KINNAIRD COLLEGE FOR WOMEN, LAHORE

SINO-US HIGH-TECH COMPETITION IN INDO-PACIFIC: A CRITIQUE ON THE USE OF ARTIFICIAL INTELLIGENCE IN HIGH SEAS (2010-2022)

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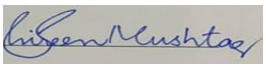

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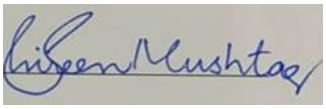

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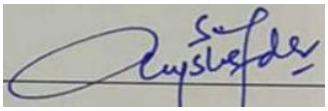

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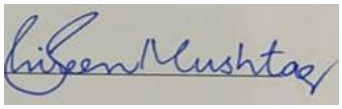
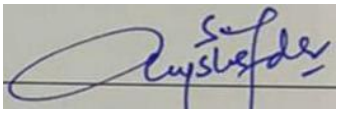
Signature of Supervisor: 

Signature of Head of Department: 

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ABSTRACT

At the turn of modern millennium, technology has obtained grounds in international politics. In this regard, the significance of Artificial Intelligence has gained momentum for Great Powers. The rise of China, as potential competitor to the US, marked the re-emergence of Great Powers competition in Indo-Pacific region. The Great Powers' rivalry with respect to high-tech dimension, in order to gain technological supremacy over its competitors and to become the Global centers of AI innovation. This research underlines the competitive paradigm of Sino-US rivalry in leading technologies such as AI, quantum computing and biotechnology. Moreover, in this research, structural realism would explain the surging High-Tech competition among major powers of Indo-Pacific. In addition, research aims to investigate the Sino-US AI based competition in Indo-Pacific and to analyze the deliberate use of AI for naval dominance in high seas. Furthermore, research speculates the profound implications for other regional stakeholder in Indo-pacific. The significance of the study lies in its critical analysis of the use of AI on high seas and limitations of international law. The methodology used in this research is mixed methodology. The type of research is exploratory and descriptive ones. Lastly, research provides the analysis that in terms of AI based maritime competition, despite China has attained bigger naval fleet with naval modernization efforts over few past decades, but still US outpaced and outplayed Chinese bigger fleet with more technologically advanced and powerful naval vessels and platforms.

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LIST OF ABBREVIATIONS

ACTUV	**ANTI-SUBMARINE WARFARE CONTINUOUS TRAIL UNMANNED VESSEL**
AI	**ARTIFICIAL INTELLIGENCE**
ASW	**ANTI-SUBMARINE WARFARE**
BRI	**BELT ROAD INITIATIVE**
DOD	**DEPARTMENT OF DEFENSE**
GDP	**GROSS DOMESTIC PRODUCT**
LAW	**LETHAL AUTONOMOUS WEAPONS**
MDUSV	**DISPLACEMENT UNMANNED SURFACE VEHICLE**
PLAN	**PEOPLE'S LIBERATION ARMY NAVY**
QUAD	**QUADILATERAL SECURITY DIALOGE**
SCS	**SOUTH CHINA SEA**
UAV	**UNMANNED AERIAL VEHICLES**
UNCLOS	**UNITED NATIONS CONVENTION OF THE LAW OF THE SEA**
USA	**UNITED STATES OF AMERICA**
USV	**UNMANNED SURFACE VEHICLE**
XLUUV	**EXTRA-LARGE UNMANNED UNDERSEA VEHICLE**
XLUUV	**EXTRA-LARGE UNMANNED UNDERSEA VEHICLE**
QUAD	**QUADRILATERAL SECURITY DIALOGUE**
TTP	**TRANS-PACIFIC PARTNERSHIP**
RECP	**REGIONAL COMPREHENSIVE ECONOMIC PARTNERSHIP**
FTAAP	**FREE TRADE AREA OF THE ASIA-PACIFIC**
NSIB	**NATIONAL SECURITY INNOVATION BASE**

IPEF	**INDO-PACIFIC ECONOMIC FRAME FOR PROSPERITY**
USICA	**UNITED STATES INNOVATION AND COMPETITION ACT**
DCCP	**DIGITAL CONNECTIVITY AND CYBER SECURITY PARTNERSHIP**
SSN	**SUBMARINE SHIP NUCLEAR**
DSR	**DIGITAL SILK ROAD**
IDSA	**INSTITUTE OF DEFENSE STUDIES AND ANALYSES**
STEM	**SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS**
JIIA	**JAPAN INSTITUTE OF INTERNAL AFFAIRS**
SCS	**SOUTH CHINA SEA**
USEIA	**US ENERGY OF INFORMATION ADMINISTRATION**
AIIB	**ASIAN INFRASTRUCTURE INVESTMENT BANK**
OECD	**ORGANIZATION OF ECONOMIC COOPERATION AND DEVELOPMENT**
PISA	**PROGRAM FOR INTERNATIONAL STUDENTS ASSESSMENT**
FONOP	**FREEDOM OF NAVIGATION OPERATION**
VC	**VENTURE CAPITAL**
ICT	**INFORMATION AND COMMUNICATIONS TECHNOLOGY**
CDI	**CENTER OF DATA INNOVATION**
QIS	**QUANTUM INFORMATION SCIENCE**
ASEAN	**ASSOCIATION OF SOUTH EAST ASIAN NATIONS**
NDRC	**NATIONAL DEVELOPMENT AND REFORM COMMISSION**
R&D	**RESEARCH AND DEVELOPMENT**
GPS	**GLOBAL POSITIONING SYSTEM**
GIS	**GLOBAL INFORMATION SYSTEM**

NIST	**NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY**
UNCLOS	**UNITED NATIONS CONVENTION OF THE LAW OF SEA**
ISR	**INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE**
ISA	**INTERNATIONAL SEABED AUTHORITIES**
DARPA	**DEFENSE ADVANCED RESEARCH PROJECT AGENCY**
RSE	**REMOTE SENSING OF ENVIRONMENT**

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CHAPTER 1

INTRODUCTION

The Indo-Pacific region is the most dynamic geopolitical area of the world that comprises the maritime areas of the Indian and the Pacific Oceans along with littorals of East Asia. It has emerged as the economic, political and strategic hub of the world. The world's largest economies such as the US, China and Japan have Pacific littorals and the seven largest standing armies are there. The Indo-Pacific generated 60 percent of GDP, 25 percent of sea trade and is home to 60 percent of the world population. The geographical construct made it a consequential region for the powerful states. It has become the central theater of world politics as two major powers are at odds in this region. The US and China are competing for their strategic interests. Both the states are formulating policies and strategies to encounter each other's influence. The growing clout of China with hegemonic ambitions in this region is alarming for the United States. The assertive maritime claims of China to dominate the strategic choke points, significant waterways under the flagship of Belt and Road Initiative (BRI) to have vast access to the oceans is challenging the long standing of the United States in the Indo-Pacific. The role of the US web of alliances such as QUAD and AUKUS is important. The Open and Free Indo-Pacific strategy seems an indirect containment of the influence of the BRI project of China. Such Sino-US competition in Indo-Pacific is transcending into an artificial intelligence-based competition.

The 21st century is marked by incessant technological revolution. Artificial intelligence (AI) is used extensively from narrow to the general range with various levels of sophistication. Artificial intelligence pertains to the replication of human intelligence in machines that are designed to simulate human brain power. It refers to the traits of perception, learning, reasoning, adapting and problem-solving in machines without human assistance. The deliberate use of AI and high technology generates competition among the heavyweights of the world. In terms of high-tech competition between the US and China, both aimed at AI supremacy and aspired to be the innovation centers of the world. The ambition of both adversaries is not only to equate but to overtake AI-based capabilities. This competition is analyzed through the lens of structural realism.

Structural realism has two offshoots, offensive realism and defensive realism. Survival and domination are speculated as to the central idea of defensive and offensive realism. The Structural Realist school of thought analyzes the inherent strategic competition of Sino-US that seems to be shifted from a defensive realist manner to an offensive posture. The uncertainty and structural and material factors of the anarchic system are shaping the state's behavior. The strategic behavior of both the states is driven by their grand strategy ambitions, security and power maximization. The current dynamics portray the quest to surpass one another in AI supremacy. The AI-based naval modernization to acquire the maritime dominance and protection of Sea Lanes of Communication has become the main focus of powerful navies. The presence of a great percentage of the US fleet with its allies in the Indo-Pacific is to attain a greater degree of control. The high-tech transformation of the People's Liberation Army Navy (PLAN) of China is posing a major challenge to America's control over the blue water oceans. The US and China are expanding their influence in the Indo-Pacific through AI-powered naval vessels to achieve maritime superiority. Both the states are building offensive and defensive AI capabilities, strategies and plans to attain naval might.

This study has focused on the Sino-US rate of adoption of AI technology and automation of platforms to acquire maritime superiority and its implications for other stakeholders of the Indo-Pacific region. The supremacy in the maritime environment is the landmark of dominance and the quest to dominate global commons (especially high seas) through AI-based systems have become a matter of great importance. The US-China competition made this region an epicenter of turbulence which raised the security concerns of other states. The regional stakeholders of the Indo-Pacific are also taking measures to promote and collaborate on AI-based technologies to protect their national interests.

1.1 Significance of the Study

This research is a combination of exploratory and descriptive research. This study has analyzed the dazzling high-tech Sino-US competition in the Indo-Pacific region. It emphasized the importance of artificial intelligence as it has become a dynamic source of power. This research is significant to develop a comparative analysis of the AI-based naval modernization of the US and China. It has highlighted the profound impact of AI utility by US-China to acquire maritime superiority. This study also explored the implications and ubiquity of AI technology in the high seas. It has underlined profound challenges and Implications for other states of the region.

1.2 Purpose and Design

1.2.1 Aims and Objective of the Study

- To understand the political and strategic importance of the Indo-pacific region.
- To investigate the purpose of Sino-US high-tech competition through the Structural Realist approach and analyze their naval modernization in Indo-pacific.
- To explore the profound implications of AI in the maritime competition of the high seas.
- To comprehend the challenges and Implications of AI for other stakeholders of the Indo-Pacific region.

1.2.2 Research Question

- What is the political and strategic significance of the Indo-Pacific region?
- How Sino-US indulgence in high-tech competition in Indo-Pacific can be analyzed through the lens of Structural Realism?
- What is AI and how does it play its role in maritime competition in the high seas?
- How the use of AI by the US and China is posing challenges to the other stakeholders of the Indo-Pacific region?

1.3 Nature of the Study

A mixed method of research that combines both qualitative and quantitative data has used for this research study. It is exploratory and descriptive research that deals with the questions of what and how. For this purpose, the data has been collected from secondary sources such as books, journals and journal articles. Some primary sources such as official reports and documents of the government e.g. Department of Defense, China Maritime Studies Institute, has also been consulted. The duration of this research is from 2010 to 2022.

1.4 Literature Review

Kai He and Mingjiang Li analyze the emergence of BRI as the fundamental part of China's grand strategy and its influence on the security with the major players of the Indo-Pacific. The political and strategic notion of Indo-pacific came into the wordbook of the foreign policy of the leading powers in 2010. The US strategy of Open Indo-Pacific is a containment attempt

against China's rise in Eurasia and Indo-Pacific. Beijing views this strategy as US-dominated and to avert BRI. To secure its economic interest, China is also modifying its security policy with an increasing role of the military. This article interpreted that economic ambitions are the driving force behind the geopolitical contest among the powers. It speculates the contest between BRI and the construct of Free and Open Indo-Pacific is leading toward the Thucydides trap. The only possible solution is to convert BRI into a multilateral platform with the equal engagement of the regional and extra-regional players (He & Li, 2020).

Gordon Chang in his book *The Great U.S.-China Tech War* illustrates that the US and China indulged in a cold war of technology. Whoever wins this contest of technological arms race will dominate the 21st century. A decade earlier, China was not considered compatible enough but is now speculated as a leading tech figure. China as the powerhouse of technology with its disciplined approach surpassed the US but still, the US can cope. As the US opens many war fronts and is not able to meet the Sino-tech challenges. A biased view depicted that China not only equates but overtakes in technological dimensions. It predicted the influence of communists over the communication system and called for the US to contain it. The fact is the US is again in a cold war scenario, either it will cope up the pace or will be left behind (Chang, 2020).

Satoru Mori examines the shift in the US approach from cooperation to confrontation toward China which describes as great power competition. The core of this contest is technological superiority. The center of this rivalry is to dominate the next generation technological dimensions of industrial, financial, digital information and military power. It speculates that if the Trump-Xi deal is made, it will not diffuse technological dimensions. It will only handle some industrial aspects and alleviate the Sino-US trade war. This study depicts China's struggle to dominate and the US response as an antidote. One dimension of this competition is ideology; liberal democratic model vs state authoritarianism. The successful rise of China led the US to shift its posture to competition. Beyond the moral imperatives or irrational Chinese policies, this dyadic contest is to gain technological supremacy to win the 21st century (Mori, 2019).

Phillip Saunders and Julia Bowie track the ups and downs in US-China relations. It principally analyzes military-to-military relations that are influenced by bilateral political relations. It faced confrontation from 2000 to 2010 and cooperation after 2012. The first part views China's efforts for unprecedented power and strong military ties. The second part credited leaders' efforts and China's struggle for this military cooperation. The third part highlights the constraints of bilateral political ties and the lack of mutual trust that leads to military interaction. A sustainable strategic interaction faced politically imposed obstacles from both

sides. A bigoted view described the US as a facilitator or an obstructer of the state's ambitions, sustaining an upper hand in international politics. It concludes that both countries pursue an ambiguous relationship with limited cooperation and reduced escalation under certain circumstances (Saunders & Bowie, 2016).

