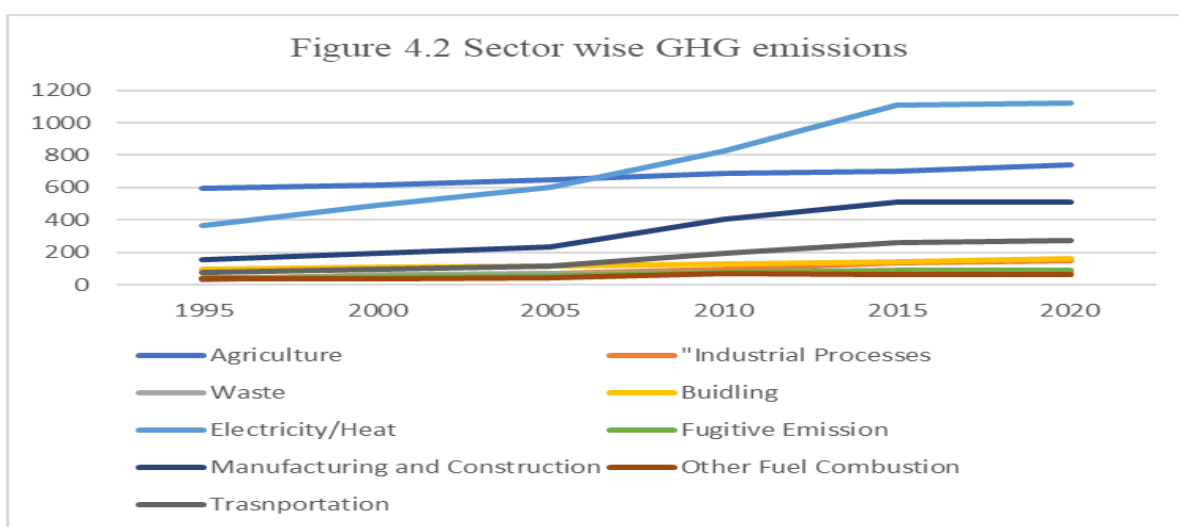


Table 4.1 discusses country-wide impacts due to emissions in million metric tons. India stands in the third position, while China is impacted with 15.7 billion tons. The reason is due to heavy reliance on coal, coal-fired power stations, coal mining, and blast furnaces producing iron and

steel. Other causes for the rise due to increased population, advanced industrial development, urbanization enormous power expansion, and electronics product manufacturing. The same is the situation with the USA, due to the increased use of GHG emissions and the rise in transportation. In India, due to the rise in CO2 are coal, oil, natural gas, and cement. While rest of the regions for low emissions are with the use of renewable and nuclear power energy.

Sector	1995	2000	2005	2010	2015	2020
Agriculture	599.03	617.43	647.21	690.93	703.94	741.92
Industrial Processes	37.39	57.48	71.39	100.08	135.89	149.37
Waste	32.9	61.62	67.98	74.34	79.89	85.35
Building	99.4	107.85	115.92	130.48	145.92	162.49
Electricity/Heat	366.55	493.44	602.88	823.81	1108.95	1121.98
Fugitive emissions	48.01	50.32	58.64	78.63	90.21	88.99
Manufacturing/Construction	159.05	195.1	236.27	403.34	509.88	509.45
Other Fuel Combustion	39.54	38.9	47.94	69.6	64.98	64.83
Transportation	80.3	97.52	118.48	197.84	264.4	276.44

Source: Statista World



Source: Statista World

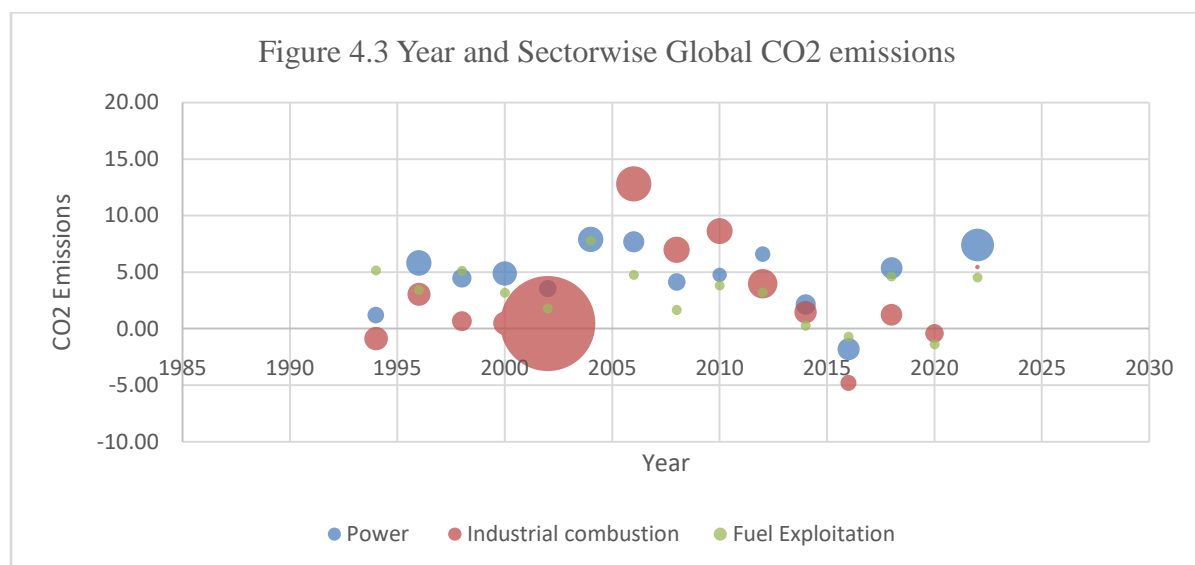
Table 4.2 narrates the trend of CHG emissions from the chosen nine sectors. Among all the highest contributors is electricity/heat, while agriculture is the second highest. The sequence of five years of data reveals, that there are mitigation measures adopted for waste, while those