Kenneth Payne illustrates a transdisciplinary analysis of how humans perform strategy and its evolution. All the things from the theory of mind to artificial intelligence are edifying. The general assumption is that the cyborg will have the capability to make decisions just like humans. But the author takes exception that the decision-making process is a biologically human phenomenon. The book defines the nature of war through the lens of history in which two adversaries deliberately use violence either by maintaining the large infantry or by using the tactics of deception and surprise. The strategy to defeat the enemy requires rational decision-making that is elaborated by the theory of mind. It has generalized the history only based on western culture and its impact on strategy. Starting with Thucydides and the hoplite revolution, society and technology were linked with mutualism. Then recalls Clausewitz's notion that psychology matters in strategy. The force generation idea shifted to deterrence with the advent of nuclear weapons. The author refers to the Cuban missile crisis where the theory of mind was indispensable. It is argued doubtlessly that hybrid AGI-human is still subject to man's decision-making power of the mind (Payne, 2018).

James John re-examines the catalytic nuclear war concept of the Cold War period and re-conceptualizes it with AI technology. The misuse of technology by third parties to acquire nuclear weapons can exacerbate the conflicting scenario between nuclear adversaries. It highlighted the intersection of emerging technology with nuclear weapons in the age of AI. The article brings up the question that is there any compliance between AI and existing military notions of escalation or deterrence. The author portrays the fictional situations to demonstrate that the exploitation of AI-based weapons by non-state actors can lead to war between nuclear dyads in competition. The last section emphasizes the possible ways to curtail the escalation risks, reducing human and technological errors. AI-based weapons depending on the use can escalate or deter the use of force (Johnson, 2021).

Audrey Kurth Cronin investigated how the diffusion of lethal technology is drastically impacting society and empowering rogue actors. The closed military innovations shifted to open innovations in the 21st century reshaping future warfare. The core argument of this book is about disruptive technology that is easily accessible and cheaper for the general public. The author exemplified the misuse of dynamite and the AK-47 rifle by crime groups, rouge actors or insurgents that have wreaked havoc. Such inventions were to facilitate but repurposed for

mass violence. The rouge actors like ISIS misused AI technology. This book draws an insightful American history, inventors and adversaries' action methods of combat. The last sections lost relevance with the core argument. It called inventors to foresee the misuse of open inventions. The malign applications must be counter strategically by governments (Cronin, 2019).

Daniel Wagner signifies the shift of conventional terrorism to virtual terrorism spread beyond borders in the digital age. Wagner in his pioneering work about virtual terror illustrates the threat of cyberwar to global governance, security and civilian safety. The author penned down the serious subject of hacking the nuclear stations by terrorists with cyber technology. It predicted the Third World War would be a cyberwar. Virtual terror is not only limited to cyber or bio-warfare but has plausible implications for drones and artificial intelligence. A thought-provoking analysis of anonymous and borderless virtual terror posing threats to a globally connected world. The book also calls for cybersecurity and the management wings of the governments to tackle the grave situation (Wagner, 2017).

P.W. Singer investigates the rapidly changing world with technological revolutions that not only reshape the conduct of wars but generate ethical concerns. The author traces the roots of the contemporary revolutionary age to the age of invention in the 18th century. The wave after wave of modern inventions and technology leads to killer applications. The brilliant achievements of technology made it difficult to accentuate the ethical ramifications of killer applications. The underlying issues are unclear laws of conventions, the role of think tanks, research laboratories and their funding sources, disagreement of cross-culture values that sparks the conflict, the use of combat systems to overcome the geographical and temporal distance dilemma and the mystical power of emerging technologies. The exponential growth of killer applications posed daunting challenges but we must face these primary issues and try to overcome them (Singer, 2010).

The author illustrates that highly advanced technological robots, drones and automated systems become ubiquitous on land, air, high seas and everyday life. The unmanned combat weapons used in Global War on Terrorism traced back to World War I and II. The technology evolved from a converted manned system to a fully autonomous system that can remotely target without any formal war. It focuses on the demand for drones' deployment in naval spheres for multi-dimensional operations. The further debate focuses on modern drone programs of global powers at the macro level. It also speculates that drone proliferation in the hands of non-state actors can pose serious challenges. This book emphasizes the ethical and legal standards of using drones in the Naval sphere. Then blended it with an optimistic view that autonomous

systems may take rational decisions in the future. This book presents a multifaceted approach to the drone system and its proliferation is generating concern for the military stakeholders, national security analysts and policymakers (Jackson, 2018).

Monika Chansoria analyzes the letter of researchers that convened a ban on offensive autonomous weapons. The suggested ban is not on already deployed autonomous systems because they are classified as defensive tools. It includes various autonomous systems in the US, Germany and Israel. It warns about the use of autonomous weapons in asymmetric and unconventional conduct of the war by non-state actors. India is described as a country where non-state actors have leverage over military and democratic nations but autonomous weapons can change this equation. However, no such autonomous weapons exist that have moral imperative judgment and human intelligence. There is a hope that future technology may surpass human intelligence and make ethical decisions. The author favors the regulation of autonomous weapons with improved programming rather than prohibition. The legitimate use of technology can reduce the grave risks of collateral damage (Chansoria, 2016).

CHAPTER 2

THEORETICAL FRAMEWORK

2. Introduction

Over the course of last two decades, strategic competition between the United States and the People's Republic of China (PRC) has more inclined towards high-tech competition in International Relations. The technological aspect of the US-China competition is a struggle for power projection through techno political sphere of influence. The Indo-Pacific region is the most dynamic geopolitical area that has emerged as the economic, political and strategic hub of the world. Indo-Pacific is a gateway for both powers to expand their influence as leading superpowers. With increasing technological competition, Artificial Intelligence has become the new frontier. The quest to attain power to dominate global commons (especially high seas) through AI-based systems have become a matter of great importance. Such a competitive paradigm of power, status and technological advancements incorporate threat perceptions and security concerns among the states. The competition and likelihood of Sino-US conflict are viewed through a particular lens of Structural Realism. It defines security and power as an important factor in the anarchic structure of the international system. Structural realism is a version of realism that gives a powerful explanation of the anarchic nature of the international system in which security, survival and power struggles are embedded.

2.1 Realism and the Pursuit of Power

Realism is one of the most well-known and influential theories in international politics. Realism is a theoretical account of how the world operates. The ancient traces of realism can be found in the writings of Sun Tzu and Thucydides. The intellectual roots of realism traced the lineage to the 19th century in the Realpolitik tradition of Europe. The emergence of realism is marked as a response to idealism in the interwar period and ascendency of realism witnessed in post-war period. Realism asserted that the account of world politics clearly depicted that it was a struggle for security and power for states. The pursuit of power and national interest are the main drivers of international politics that influence inter-state relations. Realists believed that the best way to avoid war is to build capabilities and face potential aggression.

In the realist paradigm, the nation-state is the principal unit of analysis. Realists believe that states have overlapping national interests and objectives that ultimately lead to a conflicting scenario. Realism is also referred as power politics. Realists posit that states' capabilities are crucial to influencing other states' behavior. The realist theoretical tradition can be illustrated by the following main facets. There is an exclusive emphasis on politics and does not account for economics, religion, culture or other factors. It claims to have a better understanding of the realities of international politics. Realists characterize politics as a tool to maximize power. The center of focus is the international arena while the domestic political sphere is overlooked.

(a) Realist perspective of power

Realists speculate power is the currency of the political world. International politics is synonymous with power politics. ln the realist paradigm, exclusive emphasis is given to accumulating power. Structural realists interpret security as the core element of national interest and power as indispensable to achieving security. Power as influence describes in terms as a state's ability to exercise influence over other actors of the international system under anarchy. Such influence can be competitive, cooperative or even coercive. Power can also be described in terms of the resources and capabilities of states. Capabilities are usually described in tangible terms which is the composite indicator of aggregate power. The material capabilities of a state form the base of power. Balancing the power means possessing tangible military assets. But there is another kind of power which refers to latent power. Latent power pertains to upscale socio-economic factors that serve in building material capabilities. According to the modern era, big powers require capital, advanced technology and personnel to augment their military potential. Latent power pertains to the raw potential that can be utilized in systematic competition. Hence, developing a high-tech, skillful population and a substantial share of global wealth can enable the state to gain power.

All the main currents of realism are regarded as theories of conflict. Unlike utopianism or idealism, realism asserts war is an inevitable phenomenon. These common features are combined in distinct configurations by different realists such as Hans Morgenthau, Kenneth Waltz and Gideon Rose. This broad school of thought has various distinctive strands. The three leading currents of this thought; Classical Realism, Structural Realism and Neo-Classical Realism generated in the 20th Century. Structural Realism is the central focus in this chapter and a weaving thread throughout the work.

2.2 The Emergence of Structural Realism

Structural realism is a school of thought in international politics that seeks to explain the states' behavior with an exclusive focus on the structure of the international system. It rejects traditional notions but it shares many common grounds with classical realism regarding the pursuit of power and national interest. Structural Realism and Neorealism are the standard terms that are used interchangeably. Structural realism also sometimes refers to Waltzian neorealism. It is principally credited with the writings of Kenneth Waltz. This theoretical perspective was formulated by Kenneth Waltz in 1979 in his book *Theory of International Politics*. Survival and security are the essential prerequisites in the anarchic system which provides the foundational basis for Waltz's theory. According to Waltz, all states seek to maintain their own security by striving to increase their power and resist the attempts of others to gain power over them.

Waltz revisited the realist tradition with an exclusive emphasis on systemic structures to interpret the potential behavior of great powers. It is a response to the Reductionist theories that attempt to describe the international outcomes exclusively via the state's behavior and simply ignore the structural causes. Waltz argued that both units of analysis - states and the system as a whole should be described to understand the overall structure. It aims to analyze the impact of structure on states' behavior. There are three key features that act as explanatory factors for a state's behavior in the international system.

2.2.1 Anarchy as the Key Organizing Principal

Anarchy is a state of complete absence of sovereign or supreme authority in the international system. The world lacks a hierarchically superior power that can settle disputes, ensure laws and authorize the system of international politics in abidance with global directives. This notion was first introduced by Kenneth Waltz in his neorealist writing *Man, State and War* (1959) and further elaborated in the *Theory of International Politics* (1979). As a structural determinist, Waltz described the principal aspect of the structure of the international system is anarchy that interprets International politics. While in classical realism, power politics is associated with human nature. The central focus on anarchic structure is the key difference between structural realism and classical realism. Anarchy remains a predominant factor in the international system in neorealist thought. The anarchic structure gave rise to the belief in self-help which served as a basis of neorealism. The absence of central authority made states rely on themselves to ensure their survival and be ready for any possibility of war. According to Waltz, competition,

conflicts and wars occur because nothing can prevent it. Anarchic structure largely determines the interests and actions of states (Waltz, 1959).

The absence of absolute or central authority illustrates that there is no world government. There is no higher authority than the states. States exist in a self-help system, hence, bound by the aim of survival. In this context, States struggle to balance against each other in order to ensure their survival. The order is not entirely absent. The role of international institutions is limited in terms of structural realism as it marks down the significance of institutions. Realists speculate that international institutions are under the influence of the state that found them and they have limited self-sufficiency. For instance, the League of Nations was a fragile substitute for a sovereign authority that ensures the rule of law.

2.2.2 States as Unit of Analysis

Waltz claims that states are the unitary actors in the international system. The units of the system are the sovereign states act functionally similarly because of their same goal. The main objective of survival and security made states act in a similar manner. The uniform behavior of states is imposed by the structure. Waltz argued that there are structural constraints that shape the states' behavior in the international environment. States are bound to secure themselves in a self-competitive world. These constraints confine the actions of states which resulted in a similar response to international phenomena. Waltz claims that dissimilar states act in similar ways. That is why despite the considerable difference in the relations and stances of states, there is a "striking sameness in the quality of international life through the millennia" (Waltz, 1979). The international system is comprised of sovereign states that exist in the absence of absolute authority. They survive on the logic of self-help and safeguarding their interests. In international realms, states pursue a common goal of survival that can be achieved by having relative power. So, States are more inclined to avoid relative losses of power against other states (Waltz, 2009). The states can be distinguished based on their capabilities.

2.2.3 Distribution of Capabilities in The System

The structure of the international system is principally based on the distribution of capabilities (power). States struggle to attain security by gaining power in competition with other states. Capabilities are often perceived as military capabilities while power includes both military and nonmilitary components. Realist theorists assert that the nation's capabilities also included geographical leverage, natural resources, advanced technology, a form of government, and human capital. The key capability that places states differently is power. It is the most important attribute in a relative sense. States act in an undifferentiated manner because of their security-

seeking behavior and are differentiated based on the distribution of capabilities. The distribution of capabilities varies in the international arena that interprets the type of the system (unipolar, bipolar or multipolar). Waltz interprets the distribution of power as a structural-level variable and categorizes power itself as a state-level variable. Waltz defines anarchy as the ordering principle of the international system and functionally similar units of analysis (sovereign states) that possess different power capabilities.

2.3 Interpretation of National Interest: A Realist Appraisal

National interest is defined as the goals and preferences of sovereign states. Such goals are attributed to grand strategies that materialize national power. This term pertains to political, military and economic spheres of interest. National interest is a central concept in the anarchic international system. Various strands of realist approaches such as classical, neorealism and neoclassical realism define national interest distinctively. As a classical realist, Hans Morgenthau defines the core of national interest as power and survival in the postwar period. He viewed power can be achieved through the national interest. In the post-cold war era, a neorealist Kenneth Waltz, interprets national interest as the product of an anarchic structure. Waltz believed survival can be attained through national interest. Neorealists predominantly define national interest in seeking security and power for survival. The neoclassical realists analyze national interest as the determinant of foreign policy. The distinctive perceptions give unique essence to the national interest in realist appraisal. All these versions of the realist tradition describe national interest in relation to security and the pursuit of power in the international system (Trifunovic & Curcic, 2021).

2.3.1 Waltzian Interpretation of National Interest

In the neorealist paradigm, Waltz perceives the national interest as the outcome of the structure of the international system. In this way, the individuals such as political leaders have no substantial impact on its determination. Waltz interpreted that states seek to prioritize the activities that assist in achieving their national interest successfully. To illustrate this point of view, Waltz analogizes a state that counts on self-help and a company working in a competitive international setting. As he believes economic factors increase the expected leverage which in turn aid the state in assuring its survival. If the survival of a leading corporation is conditioned according to a self-help system, then survival becomes a more important goal instead of gaining leverage. Hence, survival is a prerequisite and a priority of any nation's interest ((Waltz, 1979, p.134).

Waltz asserts that every state determines the ways and means to sustain its national interests. As a state is a sovereign entity that seeks a self-reliant way to cope with its internal or external problems. Because if a state seeks assistance from other entities in the form of commitment it will limit its autonomy in the system (Waltz, 1979, p. 96). States can also pursue their interest via cooperation for the common good. In analyzing the scenario, a state must review the division of mutual benefit. States become more concerned about relative gain. There remains a peril that if one state gains more benefits that will aggregate its power. It can terminate the coalition or pursue such policies which can be detrimental to another state (Waltz, 1979, p. 105). The alliances based on relative gain are short-lived and states are uncertain of the potential cooperation. As there is no central authority to assure compliance with the commitment. Hence, neorealism depicts a skeptical view of the potential cooperation among states. It asserts the fact that all aspects of cooperation are only interim agreements that will be annulled if they are at odds with the national interest.

(a) Polarity of international system and resulting behaviors of states

In this most quoted work, *Theory of International Politics*, Waltz assert some other important ideas. Waltz prefers the bipolar system as a peaceful system rather than a multipolar system and speculates economic interdependence can enhance the prospects of peace and stability. In international relations, scholars tend to describe the distribution of capabilities from the perspectives of polarity as well. In the post-cold war era, unipolarity was contemporary and is alleged as unstable. Waltz jotted down his viewpoint in his empirical articles (such as Structural Realism after the Cold War) that the post-cold war era turned unipolar with fall of Soviet Union and the United States as the rising superpower. In the wake of the new century, Waltz's article Structural Realism after the Cold War reflected his thought that with the fall of the Soviet Union the international system turned unipolar (Waltz, 2000). He also predicts that the lifespan of a unipolar system is brief. Multipolarity will soon dominate the system of the world. The international system would govern by one, two, three, or a few big powers. The attitude of the state towards security is affected by the change in polarity. A shift from bipolar world order to a unipolar one and then the multipolar system is quite complex. Waltz believes that the bipolar system is much more stable than that of a multipolar system. Waltz admits the fact that during the cold war both the superpowers confront and balanced each other's capability and rationalize their behaviors. But there is no check and balance of the dominant force in the unipolar world. Waltz marks the distinction between balancing and bandwagoning. He upholds the notion that balancing is the behavior incited by the anarchic system rather than bandwagoning. The balancers strive to lessen their risk by confronting the powerful country. Bandwagoning

pursues absolute gains by aligning with the potential power to achieve maximum benefit. While balancing seeks relative gain. In the anarchic system, one must concern not only about whether one gains or not but also consider the gains that offset potential foes. Waltz is of the view that balancing can be internal and external as well. Internal balancing can be achieved by outlining a national security strategy and by having a powerful military to match up with other states. External balancing pertains to the alliance formation against a powerful state or a hegemon. Such a coalition avoids the stronger side to attain their security. So, States balance specifically against threats, not against all outside potentials. Waltz is of the view that cooperation is very limited as states are concerned about their relative gains to shift the balance of power in their favor.

Pertaining to the Waltz analysis of national interest, various observations are made by scholars. States can have minimal influence but the anarchic structure is not under their control. State's survival and security must be the prime concern rather than any state's policy. For structural realists, the national interest serves as an automatic indication that guides the leaders on how to act in the political system. States are bound by the impersonal constraints and dictations of the international system.

There is a divide in structural realism with competing assumptions, various distinctions and key divisions viewed by analysts. Another prominent representative of neorealism is John Mearsheimer under the banner of Offensive Realism. He made significant contributions to the neo-realist approach with his book-length seminal writings on great power politics. Mearsheimer is a leading proponent of realist tradition that made innovations with thought-provoking addition to Waltz's neorealism.

2.4 Mearsheimer's Theory of Great Power Politics

John Mearsheimer's corner stone work, *The Tragedy of Great Power Politics* was hailed as a classic in the realist tradition. The view of great powers rivalry with a haunting fear of security competition is built up in the offensive realist theory of international relations. He explains his theory of offensive realism with five basic assumptions that include;

i) Anarchy, absence of central authority
ii) Possession of offensive military capabilities by great powers
iii) Uncertainty about other states' intentions of using offensive capability
iv) Survival is the prime goal and a means to all ends

v) States are rational actors that behave strategically to pursue their highest goal (survival).

These bedrock assumptions have the following implications the tragic self-help system generated deep insecurity that compelled states to pursue aggressive aims at the risk of war. Even if a great power attains an upper hand in military might over its adversaries, the quest for power never stops until it becomes a hegemon. It strives to eliminate any future challenger that disrupts its power.

The main arguments address the importance of land power and the unremitting power of water. The paramount power of a state is primarily based on the army accompanied by air and naval force. Mearsheimer argued that in the modern era land force is the main source of a state's power. Some might argue that nuclear weapon nullifies the primacy of land power. Mearsheimer claims that nuclear weapons either make war obsolete or form a nuclear balance among great powers. Continental powers remain the king in war conquest. While insular powers are less likely to initiate war or project power. There is an exception, an insular state Japan attacked Pearl Harbor in 1941. However, it did not conquer any part of the US and just wanted to invade some islands to establish its rule. So water has stopping power to limit the power projection (Mearsheimer, 2001). The power projection abilities naturally limited by water and prevents any state from becoming a hegemon by dividing the power across the globe. He portrayed the example of Britain which acts as an offshore balancer. The presence of the English Channel provides isolation to Britain. It made unable the European powers meddle across the English Channel in British Empire. Just like Britain, he considered the US as an offshore balancer against any peer competitor on the American sphere of dominance.

2.4.1 Stopping Power of Water: A Critique on Seas

According to Mearsheimer, the presence of water stops the continental powers from exercising enough power to establish global hegemony. The best way of being powerful is to become a regional hegemon in its part of the world. It can have influence over other accessible regions on nearby land. Water makes power projection difficult over long distances. He depicts insular powers as less vulnerable and more secure than land powers. The land powers like Germany, USSR, and France aspire to be regional hegemons and involve in fierce power competition. While the UK and US were less prone to such conquests because both were insular powers. Due to such geographical constraints, he believes that regional hegemony is the ultimate goal. There is a difference of opinion among offensive realists about the pursuit of hegemony. Gilpin asserts that the absolute goal of states is to be a global hegemon. Gilpin speculates global

hegemony, which establishes their rules and exercised influence have been naval powers. To give an example, the UK, and the US were prominent naval powers to exercise absolute power as the UK was a major sea power and the US has fleets around the world. Apart from hegemonic theorists like Gilpin, many influential sea theorists such as Alfred Thayer Mahan, Julian Corbett and Nicholas Spykman articulated the immense significance of oceans as an enabler of power. Spykman expressed the importance of rimland along the heartland, Mahan enunciated sea control and Corbett put forward securing sea command to accumulate maximum power and wealth.

Furthermore, Oceans are the powerhouse of natural resources and a very source of existence. The blue economy is evaluated as one of the important indices of national interest. The emerging paradigm of an ocean-based economy increments the latent power which is crucial to building military muscle. Oceans are deemed as a lever for economic growth and a window of opportunity to develop the marine economy. It is an important source to gain control of the globalized market. As 80% of global trade is carried through waterways and 40% of the world's population resides near coastal areas. The waterways are the backbone of intercontinental connections, maritime trade, globalization and sea power.

The paramount attributes highlight the significance of oceans as enablers contrarily to Mearsheimer's idea of stopping power of water. Focusing on the military strategic facet of the oceans, it is crucial to complement land operations. The primacy of land power does not undermine other domains of military power such as the navy. To give an illustration, in the second World War, sea power complemented many land operations and exploited adversaries' potential. Even the great powers use naval blockade tactics to cause economic suffocation of the adversary. Mearsheimer also acknowledged that the US maintained control of seas along land primacy which was validated as a deciding factor in the victory. The attribute of water as a stopping power is more pertinent to the state's incapability to attain sea power and secure power projection. So, Oceans are not barriers but enablers of wealth, power projection and generators of influence in world politics.

States formulate strategies to achieve their prime goal of survival. On the side, states pursue three main objectives including regional hegemony, high capital and nuclear prominence. The fulfillment of these objectives provides states maximum security and superiority in the anarchic system. The three great powers; Nazi Germany, Imperial Japan, and Imperial Germany, strived for regional dominance in the early decades of the 20th century. In the second half of the 20th

century, the Cold-Warperiod, there was intense security competition between the USA and the Soviet Union reflected hegemonic ambitions. Mearsheimer illustrates the rise of American power in the 19th and 20th century. He described America as an expansionist power that is titled as one of the largest territorial expansionists having a history of conquest and colonial rule. In the wake of the 20th century, it earned the status of the regional hegemon and become invulnerable to other powers. The future of American power is predicted by Mearsheimer in concluding thoughts of the *Tragedy of Great Power Politics*. He signifies that the US had an unbeatable amount of latent power in comparison to Germany, the Soviet Union or Japan during their confrontations. In modern times, if China continues to grow then it would have the leverage of four times latent power over the US (Mearsheimer, 2001).

Structural realism is divided into two competing versions: defensive realism and offensive realism. Structural realists contend that anarchy is the main impetus to pursue security. The difference lies in the opinion that states' sole goal is security to survive or power preponderance is essential to survive. The influential advocate of defensive realism Kenneth Waltz contends with the former opinion of the appropriate amount of power. While the leading espouser of offensive realism, John Mearsheimer, maintains that power maximization is crucial to a state's survival. Both strands are powerful lenses to understand the contemporary paradigm of international politics.

2.5 An Empirical Assessment of Defensive Realism VS Offensive Realism

There is a substantial divide between the two strands of structural realism; defensive and offensive realism. Defensive realists believe that states adopt defensive strategies to acquire maximum security to preserve their sound status in the international system. Such restrained behavior implies moderate policies which allow expansion in selected instances. The aggressive incentives are counterproductive and incite security dilemma which ultimately leads to counterbalancing and thwart states into ceaseless security competition. Security is the sole goal of states in the anarchic structure. While offensive realists speculate that security is scarce which compels states to attain maximum power and become more secure. The uncertainty about others' intentions leads to aggressive behavior. Aggressor states pursue offensive, revisionist and expansionist policies to expand their power. In historical cases, the aggressor gains leverage and succeeds. The absolute goal is to be a hegemon in the anarchic structure.

The fundamental divide is reflected in the main currents of realism while addressing why do states want power. For neorealists, it is the anarchic structure of the international system that

urges states to seek power. The anarchic structure compels the states to be powerful enough to defend themselves in case of any attack. The iron cage is used as an analogy picturesque system where trapped powers have to compete for survival. There is a considerable difference between defensive and offensive perspectives about the role of an anarchic system, accumulation of power, aggression, expansion, conquest, revisionist intentions, and balancing behaviors.

2.5.1 Anarchic Structure

It illustrates five explicit assumptions to explain the competition for power. States indulge in ceaseless security competition as they operate in an anarchic structure. Here anarchy is not described as complete chaos or disorder but as an ordering principle with no hierarchy. It characterizes that there is no absolute authority higher than that of the state. The first main distinction between these two strands is the implications of anarchic structure. Defensive realists argue that States are determined to maximize their security due to the anarchic system. While offensive realists asserted that anarchy encourages stars to maximize their power and security by exercising significant influence.

2.5.2 Power Maximization or Moderate Power

Defensive realists like Kenneth Waltz (1979) argued that it is imprudent to maximize the amount of power as it can face retaliation in the system. Too much power or the quest for hegemony is foolhardy. While Offensive realists like John Mearsheimer (2001) take a distinct view and asserted that maximum power generates a favorable strategic insight. And if the circumstances are feasible, more power can aid in pursuing hegemony. The best way to ensure survival in the system is to gain overwhelming power. States always retain an aggressive stance, which fosters them to attack other states (Mearsheimer, 2001). The international system is based on uncertainty; one cannot forecast the exact behavior of the state in the anarchic structure. The atmosphere of suspicion and mistrust is dominant. Offensive realism holds that states seek to project absolute power to promote their interests which often leads to conflict with other states. Structural realists believe that almost all states have some offensive military capability. To put it in another way, every state possesses some power to cause harm to other entities. Such capabilities differ from state to state and can change with the passage of time.

2.5.3 State's Revisionist and Status-Quo Tendencies

Neorealism deals with the subject matter of uncertainty. States are always skeptical assessing other states' intentions. Eventually, states remained concerned and anxious about other states' motives whether they are revisionist states or status quo states. If they are determined to use force to shift the balance of power in their favor, such states are revisionist states. However, if

there is no intention of using force and is complacent enough not to shift the balance of power, such states are status quo states. Defensive Realists speculate that status quo entities prefer to attain security and balance against the imminent threat. They are likely to preserve their balance of power and signify their benign intent to identify each other as secure states. According to offensive realists, there is far less of a status quo entity while everyone has revisionist intentions (Mearsheimer, 2001). The rationale is that major powers do not rely on the existing distribution of power and strive to maximize it. Even if there is no imminent threat but states are not certain when and where the threat emerges in the future. States prefer to prepare for the worst possible situation.

Though, it is impossible to understand others' intentions accurately as they are in the mind of policymakers. Motives are contrary to the military capabilities which are tangible and can be empirically assessed. This situation raised an argument that decision-makers can reveal their intentions via speeches or policy documents. But they can fabricate their intentions and hide their true motives. For a while, if a state successfully discerns another state's intentions but it can never be sure of its future implications. The core of the argument is that decision-makers can never be assured about other states either they are revisionists or status quo.