fugitive emissions are mostly from factory operations due to gases and vapors that affect the environment in climate changes as well as pollution. Manufacturing and construction are also on the rise, due to an increase in urbanization and city development with high-rise buildings. Industrial processes cause anthropogenic activities, where human involvement affects the environment, like energy combustion of fuels in electric utility and transportation sectors, as well as treatment plants with land use change activities. Buildings cause natural carbon due to the purchase of electricity, and direct consumption of natural gas, and petroleum for heating and cooking.

Table 4.3 Sector-wise global emissions

Year	Power	Transportation	Industrial combustion	Industrial processes	Fuel Exploitation
1994	1.20	2.81	-0.89	5.56	5.16
1996	5.82	6.50	3.04	5.35	3.44
1998	4.47	3.68	0.66	3.89	5.13
2000	4.87	5.90	0.47	5.46	3.17
2002	3.54	3.04	0.44	90.61	1.80
2004	7.89	6.40	13.69	-793.94	7.79
2006	7.68	4.39	12.79	12.48	4.77
2008	4.13	3.07	6.98	6.90	1.67
2010	4.75	2.11	8.63	6.82	3.82
2012	6.58	2.46	3.97	8.69	3.22
2014	2.14	4.13	1.45	5.01	0.28
2016	-1.82	4.85	-4.80	2.55	-0.70
2018	5.36	4.75	1.22	4.70	4.62
2020	-4.56	-16.49	-0.42	3.49	-1.37
2022	7.40	10.88	5.45	0.20	4.53

Source: Statista World



Source: Statista World

Table 4.3 explains sectors-wise global emissions, while power and industrial combustion have been higher in 2000-05, subsequently, mitigation measures have been taken. Active initiatives have been adopted at the global level by organizations, with standardization and adoption. Transportation and industrial processes, industries have already complied with norms and rewards, to ensure policy mandate as well as effective in their developed and mandate structure implementation. Fossil fuel exploitation is on the rise due to man-made human activities, as well as due to burning heavy fossil fuel, deforestation, biomass burning, and heavy combustion release.

Social Needs	GT	End of use	
Mobility	17.1		
Housing	13.5		
Communication	3.5	42.8	CO2
Health care	3		
Services	6.4	11.2	CH4
Consumables	5.6	3.5	N2O
Nutrition	10	1.8	F cases

Source: Statista World

Table 4.4 reflects the social needs and extraction of resources. This exploitation and extraction is based on the take, resources, based on process, produce, and provide. Much of the resources are taken based on the total emissions embodied in each group. The following table will further substantiate the extent of total emissions from natural resource extraction that causes emissions.

Take	Resources	Process	Produce	Provide
Petroleum	Fossil Fuels- 38.4	Energy use in transport	Transport, fuel production, Transport fuels, vehicles	passenger transport, freight transport
Extraction, Natural Gas	Minerals- 1.6	Energy use in buildings	energy use in residential	energy use in residential, energy use in non-residential, material use to residential, material use in non-residential
Coal, sand & clay, stone, metal, wood, animals	Ores-1.2	Energy use in industry and food, cement, iron, steel and non-ferrous metals, chemicals, rubber, plastics, mineral use in buildings, wood products, food products	energy use in non-residential	
Mineral, ores, Forestry	Biomass- 16	Material used in buildings, metal ores	construction materials, electronics, machinery, and equipment	

Source: Statista World

Table 4.5 is connected to Table 4.4, which explains the need for analysis and emissions that are caused during the extraction and exploitation of resources. Social needs are growing in day-to-day demands. Table briefs on the total emissions under each group under petroleum, extraction of Natural Gas, Coal, sand & clay, stone, metal, wood, animals, mineral ores, and forestry. The framework of Take-Resource-Process-Produce-Provide, explains highest emissions are caused due to oil, and biomass, next is ores and minerals. The purpose of recurring use narrates the higher need and provision for utilization.

1971	4564.7
1981	7076.7
1991	11.62
2001	1913.1
2011	33447
2021	57104.7

Table 4.6 briefs on India’s carbon emissions needs actions and policy initiatives is the need of the hour. Numerical metric emissions have thickened the surface. During pre-expansion, CO2 was 155%,while post-open system, carbon emissions have further risen to 170%. This needs attention and initiative from policy to become a mandate. Companies prioritize based on overall policy and commit to zero emissions. Recent actions based on data reveal the initiatives undertaken by the government. From the following table, CO2 can be viewed, from two angles.