The next assumption centers the survival as the prime goal of a state and it has been discussed in Waltz's neorealist thought. It describes that states strive to sustain their territorial sovereignty and the autonomous stature of a hierarchical political order at the domestic level. All other goals take a back seat and are of secondary importance when it comes to the survival of a state. While Mearsheimer argued survival is only possible through immense power.

All these assumptions simply state the fact that there is mistrust, a power gap, uncertainty and a fear of a revisionist state compounded with an anarchic structure. The ever-present prospect of war has preoccupied the states just to gain power. States are left with no option but to put forward their own interest over others in the international system. The powerful state has always an upper hand over its competitors and fewer chances of any outside attack. For instance, in the western hemisphere, no state can dare to attack the US because of its invincible power. All these structural imperatives are indicated in the key concept of the Security Dilemma. John Herbz coined the term in 1950. It describes when a great power effort to strengthen its security, ultimately, lessens other states' security. The decrease in security threatens the survival of the state. The threatened state strives to enhance its security which in turn threatens other states' survival. This ignites an unremitting security competition among States. This is the tragedy of great power politics.

2.6 The Pursuit of “Enough” Power

Structural realists have a difference of opinion about how much power is enough for states to sustain their influence. Offensive realists assert that states should always cash the opportunities to attain more power, whenever the circumstances are feasible. The powerful state is always in a dominant position to exploit the weaker ones. The only way to overcome this is to be powerful enough to become a regional hegemon. This fact is coupled with the fact that states can never be certain of other states’ intentions. They might be living up next door to a really powerful state that has malign intentions. Due to this states do everything they can to be as powerful as possible which is the best way to survive in the anarchic system. Offensive realists believe that it is the structure of the international system that led states to behave aggressively and engage in security competition.

Defensive realists disagree and believe that the anarchic system develops strong incentives to attain the power to maximize security. But to pursue hegemony is foolhardy according to defensive realists. Rather than maximizing the power beyond their accounts, states should struggle for what Waltz called an "appropriate amount of power" (Waltz, 1979, p. 40). Defensive realists argued that if a state attains too much power then balancing will take place against it. Great powers will enhance their military capability and form balancing alliances. In turn, the state who aspires to be a hegemon will be highly insecure and can be destroyed by the big powers. Defensive realists illustrate the historical examples of Napoleonic France (1792–1815), Imperial Germany (1900–1918) and Nazi Germany (1933–1945) had to face decisive defeat whenever they strive to dominate Europe. At that, the balancing coalition was formed by almost all great powers to defeat such aggressors. Defensive realists exemplified Otto von Bismarck, he realized that overpowering Germany will lead its neighborhood to balance against it. After gaining remarkable victories in the Austro–Prussian (1866) and Franco–Prussian (1870) Wars, he stopped the over-expansion of Germany from accumulating too much power.

2.6.1 The Spoils of Conquest

Defensive realists claim that offense-defense balance reveals to which extent it is easy or challenging to acquire territory or to overthrow a defender. In simple words, whether offense gains leverage or not. Defensive realists anticipated several dangers as an outcome of aggression, expansion and conquest. The systemic imperatives rarely push the states to expand, instead, states are subjected to the goal of survival. Aggression is a self-defeating behavior that tends to meet massive resistance and counterbalancing threats. The combined balancing can eschew the offender's aggressive motives and leave it in the weakest position. Even if the

aggressor gain a feasible victory but still the cost of offense outweighs the privileges. It highlighted the pervasive notion of nationalism that deals with self-determination and urge the occupiers to stand against the conqueror. Furthermore, in the modern era of advanced technologies that call for freedom and openness, it is difficult to subdue the conquered territory and exploit them. In a word, conquerors also reap difficulties with little benefits. Sometimes defensive realists accept that great powers act in a manner that is contradictory to theory. But claims that the conduct of those states was not rational and obliterated as well. So power maximization undermines survival rather than enhances security. The cost-benefit analysis and offense-defense military balance favor the defender rather than the aggressor. Defensive advantage make sure status quo states are more secure and less likely to engage in a security competition. Therefore, states strive to maintain their status in the balance of power rather the concentrating on futile offenses.

Offensive realists call into question the defensive claims that offense rarely pays and the defender's benefit over the aggressor. Offensive realists argued that historical account exhibits the fact that those who instigate the war gain victory often and maintain that conquest is favorable. Across the years from 1850 to 1980, the aggressors won the war 39 times out of 63 which indicates the 60 percent chance of conquest is successful (Mearsheimer, 2001). Such victories brought cumulative power and resources that increment the state's power. He exemplified Imperial Germany dominate enough during World War-I to become a hegemon in Europe. And the US also take over the western hemisphere. The expansion allows the states to gain control of the economic, military and political power of the conquered territory which will swiftly shift the balance of power in the aggressor's favor. So, conquest ultimately enhances the amount of national power with the relative increase in the state's power.

Great powers are strategic calculators that weigh the benefits and the risks before taking offensive action. As an illustration, the US gains a striking victory against Iraq in 1991. He viewed that the only misguided states forgo the opportunity to become regional hegemons and assume that they preserved the appropriate amount of power. According to Mearsheimer, the great powers do not pass up the opportunity to take advantage to become a regional hegemon (Mearsheimer, 2001). They always struggle to be the most powerful- hegemon among their peers. However, the states can never ascertain others' intentions, so, miscalculations can lead to danger. For instance, Germany mistook the war against Russia and France and UK would not be part of it. A multipolar system is more prone to miscalculations about relative power and other states' intentions. Mearsheimer argued that the choice to initiate war is still a logical response according to the particular situation that a state faced. To illustrate, during World War

II, Imperial Japan and Nazi Germany put up with a calculated risk but the outcomes were unsuccessful.

Furthermore, the conqueror can annex a part of the defeated territory rather than occupying the whole state, and disarm it by prohibiting rearming. The victor can also opt for the strategy of divide and rule. Therefore, offensive realists anticipate that great powers should aspire to take advantage by utilizing the opportunity of maximum power. Offensive realists argue that systemic pressure urges the states to expand. There are several systemic pressures such as a decline in relative power, a quest to gain power, advanced military technology or the miscalculation ascertained to the multipolar system.

2.6.2 Emulation Mechanism of Competition

Defensive realists consider that security competition needs not to be particularly intense in the anarchic system. The state should prioritize its relative strength over its absolute advantage. Waltz believe that security competition compelled great powers to imitate the winning strategies of their adversaries. States act following common practices in the international system. The tendency of sameness seems an emulation of balancing behavior to preserve the status quo. Anarchy provides sentiments of defensive behavior and encourages the states to maintain the balance of power. It interprets a notion of status quo bias in Waltz's writing. While Mearsheimer contradicts this view by claiming that this imitation behavior is more offense-oriented. States that can imitate balancing posture can also emulate aggressive behavior. States pursue innovative strategies to remain ahead of others and maintain the strategic surprise.

2.6.3 The Polarity of the International System

In international relations, scholars tend to describe the distribution of capabilities with respect to polarity as well. As it is mentioned above, Waltz's view unipolar system is short-lived and multipolarity will soon dominate the system. Waltz and Mearsheimer agreed that a bipolar system is more stable and balancing alliances are ascertained to be safer. Both structural realists agreed that bandwagoning is a rare phenomenon among great powers. There is no assurance that the aggressor will remain satisfied with bandwagoners or turn on them in the future. Only an opportunistic revisionist state will be attracted to pay such high costs to increase its power to dominate in the future.

A multipolar system is more prone to miscalculations about relative power and other states' intentions. Mearsheimer differentiates between a balanced multipolar world and an unbalanced multipolar world. In an unbalanced multipolar system, there is an unstable distribution of power. Such instability among different power dyads diffuses danger and generates a high level

of fear. The power struggle and security competitors exacerbate between various big powers and an aspiring hegemon. States try to block peer competitors to gain dominance. In doing so, states behave more aggressively than in a balanced multipolar system. Great power will uphold the balance of power until it works in its favor and the moment it shifts in other states' favor; great power will try to undermine the balance of power. Even if the conflict causes absolute damage, states remain contended as long as their adversaries are in a worse situation.

Offensive realists comprehend that imperiled states balance against their adversaries but claim that balancing is often ineffective in a multipolar system. Besides, many imperiled states prefer to buck pass rather than form an alliance. In simple words, avoiding the responsibility of keep checking adversaries' intentions and passing this burden to others by keeping themselves on the sideline. Mearsheimer proclaimed that the US and the UK behave as offshore balancers rather than confronting a potential challenger and incline toward a buck-passing strategy in a multipolar system. In a bipolar system, states opt for balancing because there is no big power to catch the buck. Buck passing usually occurs in a balanced multipolar system. Geography also interprets the buck-passers and buck catchers in a multipolar world. For instance, the states that share a common border prefer balancing whereas barriers opt for buck-passing. So, the international system, geography of the state and distribution of capabilities determine whether states opt for balancing coalition or buck-passing.

As money is ascertained to the economy so power is to international relations. Offensive realists believe that effective power projection is based on military capabilities. Thus, the balance of power is interpreted as the balance of military power. Offensive realists define power mainly in terms of military power and latent power takes the back seat. As in the case of Japan, despite having a sound economy, it depends on the US for its security. Yet Wealth is equally important to build the military might. In today’s world, a balance of both latent and military power is inevitable.

2.6.4 Restraining the Influence of Nuclear Weapons

Both the strands of structural realism; defensive and offensive realists accept the fact that the chances of conventional war are less likely to happen among nuclear powers due to the threat of nuclear escalation. There lies a disagreement between defensive and offensive realists over the restraining influence of nuclear weapons in maintaining peace. Waltz viewed the coming of nuclear weapons as a revolution. When states achieve a second-strike capability, they are secure because the potential outcomes of such war are catastrophic. Such lethal weapons have such a sobering and stabilizing impact. Such secure states are only concerned to preserve their

power position in the system. To stabilize the zones with elevated political tensions, nuclear weapons can have a pacifying impact. Mearsheimer's theory does not claim that nuclearized state cannot initiate war or they terminate war to gain maximum security. However, Mearsheimer holds a controversial stance that the competition among great powers can lead to low-level nuclear exchange but not to escalate a full-scale nuclear war. So, nuclear weapons do not in themselves provide security to states. For offensive realists, peace is possible only if great powers are insular power having balanced nuclear capabilities. Defensive realists argue that states strive to attain security and maintain the status quo while offensive realists assert that states have expansionist desires to root out their rivals to gain a significant amount of power. At a minimum, great powers aspire for regional hegemony and at the maximum quest for global dominance. Defensive realists speculate states are less fearful, thus inclined to a subtle amount of security. Offensive realists contrarily view states are haunted by the fear that compels them for absolute security. Offensive realists accept that nuclear weapons are a powerful source of maintaining peace and assured the absence of war. Yet, states compete to enhance their nuclear arsenals and to balance the nuclear capabilities of their rivals. Still, it is uncertain to determine a long-lasting stability period owing to the influence of bipolarity and nuclear weapon.

Mearsheimer speculates great power competition is not over and still fear generates security concerns. Big powers counter potential adversaries even at the risk of the outbreak of war. They usually pursue hegemony rather than be satisfied being a status quo state. For the maritime states, he argued that offshore balancing is an intricate sort of calculated aggression. Therefore, Mearsheimer anticipates that the stability and peace among big powers will come to an end after the Iron Curtain period. When the US will rescind its security commitments being the sole superpower of the world. Soon the security competition will return with a potential competitor. History portrays the offensive predictions are more in accordance with the past behaviors of the big powers instead of a defensive realist approach.

2.7 Causes of Great Power War and Structural Dynamics

Defensive realist portrays a legitimate argument that sometimes states behave that is strategically irrational. Defensive realists like Jack Snyder, Barry Posen and Stephen Van Evera go after Waltz to underline the shortcoming of structural realism to define the non-strategic behavior of states in terms of domestic-level and system-level integration theories. While offensive realists tend to explain the political theater of the world exclusively on the

behalf of structure. This implies that the past behavior of states that initiate war made strategic sense. Structural realists believe that states initiate wars to accumulate relative power over their adversaries and strengthen their security. It is argued that security is not only the driving force to start wars but economy and nationalism also account as principal factors. For instance, Bismarck started three remarkable wars to establish a unified German Empire based on nationalism. These motivations are consistent with structural realism until the aggressor's position in the balance of power is secured. In any case, victory enhances the amount of power the state holds. Just like a German state that rose after 1870 was way more powerful than the Prussian state in 1862. Other variables include the polarity of the system, the distribution of capabilities among great powers, and variation in the distribution of power can influence the probability of war. Waltz did not mention any potential gains from the war. He argues that miscalculations and skepticism in the anarchic system are the prime causes of war. The prime consensus of various structural realists is that the architecture of the international system has significant impact on the likelihood of war.

The shift in the offense-defense balance has a considerable impact on the probability of war. Defensive realists argue that offense-defense balance perpetually assists defense and therefore operates to diminish the security competition. Such balance enables stability in the system. The change in balance sometimes shifts favors to offensive actions as a result of war. To give an example, the use of dive bombers and light tanks to make blitzkrieg much more effective remarkably shifts this balance in favor of the aggressor's offense. But defensive realists maintain that the superiority of defense can promote peace. They exemplified the Cold War era, there was no shooting war between two great powers. The advent of nuclear weapons clearly shifts the balance towards defense.

The following table succinctly summarizes and differentiate the two offshoots of realism i.e. defensive and offensive realism.

Table 2.1

Defensive Realism Vs. Offensive Realism

	Defensive Realism	Offensive Realism
Why do states want power?	Survival and security under Anarchy	Survival and domination under Anarchy
What is the proximate cause of the state's behavior?	Security through the appropriate amount of power	Security through power maximization
State's behavior is envisioned as:	Status Quo intentions	Revisionist intentions
Does conquest pay?	Conquest rarely pays	Conquest is profitable and pays often
How much power is enough?	Moderate power to preserve the balance of power	Maximum power to attain regional hegemony

Table 2.1 has been generated by the researcher which provides an overview and elucidate the distinction between defensive and offensive realism. The table highlighted the key arguments of differentiation about state's behavior and its pursuit of power in the anarchic international system.