Year	Baseline emission	Post-implementation of CO2
2019-20	23	23
2021-22	25	24
2022-23	25	24
2023-24	26	21
2024-25	30	19
2025-26	36	14
2026-27	42	11
2027-28	49	11
2028-29	55	6
2029-30	60	6

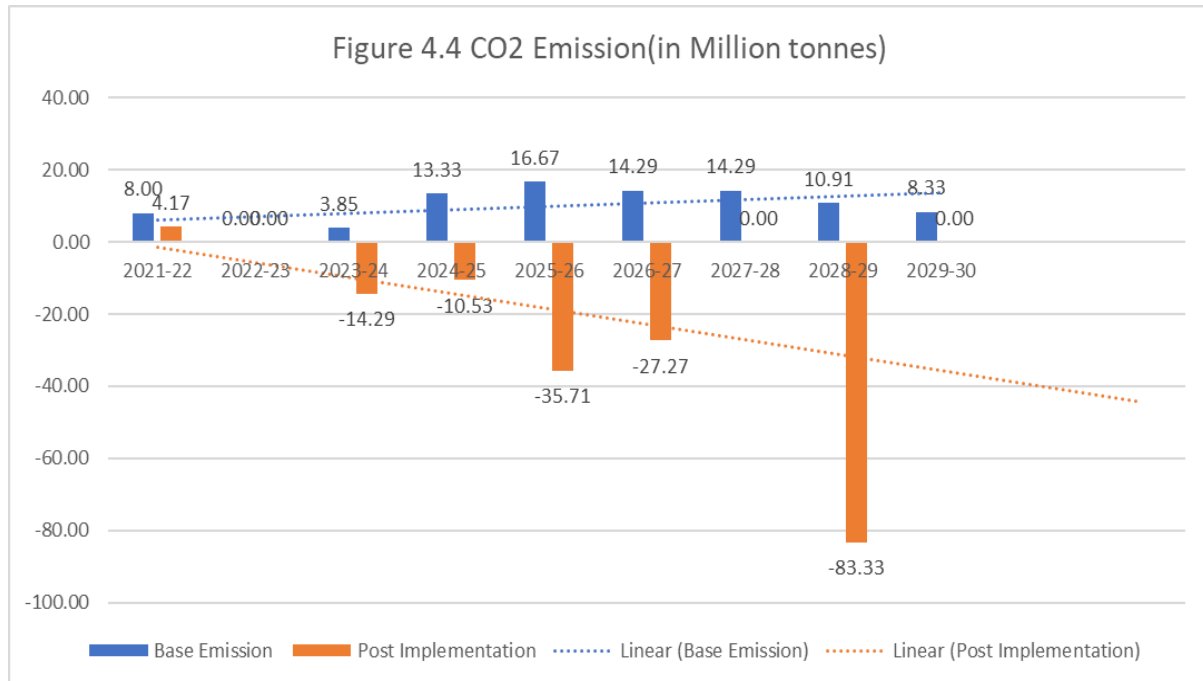
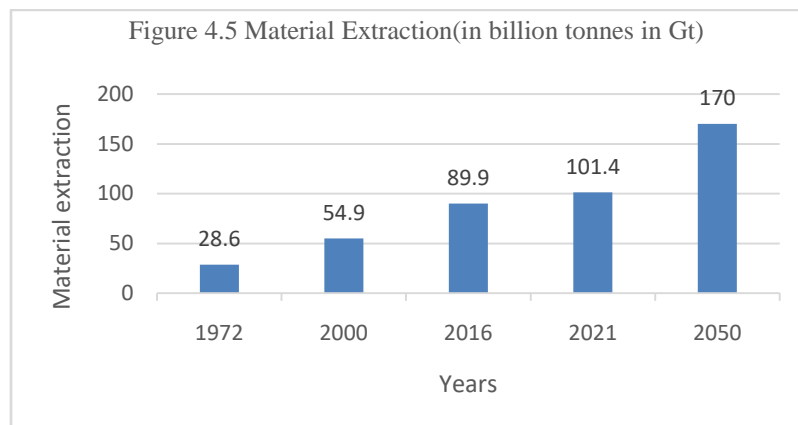


Table 4.7 explains before strategy and policy frame, it is essential to know the past emissions due to GHG. Baseline emissions in India occurred in the past, as of 2021-22 percentage rise is almost 8%, and planned to reduce to zero CO2. Effective strategies become essential to combat the environmental problem. Appropriate mitigation measures taken can reduce CO2, however alarming baseline emissions between 2025 and 2029 reflect that initiatives taken to control still need substantial effort. Post-control of CO2 compared to baseline illustration reveals a discrepancy in size, however, mitigation efforts have to continue concomitantly. India's efforts to combat emissions could be possible with active citizens-industry participation as well as stringent policy measures.

Year	Table 4.8 Material extraction (in billion tonnes in Gt)
1972	28.6
2000	54.9
2016	89.9
2021	101.4
2050	170

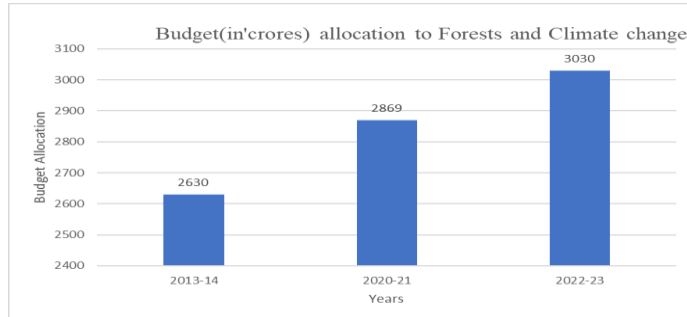


Source: India Budget Series, Research unit 2022-23

Table 4.8 explains over the years material extraction in billion tonnes. This could be a concern and an appropriate model adapted during policy structures and development could align 2030

commitment. The higher the extraction lower the need for the waste, these reverse thoughts, with focused financial plans can be one of the ways to combat the emissions. Through the 3Rs as well protective measures need to be made during the annual business plan. This could facilitate to meet the zero target by 2030.

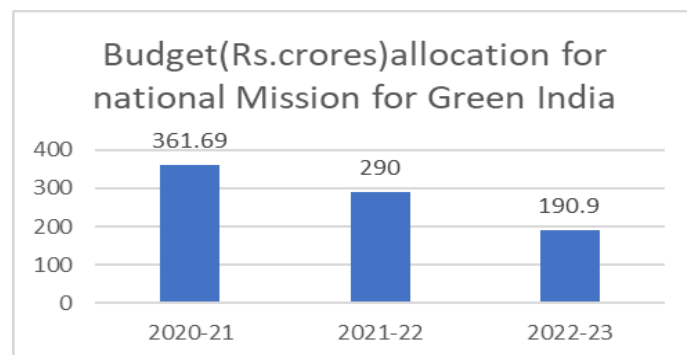
Year	Budget(₹.crores)
2013-14	2630
2020-21	2869
2022-23	3030



Source: India Budget Series, Research unit 2022-23

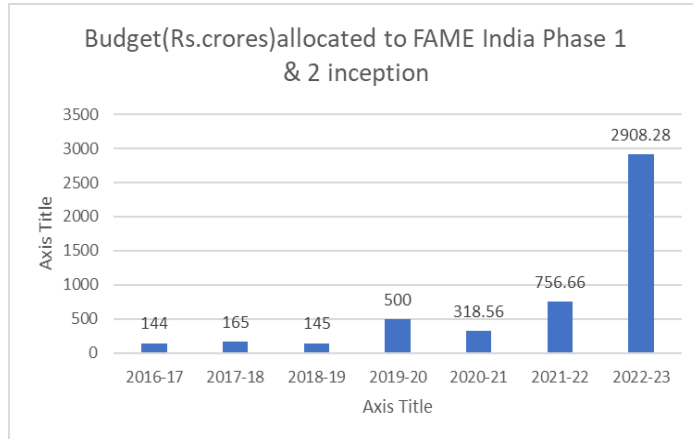
Table 4.9 briefs India’s breakthrough of net-zero commitment by 2070, is to enable through five new climate change targets announced by the Prime Minister of India, Mr. Narendra Modi. In the discussion consensus taken is that removing as many emissions of carbon dioxide from the environment as is emitted. India's four other commitments are by 2030, increasing non-fossil energy capacity to 500 gigawatts. Meeting 50% of energy needs from renewable sources. Reducing the carbon intensity of an economy by 45% and reducing total projected carbon emissions by One billion tonnes. Efforts here the Indian government has taken are based on India being the tenth largest country by forest area in the world, and gaining third rank globally, in average net gain in forest area between 2010-2020. India's forest with 7,13,789 sq km in 2021 an increase of 3.14% over 2011. Improvement in forest canopy density would improve conservation measures, afforestation measures, and protection activities. The budgetary allocation has a gap of 6 years.

Year	Budget(Rs. Crores)
2020-21	361.69
2021-22	290
2022-23	190.9



Source: India Budget Series, Research unit 2022-23

Table 4.10 explains the budgetary allocation for the National Mission for Green India. Over the years there has been a rise in allocation at a decreasing rate. The main objective is to protect, enhance, and restore India's falling foreign coverage. This mission under the umbrella of the national action plan on climate change has been launched to reduce the deleterious effect of climate change.



Year	Budget(Rs.crores)
2016-17	144
2017-18	165
2018-19	145
2019-20	500
2020-21	318.56
2021-22	756.66
2022-23	2908.28

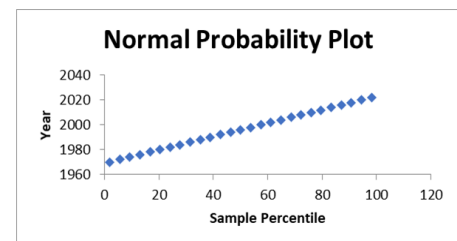
Source: India Budget Series, Research unit 2022-23

Table 4.11 explains the budgetary allocation for Faster adoption and manufacturing of hybrid and electric vehicles in India. To propel green India production link incentives for manufacturing high-efficiency modules prioritizing a shift from polysilicon to solar modules. Energy efficiency and saving for large commercial buildings through energy service company models and energy audits have been promoted. A sovereign green bond has been initiated to enhance government market borrowings. This would increase the potential and mobilization of resources.