2.8 Structural Incentives and The Rise of China

The anarchic system creates strong sentiments in states to accumulate power to ensure their survival. A mighty China that will soon may be an economic powerhouse and build its military muscle, is not an exception. Defensive realists argue that it will also attempt to shift the balance of power in its favor. This scenario will not eliminate the security competition but it will be less intense. Defensive realists predicted that China will coexist peacefully and act smart like Bismarck to strengthen its power. There is no doubt that China will strive to gain power in Asia. The quest to become a world power is limited by structural constraints. Moreover, the possession of nuclear weapons by other big powers limits extravagant aims. Defensive realists present an optimistic view and claim policy of engagement will build cooperative incentives. Mearsheimer predicted that in the early decades of the 21st century, the US might confront China as a potential challenger in Northeast Asia. The prospects for China to emerge as a hegemon depend on its economic modernization. If China continues to grow at a good pace and gains economic leverage, it will be the leader in spearheading the technology. It will become the wealthiest power that will build its military might to seek regional hegemony.

Offensive realists anticipated that China might formulate its own account of the Monroe Doctrine. Just as the US did not allow any power to interfere in Western Hemisphere, China would also not allow meddling in Asian affairs. China would be a much more powerful and dangerous peer competitor than any prior challengers to seek global competition. Offensive realists asserted that the US policy of engagement rather than containment is misguided. The wealthiest power would not be a status quo entity but an aggressor to seek domination.

Structural realism is an ideological departure from the concept that human nature is responsible for the actions of a state. It is the structure of the international system that shapes the behavior of states. Structural realists do not believe that domestic politics, the composition or makeup of individual States matter very much for how those States behave on a day-to-day basis in international politics. To be specific about this, the fact that States live in what we called an anarchic system. Structure determines the actions of the states and made them behave accordingly. The international system is encircled by an anarchic structure, security dilemma, power maximization, and balance of power. The imperatives of power politics stem from the confluence of anarchy and egoism is the core argument of the realist tradition. It is a system where collective security and central authority do not exist. Power politics is an indispensable and crucial form of world politics. Hunger for power gives the initial trigger to the predator states. The core thesis is that the anarchic system exerts pressure on states to ensure their survival and states are left with the option to compete for power, security and a quest for domination.

Over the span of years, artificial intelligence (AI) has garner the attention of many powerful states around the world. The states intend to enhance their spending to develop and deploy AI to meet the broad range defense and national security objectives, ultimately stepping up their powerful stature the region. The potential brought about by high-tech and AI to shape security, national interest and accumulation of power has triggered competition between various powers regarding who will be leading in AI-based technology. The Indo-Pacific region is the most dynamic geopolitical area that has become the economic, political and strategic hub of the world. It becomes the central theater of world politics as two major powers are at odds. The powerful presence of China in this region is endangering US interests. The development and deployment of AI-based autonomous systems in the Indo-Pacific aim to outpace each other's influence.

(a) Use of artificial intelligence in an anarchic system

In special reference to naval dominance, the US navy faces challenges and risks of falling behind its rising competitor Peoples Liberation Army Navy (PLAN). The AI-based naval

modernization to acquire maritime dominance and protection of Sea Lanes of Communication has become the main focus of powerful navies. The US and China are expanding their influence in the Indo-Pacific through AI-powered naval vessels to achieve maritime superiority. Both states are building offensive and defensive AI capabilities, strategies and plans to attain naval might. The quest to attain power in anarchic system is not limited to territorial waters but also includes the high seas. To dominate the global commons (especially, the high seas), AI-based systems can play a critical role.

The Structural Realist school of thought analyzes the inherent strategic competition between the US and China. Security, survival and domination are speculated as the central idea of defensive and offensive realism. The uncertainty and structural and material factors of the anarchic system are shaping the state's behavior. The strategic behavior of both states is driven by their grand strategy ambitions, security and power maximization.

In the anarchic structure of the international system, power is a prerequisite for the survival and security. If a state has substantial high-tech power in the age of AI, it can harness the best of its national interest and an influential position. The power and security of one state generates fear and insecurity in other states and ultimately it will also strive for its survival and dominance. This situation urges the regional stakeholders of the Indo-Pacific to preemptively increase their high-tech capabilities for the survival and protection of their national interests. Powerful Al can provide States with technological superiority over others that can be used to attain regional as well as global dominance.

CHAPTER 3

STRATEGIC AND POLITICAL SIGNIFICANCE OF THE INDO-PACIFIC REGION

3. Introduction

The Indo-Pacific region has become a fulcrum of global politics. The confluence of two large water bodies, the Indian Ocean and the Pacific Ocean drawn by globalized supply chains and distribution networks. The waters of the Indo-Pacific depict the mounting significance of maritime choke points, trade routes, natural resources richness and global commons. This critical arena serves as a potent driving force for states to define their strategic outlook to gain power and maintain influence in the region. As states have divergent geographical perspectives of this region depending upon their national interests. Security risks flow from the anarchic pressure of the international system due to intersecting interests. This region has turned into crossroads of international relations, thus attracting the nations to compete for survival, security, power preponderance and their overlapping interests. Special reference has been given to the Sino-US rivalry and their strategic visions directed to the Indo-Pacific. China as a rising power and the US as an established power struggle to protect their prestige and supremacy in the region. The special resonance of this region's rivalry is the South China Sea, its commercial passages and island chains. Both small and great powers making sovereignty claims and are entangled in a ceaseless security competition. Against this backdrop, the control of this region is a key to regional and global dominance.

3.1 Origin and Conceptualization of Indo-Pacific

The term “Indo-Pacific” or “Indo-Pacific region” has gained grounds in the foreign and security policy discourse of many sovereign nations over the last decade. The Indo-Pacific is deemed progressively as a geographical and strategic construct by many states and regional organizations. This term gets oriented in many official documents such as white defense papers, national security strategies and the outlook of elites' rhetoric. The term found its way into many leading think tanks and intellectual institutions making it part of geopolitical nomenclature. The Indo-Pacific is a divergent concept primarily based on the understanding of each state. There is a different perspective regarding the strategic characterization and also in

terms of the geographical construct of the Indo-Pacific region. The common denominator about the strategic imagining of this region is that the confluence of the Indian and Pacific Ocean, believed as one contiguous area. Owing to the fact, most of maritime trades passes through the two-way trading channels of these two oceans (Heiduk & Wacker, 2020).

Karl Haushofer, German political thinker, first used the term Indo-Pacific called it *Indopazifischen Raum* (Indo-Pacific region/space). He laid the oceanographic foundations in terms of marine science, societal pace and political outlook which defines the confluence of these two oceans as more natural than its separation. (Li, 2021). The novel evidence of this term can be seen in his writings on geography and geopolitics such as *Geopolitics of the Pacific Ocean* (1924), *Building Blocks of Geopolitics* (1928), *Geopolitics of Pan-Ideas* (1931), and *German Cultural Politics in the Indo-Pacific Space* (1939). Kalidas Nag, an Indian historian used this term in his writing *India and the Pacific World* (1941) (Raghvan, 2019). In the 21st century, the term gained currency in International Relations after Shinzo Abey's (Japanese Prime Minister) speech "Confluence of the Two Seas" in 2007 at the parliament of the Republic of India. He remarked on the dynamic coupling of the Indian and Pacific oceans for the freedom and prosperity of broader Asia. He signifies the importance of two large democracies in broader Asia, India and Japan located at possible edges of these two oceans. The speech pertinent to the time of rising multipolarity in Asia and emerging economic engagement required a broader framework rich as Indo-Pacific to meet the geopolitical response while Asia-Pacific was limited in scope (Ministry of Foreign Affairs of Japan, 2007). Moreover, the think tanks of India, the Institute of Defense Studies and Analyses (IDSA) and Japan, the Japan Institute of International Affairs (JIIA), jointly articulated maritime security concerns in the Indo-Pacific.

From 2010 onwards, the term Indo-Pacific attained salience in strategic and political discourse. Since 2011, strategic analysts, sovereign governments and apex political leadership has been frequently using this term as part of their geopolitical discourse. Australia's Defense White Paper used this term in 2013 which is supposed to be linked with informal collaboration, the Quadrilateral Security Dialogue. Marty Natalegawa (Indonesian Foreign Minister) take steps to settle territorial disputes and to regain the trust of countries under the framework of the "Indo-Pacific Treaty of Friendship and Cooperation" in 2013. The US cashed the new coinage of the Indo-Pacific in 2013 to sustain its geographic inclusiveness.

Donald Trump, US President, and Narendra Modi, Indian Prime Minister, gave a joint statement in 2017 as responsible states of the Indo-Pacific region working mutually for the free, fair trade and stability of the region. As the US views India as a crucial part to counter China through the conceptualization of the Indo-Pacific. Indo-Pacific Report (2019) of the US marked the evolution of this concept as a pivot in global security and economy. Moreover, this term is accentuated in high-profile US strategic documents such as Nuclear Posture Review (2018).

South East Asian states occupying central positions released an Outlook on the Indo-Pacific in 2019 that is uniformly anchored in ASEAN principles. The great trading partner of Indo-Pacific economies, Europe called for cooperation in Indo-Pacific in 2021. France, a resident power of the Indo-Pacific announce its strategy grounded on this term in 2019 and updated it in 2021. Many institutional changes are specific to the Indo-Pacific concept. To give an example, the Ministry of External Affairs of India established a new Indo-Pacific Division and a new Oceania Division. For instance, the US changed the name of the US Pacific Command to US Indo-Pacific Command (USINDOPACOM). The Indo-Pacific coordinator, Kurt Campbell, is appointed by President Joe Biden to National Security Council (Musaddi & Pulipaka, 2021).

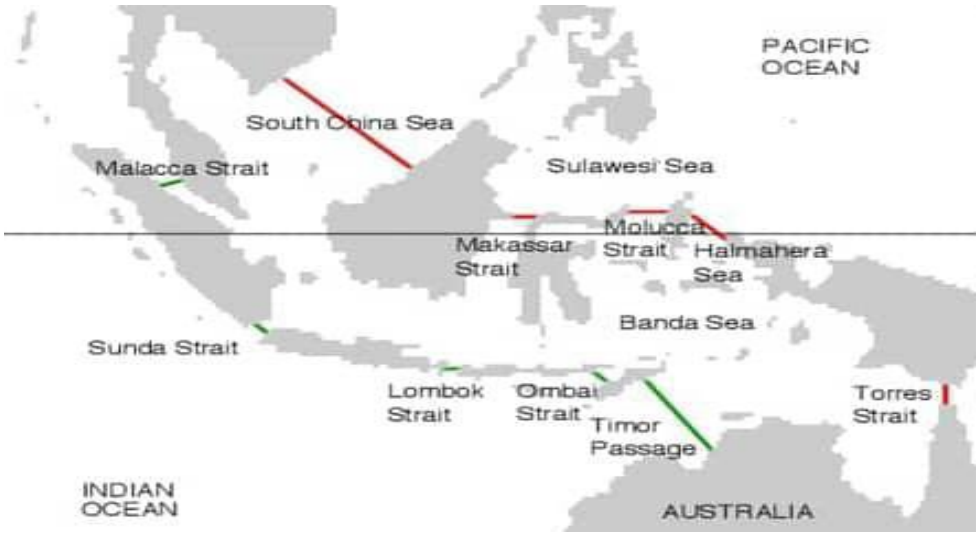
A significant strategic player, China is presenting an ambiguous stance by not adopting this term officially. China critically viewed the conceptualization of the Indo-Pacific as a containment strategy and is reluctant to use this term officially, thus, adhering to the term Asia-Pacific. Chinese officials anticipate the Indo-Pacific concept as a news lens of strategic rivalry between the US and China. In the late 20th century, the rise of China and Asian Tigers boosted the strategic and economic significance of this region. Even though China has not officially adopted this conceptual region yet it is the home of China. China's strategic decisions are of great importance in shaping the security perspective of the region. The proponents and the stakeholders of this region shape the geographical description according to their interests.

3.2 Geographical Construct of the Indo-Pacific

The three ways to understand the Cartography of the world are geographical demarcations, political boundaries or mental maps (a kind of imaginative space). The Indo-Pacific is such an imaginative space carved on a map. In terms of geospatially, this region is perceived as the interconnection of two oceans, the Indian and the Pacific (The diplomat, 2019). The Indo-Pacific region is the most dynamic geopolitical area of the world that comprises the maritime

areas of the Indian Ocean, the western and central Pacific Ocean connecting by the seas in the general area of Indonesia along with littorals of East Asia. Four narrow straits connect both these oceans and all of them lie in Indonesia. For any theoretical construct of the Indo-Pacific region, Indonesia is the linchpin (Storey & Izzudin, 2020). The Pacific joins the Indian Ocean through the Indonesian waterways as follows. Sunda Strait joins the Java Sea (a portion of the western Pacific Ocean) to the Indian Ocean. Lombok Strait connects the Java Sea and the Indian Ocean. The most important straits that connect both the oceans are the Malacca Strait and the Torres Strait. Malacca Strait is a funnel-shaped narrow channel of water that joins the Indian Ocean (Andaman Sea) and the Pacific Ocean (South China Sea). It stretches across the Indonesian east coast to the Malaysian west coast and is linked with the strait of Singapore. It is the shortest shipping canal between both oceans and is evaluated as a significant arterial shipping lane of the world. The Strait of Makassar is a narrow passage situated between Borneo and Sulawesi islands in Indonesia. It is the primary inflow path of the Indonesian Through Flow (ITF). Apart from Indonesian passages, another important path is the Torres Strait that is a narrow passage of water connect these two oceans and is located between Australia and Papua New Guinea. It is the only natural low-latitude where these two oceans meet. There is disagreement over what characterizes the Indo-Pacific as it depends on each actor's perception according to their geographical positioning.