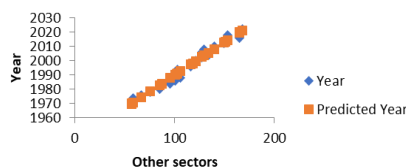
4.2 Analysis of Significance Relationship

Multiple R	0.98762
R Square	0.975392
Adjusted R Square	0.974408
Standard Error	2.539517
Observations	27

	df	SS	MS	F	Significance F
Regression	1	6390.771	6390.771	990.9487	1.23591E-21
Residual	25	161.2286	6.449145		
Total	26	6552			



Other sectors Line Fit Plot



The study has examined the sectoral emissions by applying statistical techniques based on regression. The influence of sectors listed in the study emphasizes that there is a 0.98 level of dependence year-wise and an R2 0.97 percentage of relationship that influences explanatory variables like usage, extraction, and exploitation of resources for various needs and purposes. The normality plot and scatter plot reveal that emissions based on year are exponential and there is linear growth in the sector-wise carbon emissions.

5 Organization's compliance and commitments towards zero carbon footprint.

Dalmia is the early cement company in the world to commit to a net zero and carbon-negative roadmap in 2018, Dalmia Bharat has boarded an innovative decarbonization growth curve. The firm has applied the circular economy model as a pedal to solve their product value. Dalmia Bharat has already planned and able to avoid 8.6 million tonnes of carbon dioxide (CO₂) emissions annually and desires to bring down CO₂ emissions further to 15 million tonnes per annum by the financial year 2027. Their commitment goes beyond the conservative "take, make, dispose" approach. It has instead, included a sustainable model that comprises recycling and reusing materials and energy resources within its production cycle. Substitutes for raw materials and fuels and waste heat are the three prongs of the company's circular economy model. Dalmia Cement has been able to achieve lower carbon emissions per unit of cement produced, which is a significant contribution to combatting climate change.

Mahindra Arise's action against carbon footprint has committed to carbon neutral by 2040, through energy efficiency and technology solutions. Mahindra Group continues to move towards a low carbon economy and is poised to deliver on its goals and targets that will help in achieving the landmark Paris Agreement. Key initiatives undertaken by Mahindra are ep100, carbon neutrality, and carbon pricing. Mahindra & Mahindra became the first Indian company to sign the EP100 program - a commitment to double the energy productivity by 2030, on a baseline of 2005 - and hope to make a strong contribution towards achieving the climate goals agreed upon at COP21. Mahindra has saved 58 million kWh of energy from more than 700 energy efficiency projects implemented in the past five years and Mahindra's carbon pricing leadership story was featured in the World Bank report.

6. Policy Initiatives taken for Indian attention

India's commitment by 2030 are

- Increasing non-fossil energy capacity to 500 Gigawatts (GWs),
- Fulfilling 50 percent of energy requirements from renewable sources,
- Reducing the carbon intensity of an economy by 45 percent, and
- Reducing total projected carbon emissions by One billion tonnes.

Environment sustainability can be achieved only through climatic change and India's energy requirement doubles in the next 20 years. In the focus of global brainstorming on climate change, on behalf of India, the Prime Minister presented the five nectar elements, Panchamrits, to deal with this challenge. One of them is for India to reach its non-fossil energy capacity of 500 GW by 2030. Secondly, India is to meet 50 percent of its energy requirements from renewable energy by 2030. Thirdly, India is to reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030. Fourthly by 2030, India to reduce the carbon intensity of its economy by less than 45 percent. Lastly, by the year 2070, India will achieve the target of Net Zero. These panchamrits will be an unprecedented contribution of India to climate action. He also added that the Indian railway system has set itself a target of making itself 'Net Zero' by 2030. This initiative alone will lead to a reduction of 60 million tonnes of emissions annually. A massive LED bulb campaign is reducing emissions by 40 million tonnes annually.

India has a revolutionary step in solar power, and the country has initiated the International Solar Alliance. This is a sensitive and vital initiative to save crores of lives. During the COP26 Summit

in 2021, India's PM proposed the One Word movement, which is the need of the hour, for all citizens to come together, with collective participation, to take Lifestyle For Environment (LIFE) forward as a campaign. This campaign is to become a mass movement in the country, to be mindful and deliberate mobilization, instead of mindless and destructive consumption. A significant image of the Government of India's strong commitment towards sustainable development is no single ministry is responsible for moving India towards net zero, the Environment, Forest and Climate Change (MoEFCC), Ministry of New and Renewable Energy (MNRE), and Ministry of Heavy Industries (which implements the Faster Adoption and Manufacturing of Hybrid & Electric Vehicles in India (FAME INDIA) scheme to promote electric vehicles), have largely been the driving force behind India's effort in this direction

7. Findings and discussion indicate there is a correlation between growth in GHG emissions with industrial progress. Efforts being taken by Indian organizations are commendable, as the national policy pressures on the environment concern as well global participation in congress parties. India has certainly put their effort into making it conducive, to ensure that environmental degradation is taken care of. Sector-wise concentration on sustainable issues has been executed to ensure zero emissions by 2030-70.