Figure 3.1: Major Straits of the Indo-Pacific



Source: Ocean Science

3.2.1 Indo-Pacific: Divergent Geographical Concept

A new geographical term "Indo-Pacific" has gained prominence in the geopolitical discourse and become popular as a regional concept. The general understanding of the Indo-Pacific region is it consists of two oceans, the Indian and Pacific oceans, and their bordering states. Every state has its own perception of the geographical scope of this region and adapts this concept with their policy development. The geographical construct is perceived varied by the numerous stakeholders of the Indo-Pacific region. The key players of this regional conception such as the UK, the US, Japan, Australia, India, Indonesia and the ASEAN states have ratified their Indo-Pacific policy as an emblem of regional engagement and a symbol of an ideal region based on their values. However, a substantial player, China has not adopted officially this regional conception and primarily adheres to the Asia-Pacific concept.

The main emphasis is on the influential actors' divergent geographical views and does not cover all the countries in detail. The main focus is on the key players that are crucial to a sustainable security structure of the region.

- The US government started to use the Indo-Pacific concept under the Obama administration. The geographical definitions of the Indo-Pacific region remain to change under various administrations. In 2011, Hillary Clinton described, Secretary of State, described the Indo-Pacific as "spanning from the Indian subcontinent to Western shores of America, the region comprises two oceans, the Pacific and Indian. Washington's version of the Indo-Pacific stretches from America's Pacific shores to the Bay of Bengal exclusively. The geographical classification of the Indo-Pacific expanded to include the entire Indian ocean under the Biden administration (Saha,2022).
- Japan describes this region in terms of "Broader Asia" in 2007 and later the concept kept on evolving. An expanded version of Indo-Pacific is shown in the Ministry of Foreign Affairs document titled "Free and Open Indo-Pacific Basic Thinking Material". It revealed the geographical definition as the region stretches clockwise from Japan, Kamchatka, including the US, the entire Pacific Ocean and the whole littoral of the Indian Ocean (Observatory Indo-Pacific, 2021).
- Australia officially adopt the Indo-Pacific concept in 2012, considering these two oceans as one strategic arc. Foreign Policy White Papers defined the region that spans

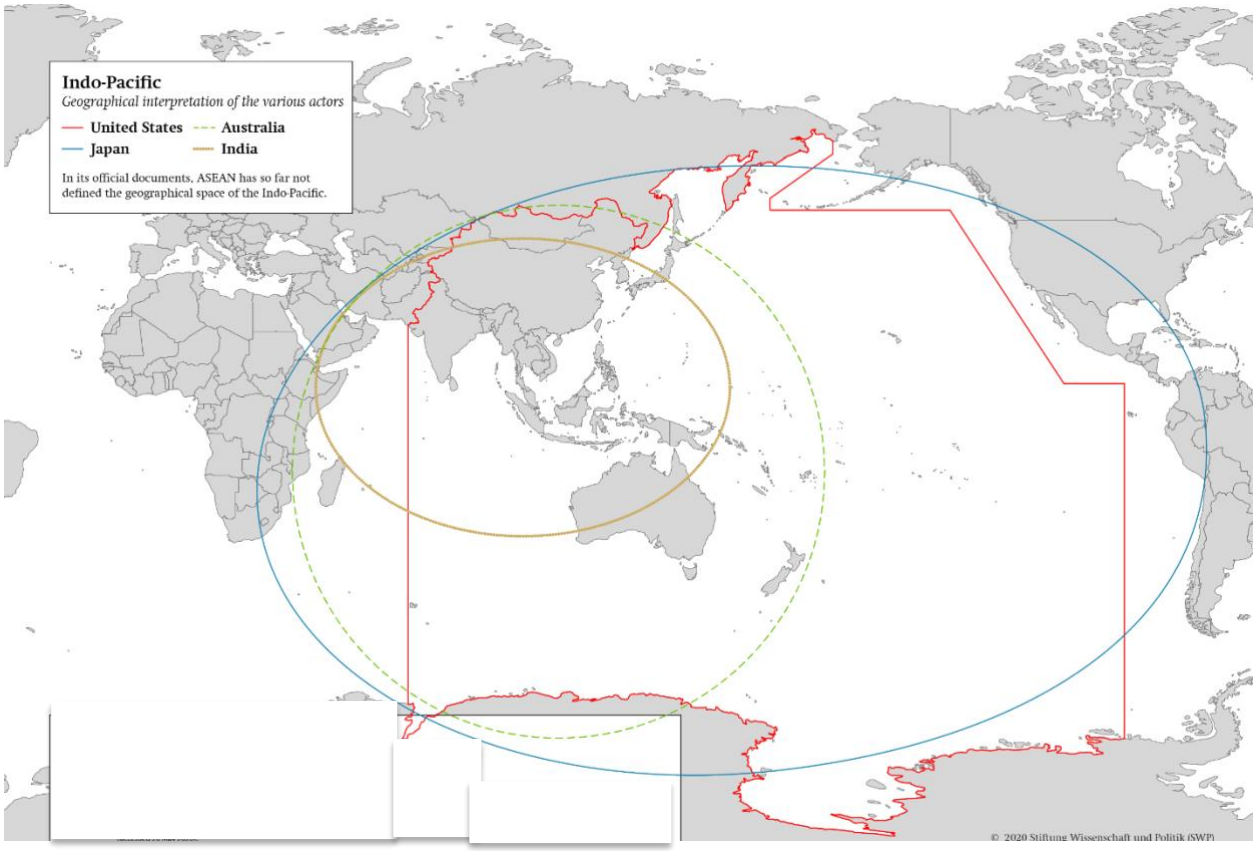
from "the eastern Indian Ocean to the Pacific Ocean adjoined by Southeast Asia, encompassing India, North Asia and the United States" (Haruka, 2020).

- The Indian version of the Indo-Pacific is grounded on the view of an “Open, Integrated, and Balanced” Indo- pacific. Prime Minister of India, Modi interpreted the Indo-Pacific region stretches from the shores of Africa to the Americas, covering two entire oceans, the Indian and the Pacific (Haruko, 2020). India and Indonesia are the two countries that geographically lie in the heart of this region.

- The United Kingdom visions the Indo-Pacific region as a place of new emphasis and called it " Global Britain". The UK partially defined the geographical perspective of the region and might not cover every state and two oceans entirely but include significant players such as the US, China, India, Russia and Southeast Asian states (Haruko, 2020).

- ASEAN's vision is also important as these states holds a central position in the Indo-Pacific region. Indonesia is deemed a significant player because of its geographical location connecting the two large water bodies, the Indian and Pacific Oceans. Indonesia revealed its World Maritime Axis doctrine which referred to it as the Pacific and Indian Ocean region (Santoso & Nafisah, 2018). Indonesia developed its concept into ASEAN's concept and prioritize ASEAN's centrality. ASEAN defines the region as a closed association and envisages the cooperative element. As China is one of the largest trading partners and many ASEAN states are bankrolled by China, hence cooperative thinking is envisaged with China and other stakeholders in this conceptual region of the Indo-Pacific. So, ASEAN prioritizes Asia-Pacific in terms of China's vision and the Indo-Pacific concept takes the back seat in ASEAN's framework.

Figure 3.2: Geographical Interpretation of Influential Actors of the Region



Source: From Asia-Pacific to Indo-Pacific

As each country takes into account a specific geographical definition of the Indo-Pacific region. It infers that the prominent stakeholders of this region formulate policies based on their own geographical perception of the Indo-pacific concept. It is significant to analyze why a state changes its geographical definition and deviates from the common denominator of the conceptual region. As most of the states adopted this concept as a policy symbol then a change of geographical perception is ascertained to a certain intention. Misperception or defying each other's regional perception might overshadow any possible collaboration or dialogues and can lead to mistrust that can steer a security competition. The Indo-Pacific region is now the fulcrum of global geopolitics and has become a widely recognized concept in the strategic and geopolitical discourse.

3.3 Reenergizing the Strategic and Political Leverage of The Indo-Pacific

The Indo-Pacific region has become a new emphasis in the 21st century driven by the widespread interests of the major powers. A more functional interpretation depicts that growing forces of globalization, commerce and changing equations between major powers resulted in the interdependence of these two oceans. The growing mobilization between the Indian and Pacific oceans generated an integrated approach to Indo-Pacific. The Indo-Pacific stretch encapsulates the most crucial seabed routes, densely populated nations at its rims with high energy demands, the abundance of natural resources and the finest global commons. This region emerged as an area of importance because of its natural resources, strategic choke points and maritime trade routes. This region is rich in mineral resources such as the abundance of natural gas and oil reserves and marine fisheries. The estimated natural resource richness of this region is worth about 333.8 billion US dollars (Saha & Mishra, 2020). It carved interest among the bigger economies of the world. The Indo-Pacific is the pivot to the world's busiest trade routes of paramount importance. A large part of world maritime trade passes through these two oceans that bears the threshold above 90percent.

The Indo-Pacific is the region of primary interest on the account of growing financial markets as world's largest economies such as the US, China and Japan are there. The fastest-growing economies such as India and the Association of Southeast Asian Nations (ASEAN) exist in this region. This region is heavily militarized with the seven largest standing armies and possesses five declared nuclear nations of the world. The world's highest military spenders exist in the Indo-Pacific region. The United States, China, India and the UK are the top four largest defense spenders with a World share of 38%, 14%,3.6% and 3.2% respectively. While Japan ranked 9th and Australia ranked 12th in military spending (Stockholm International Peace Research Institute, 2022). The Indo-Pacific generated 60 percent of the world GDP and 60 percent of global maritime trade pass through Asia. It reveals that approximately one-third of global ships transit through the South China Sea alone (Indo-Pacific Region in Major Powers' Strategies, 2022). This region accounts for more than half of the world's population with dynamic development. This region is home to 60 percent of the world's population including 20 megacities of the world (The Indo-Pacific region - Federal Foreign Office, 2021). The Indo-Pacific as a regional framework of 36 nations aims to develop a connected multi-polar region regulated by generally accepted international norms and values.

3.3.1 Indo-Pacific as a Fulcrum of Power: Scholars' Insight

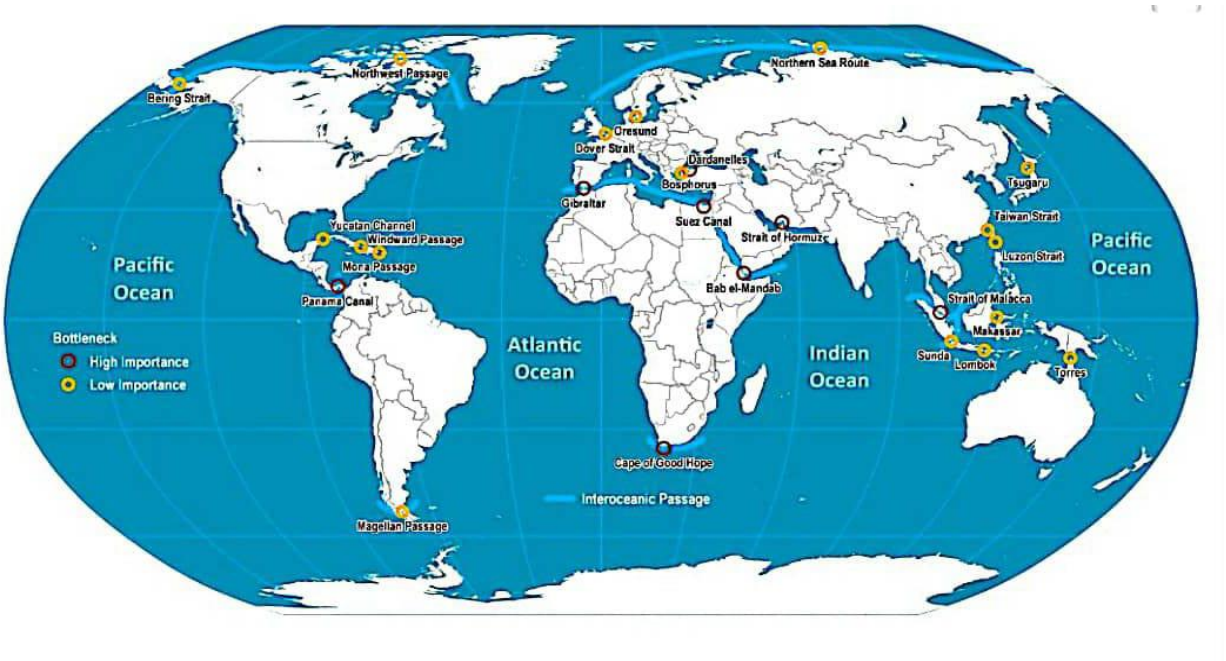
The 21st Century is characterized as "The Asian Century" as its conceptual region the Indo-Pacific has become a global stage for geopolitical struggle among great powers. The power quest to dominate the Indo-Pacific is likely to transform the geopolitical outlook of this region. The importance of this region was enunciated by many scholars and historians. The paramount significance of the Indo-Pacific region can be traced back to Karl Haushofer's geographical ruminations in the 20th century. He emphasized dense indo-pacific concentration that provides a geographic shelter to Indian and Chinese empires. Offshore island arcs of the Bay of Bengal and the western Pacific Ocean provided a protective veil. Now, in the 21st century, both India and China engage in exacerbating competition to maintain their influence in the region (Jha, 2022). The geopolitical strategists Nicholas Spykman and Alfred Thayer Mahan highlighted the importance of maritime waters of the Indian and Pacific Oceans. The significance of this region is put in words by Spykman as a "circumferential maritime highway which links the whole area together in terms of sea power". The US naval officer, Mahan recognized the Indian and Pacific Oceans as a key source to attaining maritime dominance (Scott, 2012). Mahan asserted that the control of the Indian Ocean is pivotal to dominating Asia. This ocean is the key to the seven seas in the twenty-first century, the destiny of the world will be decided in these waters" (Yonus, 2020).