8. CONCLUSION

The study concludes that Indian government initiatives to combat CO₂ emissions are of recent attempt. Every budget emphasizes the mitigation measures, that are discussed in budget allocation and schemes in action. Observation goes a long way to examine whether India's efforts to mitigate harmful emissions by 2030-70. Figure 4.4 explains the policy effort put from base emission to post-linear implementation in zero-emission as a long-term goal.

9. Practical/ Research/Industrial Implications: Industrial undertakings have involved themselves with policy changes. Business organizations have embedded in their organization goals, policy development, and strategy to combat and adapt to sustainable measures. The circular system and circular economy have given clarity to move towards a green industrialization nation. Indian businesses could come up with a standardized proposal that carbon footprint can be mitigated.

10. Limitations: The study was undertaken based on secondary data. First-hand opinions from industrial undertaking could differ in their opinion and tasks involved. Business efforts in experiencing various hurdles while implementing the circular economy model. Details relating to costs, and department policy could be biased. While other functional operations would be a difficult task and a challenge. These could be some of the constraints that the study might not reflect the realistic facts.

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APPLICABILITY OF SPLITTING APPROACH FOR DECREASING UNEMPLOYMENT AND INCREASING LIFE TIME

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DOI: 10.5958/2249-7137.2024.00014.2

ABSTRACT

Unemployment, a persistent challenge in both developed and developing economies, represents more than just a statistic-it is a multifaceted issue with far-reaching social, economic, and individual consequences. At its core, unemployment reflects a mismatch between the supply of labor and the demand for workers within an economy. Unemployment is a pervasive and intricate global challenge that transcends borders, affecting nations of all sizes and economic standings, from developed powerhouses to emerging markets. Its tendrils extend deeply into the socioeconomic fabric of societies, casting shadows of uncertainty and disparity across diverse populations. It is imperative to embrace a multifaceted approach to address this pressing issue, recognizing its complexity and the diverse factors contributing to its persistence. Here this study discusses impact of 'splitting approach' to increase the job vacancies and to provide better life time for the workers. The study is conducted using an open questionnaire for workers from various sectors and through observation method by creating an artificial working condition.

KEYWORDS: *Splitting Approach, Unemployment, Life Time, Work Life Balance.*

INTRODUCTION

Unemployment stands as one of the most pressing challenges facing societies worldwide, with repercussions that transcend mere economic statistics, profoundly impacting individuals, families, and entire communities. At its core, unemployment represents a discord between the supply of labor and the demand for it within an economy, reflecting systemic inefficiencies, cyclical economic downturns, and structural shifts in industries. In the contemporary landscape, where globalization, technological advancements, and evolving labor market dynamics continually reshape employment patterns, understanding the multifaceted nature of unemployment and its far-reaching implications is paramount.

The impact of unemployment extends beyond economic parameters, permeating various facets of society and shaping individuals' livelihoods, aspirations, and well-being. Economically, high unemployment rates undermine consumer confidence and spending, dampen business investments, and strain government resources through increased welfare expenditures and reduced tax revenues. Moreover, unemployment engenders social dislocation, contributing to

heightened levels of poverty, homelessness, and social exclusion. Beyond material deprivations, prolonged unemployment can erode individuals' self-esteem, mental health, and social connections, exacerbating social inequalities and undermining social cohesion. As such, grappling with the complexities of unemployment demands holistic approaches that address not only economic factors but also social policies, education systems, and labor market dynamics to foster inclusive growth and mitigate its adverse impacts on society.

Here this study deals with a remedial measure for unemployment by way of increasing job vacancies by increasing working shifts (splitting) through decreasing working hours. The concept of decreasing working hours while increasing shifts involves a redistribution of labor hours to accommodate more workers within the existing framework of employment. This approach offers several potential merits, particularly in terms of increasing job opportunities, which can have positive implications for both individuals and society at large. By decreasing the number of hours per shift, companies can make part-time or flexible work arrangements more feasible. This allows individuals who may not be able to commit to traditional full-time employment due to personal responsibilities or preferences to participate in the workforce. For example, parents with childcare obligations, students pursuing education, or individuals with other commitments can find employment opportunities that fit their schedules. Consequently, this approach widens the pool of available workers and creates more job openings for those seeking non-traditional work arrangements. The increasing shifts within a given timeframe can lead to greater workforce participation and utilization. By condensing work hours into shorter shifts, companies can ensure that facilities and resources are operational for more extended periods, thereby maximizing efficiency and productivity. This can translate into higher output without necessarily increasing labor costs significantly. Moreover, with more shifts available, companies may need to hire additional staff to cover these expanded operating hours, thereby creating more employment opportunities and reducing unemployment rates in the community.

STATEMENT OF THE PROBLEM

This study deals with the splitting approach that tackle unemployment is crucial due to its potential to revolutionize labor market dynamics. By exploring innovative strategies like decreasing working hours while increasing shifts, employers can assess their viability in addressing modern workforce needs and economic challenges. This examination is particularly pertinent in the context of evolving employment preferences, technological advancements, and economic uncertainties. Understanding the applicability of splitting approaches offers insights into how labor market policies can be adapted to promote inclusivity, flexibility, and sustainable employment. It enables policymakers to develop targeted interventions that cater to diverse demographic groups, such as caregivers, students, and those seeking part-time work. Additionally, this study foster creativity and adaptation in labor market practices, driving progress towards more resilient and equitable economies. Ultimately, by examining the feasibility and outcomes of shifting approaches, researchers and policymakers can contribute to shaping a future where employment opportunities are more accessible, adaptable, and supportive of individuals' evolving needs and aspirations..