3.4 Mapping the World's Strategic Maritime Choke Points

An indisputably maritime-oriented region, the Indo-Pacific has become a central focus of big powers due to its strategic marine choke points. The Indo-Pacific shows a highly complex marine picture consisting of some strategically significant yet disputed waterways. The Indo-Pacific contains several strategic key ways out of numerous global marine choke points. This region is the home to vital strategic maritime choke points such as the Suez Canal, Strait of Hormuz, Cape of Good Hope, Bab-el Mandeb, Malacca Strait and Panama Canal. Moreover, the Indo-Pacific is home to the most diverse global commons. Global Commons are geographical areas and various natural resources that are not under the sole jurisdiction of any state. It includes deep sea beds, oceans outside territorial boundaries (namely high seas), outer space, Antarctica and other celestial bodies. Global commons are defined as "parts of the earth's surface beyond national jurisdictions". It does not include the contiguous zones and fisheries zones of the bordering states. Global commons are internationally shared zones and resources that are not subject to the control of a specific national entity (Haskins, 2022). The commons

are the powerful muscle of the Indo-pacific and geographically linked to the sinews. These sinews joined the continent subregions and states. The best-known sinews are the Strait of Malacca, the South China Sea, and the Taiwan Strait.

Figure 3.3: Maritime Choke Points of the Indo-Pacific



Source: The Geographical Space of Maritime Transportation

3.4.1 Strait of Malacca: A Vital Energy Corridor

One of the vital strategic waterways, the Strait of Malacca is of utmost important. It runs between Indonesia, Malaysia and Singapore. It is the main and quickest shipping channel between the Indian Ocean and the Pacific Ocean which serves as a vital economic lifeline. This water channel is the shortest maritime route which is about one-third times shorter than the closest sea routes between these two oceans. It is linked to 400 shipping lanes and more than 700 ports in the world. A quarter of maritime trade passover Strait of Malacca. This bottleneck of the Indo-Pacific is the busiest sea route between the Indian Ocean and the South China Sea that allows 2000 ships per day. This water channel is a gateway of trade to and from Asia. 25% of the world's traded goods pass through this water channel. Several key players in Northeast Asia such as China and Japan heavily relied on this sea route for their oil imports. Any disturbance or blockade of this channel means China would be cut off from its energy supplies in the Middle East and raw material supply from Africa would also be hindered. It will cause direct harm to its capacity as an emerging power in the region.

The geographic confines of the Strait of Malacca such as its shallow depth limit its capacity for larger vessels. Such large vessels have to divert their passage towards deeper waterways of Lombok or Sunda Strait with increased travel time between markets. In response, surging competition among States which affects the security and stability of the region. As a natural choke point, it has been a major focus of regional powers (Kuper, 2019).

3.4.2 Strategic Features of the South China Sea

South China Sea (SCS) is deemed the beating heart of the Indo-Pacific and holds a vital significance in the region. The South China Sea is one of the world's largest and semi-enclosed seas that borders the Southeast Asian mainland. It is considered the arm of the western Pacific Ocean that stretches from the Singapore Strait to the Taiwan Strait. This sea is the combination of ample natural resources, significant yet disputed islands and substantial rivers. The Paracel Island, the Spratly Island, the Pratas islands and the Macclesfield bank are the disputed zones in SCS. Many regional states and predominantly China have sovereignty claims over the majority of the archipelagos. The South China Sea is the hub of natural resources such as oil, gas, natural pearls, fishing points, coral lime, etc. It is full of industrial minerals such as hydrocarbons, tin, zinc, copper, cassiterite, monazite, ilmenite and a number of salt mines with an estimation of 604,000-ton annual output (Mustajib, 2016). A Chinese agency, the Ministry of Geological Resources and Mining, figured that more than seventeen billion barrels of crude oil are present in SCS (Akram, 2022). The US Energy Information Agency indicated that there are natural gas reserves of about 190 trillion cubic feet and the amount of oil is equal to the total oil reserves of Mexico (Miller, 2017). The US geographical survey revealed that there are additional undiscovered resources of oil (12-billion-barrel oil) and gas (160 trillion cubic feet) in the South China Sea. The US Energy Information Administration (USEIA) stated that 1 trillion cubic feet of natural gas lie in Parallel Islands. Moreover, 12 percent of global fishing is produced in this sea and Spratly Island is home to fishing grounds. The fishing industry is vital in boosting the economy of China, Vietnam and the Philippines. China is the largest consumer and exporter of the fishing industry due to its closest fishing zones in Paracel island. The SCS contains one of the important shipping lanes such as the Strait of Malacca that is an essential maritime crossroad for world trade and the biggest sea route of Liquefied Natural Gas. The SCS managed three times more heavy traffic than the Suez Canal and five times more than Panama Canal, covering half of the world trade route. The SCS links Asia, America and Europe through Singapore port and Hong Kong port. Energy supplies, oil imports from the Middle

East through the Indian Ocean and the world's traded goods flow through SCS. The economic stability of regional actors, primarily of China is heavily dependent on this sea. As China is said to be the one of the largest trading partner of almost every country linked through SCS (Auslin, 2017).

The Indo-Pacific region is hailed as the World's center of gravity since the global political and economic axis are moving towards this region. The Indo-Pacific has been destined to be the region of major power's interest that lies in the foundational basis of their strategic vision. The formulation of strategies has influential impact on regional and international security (Indo-Pacific Region in major powers' strategies - National Defense Journal, 2022). The strategic imagination of the Indo-Pacific is heavily influenced by the growing footprints of China, the struggle of emerging economies to pull ahead and the US endeavor to contain China to maintain its influence across the length and breadth of the region.

3.5 The Indo-Pacific Competitive Space: Sino-Us Strategic Visions

This region holds the key position in the world economic, security and political theater where states struggle to dominate this region to attain world dominance. States are exerting influence through their strategic visions and plans to achieve their underlying goals of national interest. The divergent strategic interest of the key actors made the Indo-Pacific a contested geological space. The central venue of great power competition is the Sino-US divergent strategic interests. At first, the strategic goals, interests and policies of two great power rivals, China and the US, must be analyzed. The US and China uses critical power tools of diplomacy, politics, ideological, military and economics to gain the strategic outcomes. Two strategic frameworks, "Free and Open Indo-Pacific" outlook of the US and "community of common interest" vision of China based on divergent interest. The US presented its geographical focal point based on Free and Open Indo-Pacific as a value laden region. Wang Yi (Chinese Foreign Minister) interpreted this regional conception as dissipating like ocean foam. China holds a skeptic view regarding the Indo-Pacific and characterize it as nearly meaningless yet strategically dangerous. China envisioned that this regional conception would exacerbate the security dilemma. China perceived the US FOIP framework is to restrict its maritime claims of the First and Second Island chains. While the US perceives that community of common destiny as an attempt to exclude the US from this region (Saunders et al., 2020).

Obama administration highlight the Indo-Pacific in their initiative and centering the engagement of China and India. While Xi Jinping administration represent an assertive posture

of China which dramatically change the tone of Sino-US relations. China misinterpreted the decline of the US after the economic recession of 2008. Moreover, misperceiving the Obama administration steps for bilateral cooperation causes a considerate damage to Beijing's stance. While China uphold its stance by maintaining a balance between *weiquan* (defending China's sovereignty) and *weiwen* (regions stability). In addition to, matter of territorial claims is subject to United Nation's Convention on the Law of the Sea and asserted by other regional states as well. The phase of bilateral hardening started gradual at the end of Obama administration and take up to the official level under the Trump administration. The US spoke of a geopolitical competition in the Indo-Pacific "between the free and repressive visions of the world order" and interpreted China as a "revisionist state" (National Security Strategy, 2017). The Free and Open Indo-Pacific vision was enunciated by the President Trump in 2017. The inaugural commander of the US Indo-Pacific Command asserted that China is a threat to our long term strategic vision of free and open Indo-Pacific. It is not only a contention between an established power the US or a rising power China. China is more inclined to transform the international order based on Chinese characteristics. In 2018, President Donald Trump's new tariffs policy mulls a trade war between China and the US. A tit for tat tariffs war increased the trade tensions between both countries. The Joe Biden administration reviewed tariffs policies while keeping Trump era China tariffs in its place (Poonkham, 2022).

Major powers are well aware of the gigantic shift towards technological advancements and economic security. Every state strives to gain economic might as the notion of power has principally taken as an economic dimension. As in the 21st century, economic giants have influence in almost every sphere of the globe. So it has become the central focus of the national interest of the states. The economic ascendance of the opponent states generates a security threat, hence, a ceaseless competition ignites. Against this backdrop, China has taken the bold economic measures to confront US-led global institutions. The promotion of Belt Road Initiative (BRI), Mekong-Lancang cooperation channel and the Asian Infrastructure Investment Bank (AIIB) are significant measures. This rapid economic advancement enabled China to fund for the modernization of its armed forces and engage the regional countries in infrastructure building. Washington's tariff policy seemed to restrict China's economic might and to decouple the economies of other countries.

The US purses a double strategic goal under the Indo-Pacific framework. At first, it wanted to maintain its dominant power as well as to contain China's rise. Therefore, the US fastens its ties with likeminded influential regional actors. In this respect, the quadrilateral security initiative (Quad) was taken between the US, Australia, Japan and India. Even the coinage of

Indo-Pacific has underlined India's significance as the US deemed it as a net security provider in the region. In recent times, a trilateral security pact (AUKUS) between the US, Australia and the UK was particularly proposed for the Indo-Pacific region. By doing so, the US and allies try to shift the regional distribution of power in their favor and constrain the influence of Beijing principally in the South China Sea (Poonkham, 2022). The security pacts include the defense, logistics exchange, technology assistance, capacity building. China perceives the defense and security agreements of the US with its allies as an effort to isolate China. Such security pacts and summits for promoting democratic and liberal policies intended to curb Beijing's soaring influence in the Indo-Pacific. China perceived these security pacts as sinister gangs having an exclusive intent to contain Beijing. In response, China prefers to secure its core interests in the Indo-Pacific mainly in South China Sea, Taiwan, Hongkong and Xinjiang. China's Wolf Warrior diplomacy is tit for tat response to the West (Global Times, 2021).

The resource rich region generates the competition to scramble the scarce resources among the heavy weights of the world. The key role of emerging powers increases the strategic complexity of this region. This region is the hot bed of disputes among various sovereign states over territorial waters, islands, seabed exploration of natural resources and global commons.

3.5.1 Control of Key Maritime Chokepoints: Nations Competition

Marine choke points enfold geostrategic and geo economic significance for a nation's interest in a befitting manner. Controlling the strategic choke points enables a state to exert its influence and even constrain the functioning of maritime transits. The blockage or forcing the sea vessels to take alternative routes resulted in economic turbulence of the supplier and recipient economies. Apart from this, the subjacent marine choke points entail the risks of maritime congestion, piracy, terrorism or the control of hostile power. So, geostrategic players struggle to control and secure the maritime choke points. The Indo-Pacific is broadly understood as a new area of importance, firstly because of its vast expanse, secondly due to surging competition in maritime dominance (including blue economy) and thirdly the heightening US-China rivalry.

3.5.2 Malacca Dilemma

The Strait of Malacca and the South China Sea are closely interlinked to the Sino-US competition related to the Indo-Pacific. Malacca Strait serves as a strategic window of opportunity for economic gains. China is exclusively dependent on Malacca Strait and the SCS

because 60 percent of China's trade flows through these sea routes. The presence of other powerful actors in the SCS is a threat to China's strategic and economic spine. This plight is defined as the " Malacca Dilemma" by the former president of China Hu Jintao in 2003. He indicated that certain powers have intruded and ventured to control the Malacca Strait (Paszak, 2021). The term “certain powers” imply the US's unparalleled capability to preside over the Indo-Pacific waters. The gigantic naval fleets of the US as a net security provider to its allies bring in the vulnerability of China to a potential naval blockade. Moreover, China's overreliance on a single choke point called for diversified influence over other sea routes as well (Myers, 2021).

3.5.3 South China Sea at the Core of Overlapping National Interest

The special resonance to the Indo-Pacific region’s rivalry is the South China Sea. South China Sea has gained currency in the geopolitics of Indo-Pacific. Due to its affluent resources, it is called as the "second Persian Gulf" (Arfeh, 2019). The resource rich sea falls under the temptations of competing states to occupy it. The dispute over this sea and its islands started due to oil shortages in 1970s. Philippines was the country to claim over Spartly Islands in due to its oil reserves (Dosch, 2015). The geophysical surveys report strongly indicated the presence of oil and gas reserves in this region. It got attention of the world among fueling prices of oil and gas. Wu Shicun in his seminal writing, *Solving Disputes for Regional Cooperation and Development on the South China Sea: A Chinese Perspective* (2013) illustrated the utmost importance South China Sea. He referred the words of Vice Chairman of the France Navigation Committee that it is impossible to ignore geostrategic position of this sea accompanied by islands and sea routes. The US, China and regional actors struggle to gain stronger position there. The control over SCS is a key to dominate whole East Asian Region that ultimately paves the way to become a regional hegemon. Wu Shicun interpreted the four stakeholders of the disputed region are Vietnam, Philippines, the US and China (on one side with overall claim). The South China Sea got attention of regional stakeholders as well as major powers due to immense resources, economic leverage, cost-effective trade routes and a key to regional supremacy (Mann, 2023).

The SCS has vital importance and serves as the backbone of economy for regional actors such as Vietnam, Philippines and China. The tensions triggered over the territorial claims and sea bed exploration. China is making sovereignty claim over the whole South China to maintain its upper hand and to establish hegemony in this region. The string of pearls and vital BRI

maritime trade routes makes this region of mounting importance for China. China seems to be evacuating the status of a spatial power to become full-fledged power in the region (Paszak, 2021). Tom Miller in his book *China's Asia Dream* (2017) referred the US energy information agency report related to abundant oil and gas reserves in SCS. Miller wrote that oil and gas is the main attraction that stimulate China to gain dominance of this place. This move is a biggest security threat to the US, Japan and other states' economic lifelines. In the pursuit of increasing its power in SCS, China build the infrastructure in Woody islands and made its military base. Chinese administration took the initiative of manmade islands which are working as functional military bases and launching pads. This indicate that China can use SCS as a dynamic citadel for its submarine (carrying JL-2 missile) and might target the US bases in East Asia. The sole purpose of these manmade islands is to proactively manage any emergency combat (Akram, 2022). In response, the US make sure its strong naval presence along its allies in the Indo-Pacific to maintain its dominance. All this scenario has commenced a power game among the states.