Objectives of the study

- Evaluate the practicality and effectiveness of implementing a splitting approach to address specific employment contexts and assess its potential applicability in diverse socio-economic settings.

- Investigate the advantages of implementing a splitting approach to address employment challenges.
- Examine the limitations and disadvantages associated with the adoption of a splitting approach in addressing employment issues.

RESEARCH METHODOLOGY

The present study designed as descriptive one based on primary and secondary data. A sample of 120 workers from various sectors such as IT, Mechanics, Medical and Services from Kerala state conveniently selected and the primary data collected from them using structured open questionnaire. The secondary data obtained through websites, journals etc. The observation method also used by creating an artificial working condition in PNP Pvt. Ltd., a call service centre in Kannur.

DISCUSSION

The description draws from both the open responses gathered through questionnaires and observations made in simulated work environments are as follows;

The splitting approach refers to a strategy where the total work time for a job is divided into two shifts, typically of equal duration, thereby effectively doubling the number of job vacancies available. In this approach, each shift covers a portion of the total work hours required for the job. By implementing the splitting approach, the number of working hours per shift is reduced by half compared to a single shift system. Consequently, the remuneration or wages for each worker are adjusted accordingly, reflecting the reduced working hours.

The splitting approach optimizes workforce utilization by dividing the total work hours into two shifts, effectively creating more job vacancies without increasing overall labor hours. Each shift covers a portion of the workload, allowing for greater flexibility in scheduling and accommodating a larger workforce. By halving the working hours per shift compared to a single shift system, employees benefit from improved work-life balance and reduced fatigue. However, remuneration or wages are adjusted to reflect the reduced hours worked per shift, maintaining fairness and equity within the workforce. This strategy fosters adaptability for businesses, enabling them to meet fluctuating demand without drastically altering their staffing levels. Additionally, the splitting approach can contribute to increased employment opportunities, reduced stress levels among workers, and potentially enhanced productivity due to better-rested and more motivated employees. Overall, by balancing the needs of employers and employees, the splitting approach offers a practical solution for maximizing workforce efficiency while prioritizing employee well-being.

Applicability of splitting approach

Workplaces implementing the splitting approach typically share common features such as shift-based operations to cover extended hours or fluctuating demand, flexibility in scheduling to accommodate individual preferences and needs, and a dynamic workforce consisting of full-time, part-time, and/or temporary employees. These workplaces often operate for continuous or extended hours, requiring coverage during evenings, nights, weekends, or holidays. They prioritize adaptability to demand fluctuations, necessitating quick adjustments in workforce structure without compromising productivity or customer service. Effective communication channels between management and employees are crucial to address scheduling concerns and

foster a positive work environment. Despite the non-traditional scheduling arrangements, these workplaces emphasize promoting work-life balance and employee well-being through support programs and resources.

The splitting approach is applicable in various situations across industries, especially where there's a need for flexibility in scheduling and managing workforce capacity. Here are some scenarios where this approach can be particularly beneficial:

Service Industries: Businesses such as restaurants, hotels, and retail stores often experience fluctuating demand throughout the day. Implementing split shifts allows them to align staffing levels with peak hours while avoiding overstaffing during quieter periods.

Manufacturing: In manufacturing plants with continuous operations, dividing the work into two shifts can ensure round-the-clock production without exhausting employees with long hours. It also facilitates maintenance and equipment downtime without interrupting overall output.

Healthcare: Hospitals, clinics, and emergency services require 24/7 staffing to provide continuous care. Split shifts enable healthcare facilities to maintain adequate staffing levels while accommodating staff preferences for flexible scheduling.

Customer Support: Companies offering customer support services may operate multiple shifts to provide assistance across different time zones. Split shifts allow them to cover extended hours efficiently while ensuring that employees have sufficient rest between shifts.

Transportation: Industries like logistics and public transportation often require operations around the clock. Split shifts enable companies to manage driver schedules effectively while ensuring compliance with regulations regarding driving hours and rest periods.

Education: Educational institutions, such as schools and universities, may offer split shifts for teachers and administrative staff to accommodate varied class schedules and extracurricular activities.

Merits of splitting approach

There are so many benefits with introducing the splitting approach in work place.

Increased Job Opportunities: By dividing work hours into multiple shifts, more job vacancies are created, providing opportunities for more individuals to gain employment.

Enhanced Flexibility: Split shifts allow for greater flexibility in scheduling, accommodating employees' preferences and personal commitments. This can lead to improved work-life balance and job satisfaction.

Reduced Fatigue: Shorter shifts can mitigate employee fatigue compared to long, continuous shifts, leading to higher productivity, better decision-making, and improved safety outcomes.

Improved Productivity and quality of outputs: With reduced fatigue and enhanced job satisfaction, employees may be more motivated and productive during their shifts, leading to increased overall efficiency and output.

Better Utilization of Resources: Split shifts enable businesses to better match staffing levels with demand fluctuations, optimizing resource allocation and minimizing idle time.

Cost Savings: While remuneration per hour may decrease due to shorter shifts, overall labor costs may remain stable or decrease due to potential productivity gains and reduced absenteeism.

Adaptability to Business Needs: The splitting approach allows businesses to adjust staffing levels more easily in response to changes in demand, helping them remain competitive and agile in dynamic markets.

Employee Satisfaction and Retention: Offering split shifts can improve employee satisfaction and retention by providing more options for work schedules and accommodating diverse lifestyles and needs.

Ideal for Part-Time Job Seekers: Split shifts are particularly attractive to individuals seeking part-time employment or those with multiple commitments, such as students, retirees, or individuals with other part-time jobs. It provides them with the opportunity to earn income while still accommodating their other responsibilities.

Facilitates Work-Life Balance and Enjoyment: With more time available outside of work hours, employees on split shifts have greater opportunities to pursue hobbies, spend time with family and friends, engage in recreational activities, or simply relax and unwind, leading to improved overall well-being.

Supports Care giving Responsibilities: Split shifts can be advantageous for employees who are caregivers for children, elderly parents, or individuals with special needs. It allows them to fulfill their care giving duties while still maintaining employment, providing financial stability for their families.

Enables Educational Pursuits: For individuals pursuing further education or skill development, split shifts offer the flexibility to attend classes, workshops, or training programs during non-working hours. This enables employees to invest in their personal and professional growth without sacrificing their employment.

Demerits of splitting approach

Along with the benefits there are some struggles that attached to the splitting approach.

Increased Cost of Training: Implementing split shifts may require additional training for employees to adapt to new schedules, procedures, or responsibilities. This can result in increased training costs for employers, including expenses related to trainers, materials, and time away from regular duties.

Opposition from Trade Unions: Trade unions may oppose the implementation of split shifts due to concerns about potential negative effects on workers, such as reduced wages, disrupted work schedules, or increased work-related stress. This opposition can lead to conflicts between employers and labor representatives, affecting workplace harmony and productivity.

Opposition from Existing Workers: Existing employees who are accustomed to traditional work schedules may resist the introduction of split shifts, fearing changes to their working conditions, income, or job security. Resistance from these workers can lead to morale issues, decreased motivation, and interpersonal conflicts within the workplace.

Reduced Income: Since each shift covers only half of the total work hours, employees working split shifts may experience a decrease in their overall income compared to those working full-time hours. This reduction in income can be challenging for individuals who rely on steady earnings to meet their financial obligations.

Limited Career Advancement: Split shifts may limit opportunities for career advancement or progression within the organization. Employees working part-time hours may have fewer chances for promotions, raises, or access to benefits compared to full-time employees.

Increased Commuting Costs: Employees working split shifts may incur higher commuting costs, as they may need to travel to and from work multiple times per day. This can lead to additional expenses related to transportation, such as fuel, public transportation fares, or parking fees.

Difficulty in Coordination: Split shifts can present challenges in coordinating work schedules and communication among employees, especially if there are different teams or departments working on different shifts. This can lead to inefficiencies, miscommunication, and difficulty in maintaining cohesive teamwork.

Impact on Work-Life Balance: While split shifts offer flexibility, they can also disrupt work-life balance by requiring employees to work non-standard hours, including evenings, nights, or weekends. This may affect personal relationships, social activities, and overall well-being.

Potential for Burnout: Working irregular or unpredictable shifts may increase the risk of burnout among employees, particularly if they are unable to establish consistent routines or sufficient rest periods between shifts. This can negatively impact employee morale, job satisfaction, and long-term retention.

Legal and Regulatory Considerations: Depending on local labor laws and regulations, employers may face compliance challenges related to scheduling, overtime pay, and employee rights when implementing split shifts. Failure to adhere to legal requirements can result in legal disputes, fines, or reputational damage.

CONCLUSION

The splitting approach is important in current scenario because it increases job vacancies, enhances workforce flexibility, and improves employee satisfaction. By dividing work hours into multiple shifts, it accommodates diverse scheduling needs, such as part-time employment and care giving responsibilities. This approach also optimizes resource utilization, allowing businesses to adapt to fluctuating demand and reduce labor costs. Moreover, it fosters a better work-life balance for employees, leading to increased productivity and retention. Overall, the splitting approach plays a crucial role in creating opportunities for employment, supporting employee well-being, and promoting organizational efficiency.

The splitting approach offers a viable strategy for increasing job vacancies, improving workforce flexibility, and enhancing employee satisfaction in various industries. However, it also presents several demerits and challenges that employers must carefully consider and address. While split shifts can provide opportunities for part-time job seekers, support work-life balance, and facilitate care giving responsibilities, they may lead to reduced income, limited career advancement, and increased commuting costs for employees. Moreover, implementing split shifts can incur additional training expenses, face opposition from trade unions, and meet resistance from existing workers accustomed to traditional schedules.

Despite these challenges, organizations can mitigate the negative impacts of the splitting approach by implementing effective communication strategies, providing adequate training and support, and addressing concerns raised by employees and labor representatives. By balancing

the advantages and disadvantages of split shifts, employers can maximize the benefits of this approach while ensuring the well-being and satisfaction of their workforce.

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