3.5.4 Strife in the Indo-Pacific's Commons

Indo-Pacific is home to diverse global commons. As mentioned above, global commons are not subject to the national justification of any state, thus creating a power vacuum. The absence of any authoritative entity, especially in the high seas, making it the potential flashpoint among great powers to have access over its resources. Apart from physical global commons, the technological advancements underpinning transportation, commerce along the invisible network of communication emerged as the new manifestation of the commons. With the increased artificial intelligence (AI) usage, both physical commons and virtual domains of commons are vulnerable to disruption by security threats. For the most part, throughout the Indo-Pacific's isolated islets, territorial waters, exclusive economic zones and different interpretations are subject to nations' clash. Such tensions increase the distrust in the commons at high levels. The interest of the US along its allies lie in regional security. The US maintains a rationale of protecting the Indo-Pacific commons from any political or military tensions and sustain its forward engagements in this region. The changing dimensions raise the question over free and open Indo-Pacific' strategy that leaves potential threat to commons. Majority of the territorial disputes in the Indo-Pacific's commons are between China and other stakeholders of the region. For instance, the dispute over the Senkaku Islands between Japan, China and

Taiwan. Spratly and Paracel Islands are the renowned disputed territories between China, Taiwan, Malaysia and Vietnam (Auslin, 2010).

3.6 The Prism of Neo-Realist Thought

Great power competition has exacerbated the tensions and the risk of potential escalations increases the security dilemma of the region. Military showdowns upswings to display their military muscles. The Indo-Pacific has become a subject of hegemonic attempts and counter hegemonic strategies to gain dominance in this region. John Mearsheimer interpreted the future of Asia by the rise of great powers, their strategies and response of other states in the competing scenario can be perfectly viewed through the lens of structural realism (Mearsheimer, 2006). The US Indo-Pacific strategy reflects that the rise of China that is synonymous to power transition is a challenge to the United States' preponderance of power. The US is pursuing both internal and external balancing. Internal balancing pertains to building its military muscle and external balancing refers to the alliance and security pact formation (Smith, 2019). So the Indo-Pacific Strategy of the US utilizes the threat perception regarding China and makes sure the regional actors would opt for the US rather than China.

China is facing a double dilemma, as the status quo position intersects the US interests leaving a detrimental impact on other states. An endeavor to undermine the power preponderance of the US would be considered a revisionist move. It will prompt the balancing coalition against China in the region (Paszak, 2021). So, China is turning on its defensive and offensive mode to become a world class navy to secure its imperiled interest. John Mearsheimer's offensive realism indicated this fact that Beijing's neighbors are fearful of its rise and preferably coupled with the US to contain its rise (Mearsheimer, 2014). Neorealism anticipates that there should be preemptive measures to restrict China's rise, portrayed by diplomatic moves, alliance formation, or coercive actions. The neorealist proponents Ross H. Munro, Richard Bernstein, and John Mearsheimer argued that the exponential growth of China and its military modernization has the possibility to alter the status quo not in Asia but at the global level (Younus, 2020). The other schools of thought such as liberal scholars assert that engagement policy with China would be more beneficial. While neorealist view it as a brainless move and opine to contain China at earliest by all means.

The Indo-Pacific region has turned into a cockpit of global rivalry with an intense geopolitical competition of great and small powers. The world seems to be divided into bipolar or

multipolar blocs in the near times. A traditional parable can define the Sino-US rivalry as two big elephants in the same room struggling to gain supremacy. The fight of two big elephants causes the small grass to suffer. It is a strong indication that small powers face the security dilemma in the detrimental great power competition. The Indo-Pacific is closely linked to many aspects of Sino-US competition. Against this background, it is noteworthy that the geographical construct is based on explicit political intentions and interest. Decade long offensive posture of China especially in China Sea to sustain its maritime sovereign claims and the US assertive posture to maintain its power preponderance in the region leaves a considerable threat to this region. The overlapping interests and power quest in the anarchic system leads to uncertainty, insecurity and mistrust among the states.

There are several dimensions of Sino-US competition for power and status. The primary dimensions are the aspects of military threat, disagreement over trade policies, political and ideological facets. The rivalry is not limited to these factors but also centers on technology development, its policy formulation and to gain supremacy in it. The next chapter underscores the technological competition between the US and China and a struggle to dominate the Indo-Pacific is highlighted. The considerate elements of Sino-US competition predominantly based on technology over several years. The flash points of Sino-American entanglement can be described as "3Ts" inferred as trade, technology and territorial/maritime contests (Poonkham, 2022). The trade war started with the introduction of tariffs under the Trump administration to curb China's economic influence. The main focus of trade war is on technological advancement, this characterizing it as technological competition. This cutthroat competition mainly shifted in digital space. The surging competition in 5G technologies and AI- based military arsenals to gain leverage over adversaries. The maritime competition and overlapping interests coupled with power quest of both actors hinges the significance of the Indo-Pacific region.

CHAPTER 4

HIGH-TECH COMPETITION IN THE INDO-PACIFIC

4. Introduction

Technology has gained credence as the main driver of economic, political and military power. States engaged in a perpetual competition to lead in technological development. Great powers perceive the control of high-tech is synonymous to the control of global market, trade, economy, and politics. The power of technology would further expand the geostrategic influence of key actors. It is understood that high-tech competition is a modified form of strategic competition. It is basically the competition of ideas of innovation, investment governance, and production of advanced technologies among companies or states. This is resourceful in enhancing economic stature, military power and ultimately intangible advantage to the leadership of that state. The advent of cutting edge technologies are reshaping international competition. Technological supremacy enables control over modern levers of power which accelerate the geostrategic influence of the leading edge states.

Technology has become central to international politics in the character of shaping the relations among the nations. As international politics is unwinding into a great power competition, the relative importance of high tech development is increased along with economic and military parameters. Historically, the development of leading edge technologies equipped the nation-states with economic influence, sovereignty and a leverage in foreign policy. The importance of technologies has been accredited by International Relations scientists. Since the 1970s, technological innovations prompt transformations and play key role in defining international relations. According to Robert Gilben, technological advancements allow the states (progressive or leading edge) to stimulate their political superiority at international level.

In the 21st century, the key driver of great power politics is the high tech competition. The course of international politics has been long influenced by the development in science and technology. For instance, technological development put forward the industrial revolution that shaped the modern international system. Technologically advanced industrialized nations gain vast economic and military power. It sets a hierarchy among nations where industrialized nations exercised power over less advanced nations to maintain their superiority. In this age,

the absolute and relative development of states along their economies required advancement in science and technology. The states that are the leading inventors gain the lion's share of success. More technological innovation is synonymous to more power for sovereign actors in the world politics. Technology served as a primary engine of economic growth. In technologically advanced countries, 60 to 80 percent of economic growth is due to high-tech development. While the diffusion of technology to less advanced states utilized in 90 percent of productivity growth of many countries (Drenzer, 2019). In the matter of security policy, new military technologies play the significant role in determining the global military balance of power and formulation of national security strategy. For great powers, high tech supremacy is an important strategic competitive parameter. Against this backdrop, the two leading powers, the US and China are locked in a piercing competition for technological primacy.

Gary Peters (US senator) analyzed the key areas such as patents, research publications, citation papers and STEM education in which China is quickly catching up. He emphasized heavy investments in research and STEM education to promote and preserve the US competitiveness. Analysts of Council of Economic Advisors suggest the government should double or quadruple the investment to maintain the competitive advantage. Based on this conference, the main grounds of assessing the high tech competition underlined as patents, research publications, STEM education and level of investment in science, technology and innovation. This chapter will analyze the scale of US advancements and how China quickly catching up and surpassing the US in these parameters of high-tech competition (Rasouli, 2015)

4.1 Us-China Competition: A Struggle for Technological Supremacy

Over the past two decades, Sino-US rivalry has become a paradigm of international relations. Technology is the defining element of this growing strategic competition among leading powers. The US and China have entered into a piercing technological competition. To gain technological primacy, multinational corporations of both China and the US, locked in a hard fought battle. Innovation and technology sectors not only alter the competitive paradigm but also render a new political environment by generating market pressure indebted to rivalry. The emerging high tech competition turns the tables in the geopolitical dimensions. It is not similar to the conventional competitions solely for land or resources. On the contrary, it is inclined towards a race of creating new technologies to gain dominance in the digital world. Both powers are graded as economic giants with military might and possess cutting edge technologies. The key factors of the US-China relations such as politics, economy, or trade

cooperation are driven by deep government mistrust. Now, the competition between two economic giants has gone far beyond trade tariffs or reprisals and is driven by a race to gain technological supremacy.

4.1.1 China's Emergence as a Near Peer High-Tech Competitor to The Us

The US National Academies of Science, Engineering, and Medicine published a report in 1999, that titled the US as the largest inventor of 20th Century technologies and will be leading in future technologies. The elephant in the room it missed was China. China take the road to development and progress in science, technology and innovation back in 1970s. Deng Xiao Ping took the initiative in 1978 by sending millions of Chinese students to leading Universities of Europe, Japan, America and all over the world. Special teams routed to the developed world tasked to learn and master the modern technology. A large amount of capital was funded for research and development (R&D) and science and technology by the government (Shuo, 2019). The educational standards have been significantly upgraded with maximum liberties, facilities and high fundings granted by the government. Now, Chinese universities are among the chart-topping universities of the world. China struggled hard and learned from all over the world to overcome the gap and paved the way for global leadership in science, technology and innovation (Awan, 2023). The central leadership in China apprehends the stakes of technology competition and gears towards the forefront of innovative countries by 2035. Remarkable national strategies formulated to acquire the overseas technologies by introducing talent programs, high tech parks, open-source science and technology strategies play the role of green lights in China's advancement in emerging technologies.

America was acknowledged as a global leader in 2000 by the count of undergraduate university degrees in science and engineering that was over 500,000. In the same year, China stood lower by the total number of 360, 000. Now, China outweighed the US by the count of graduates in Science, technology, engineering, and mathematics (STEM) by four times and in computer science by three times (Zwetsloot et al., 2021). The Organization for Economic Cooperation and Development (OECD) conducts Program for International Student Assessment (PISA) every three years to evaluate critical thinking in science, math and reading literacy with an innovative domain of creative thinking. Researchers called PISA an indicator to assess that education systems are preparing the students for modern levers of 21st century science, technology and innovation. The countries that attain the high PISA scores lead to economic success. China invariably outscores the US in PISA 2018. China topped the list, Singapore and

Estonia ranked 2nd and third respectively. While the US ranked 25th with the score slightly above the average score (Organization of Economic Cooperation and Development, 2018). Norman Augustine (CEO of Lockheed Martin) asserted that the US technological dominance is threatened by the lack of human investment. Despite having first rate research institutes and universities, the education system is not competitive. Historically, America benefited by attracting the global pool of talent as more than 500 companies of US fortune founded by immigrants. The National Security Commission on Artificial Intelligence recognized the US is at the risk of losing the war for talent mainly at scientific frontiers (Lane, 2021).

At the turn of this century, America was top of the line by spending 270 billion dollars in research and development while China's expenditure was 33 billion dollars. China covers 90% of the gap by 2020 and rose to second position in research and development expenditure. To confront America's strong position in scientific developments, China is turning scientific developments to commercial products. China is spending 70 billion dollars annually in experimental development exceeding the US investment (Heney, 2021). In the list of World's 10 most valuable tech companies, the top six are US companies. While 6 Chinese companies made their place in the valuable unicorns pioneering new technologies (Yi, 2020).

The research publications and patents are considered as the parameters to measure the science and technology status of a country. China has been issuing high quality research journals with high impact factors and high citation factors. In the second benchmark, patents, China exceeded the US. China supplanted the US in international patent filings and became the top user of Patent Cooperation Treaty (PCT) (Tollefson, 2018). During the period of 2000-19, China's share increased from 0.6% to 22% while America's share dropped from 42% to 22%. China surpassed the US in scientific publications in 2016 by producing 20% of worldwide science research (Zhang, 2021). Moreover, technological prowess is imperiled by outsourcing of manufacturing ability and antitrust measures against leading companies. Andy Grove (Intel CEO and Silicon Valley legend) asserted that losing the ability to scale up indicates losing the ability to innovate that ultimately loses the hold on new technologies. He asserted that China's ability to scale up the innovations of others has strengthened its technological rise. Paulson Institute (US based think tank) published a report claiming the maturity of China's technology ecosystem. Its capacity can match the Silicon Valley standard by 2025 with regard to innovation, dynamism and competitiveness (Tan & Kawate, 2020). Tarun Chabra (Senior Director for Technology and National Security) and the Center for Security and Emerging

Technologies noted that the US is no longer the hegemon in global research and development (Chabra et al., 2020).

The durability of China's trajectory of development often called into question. The rise of China mirrored that of Japan in the 1980s. By the 1990s, Japan was also predicted to displace the US as the leading economic and technological power. Historical analogy shows the development in both countries was subjected to slow productivity growth, state interventions, and highly centralized policies. However, the tech value chain of China is more competent (Pesek, 2021). In reference of purchasing power parity, China's GDP is 15 times higher than the US. Over the past two decades, China's research and development spending is equivalent to America's spending by 90%. While Japan's GDP and research and development expenditure could not reach even up to 50% of the US spending. China's venture capital (VC) market is the second largest in the world with an investment of 105 million dollars reaching 95% of America's VC spending. Despite sanctions, restrictions and technology constraints, China has accelerated and developed indigenous technologies (Zinser, 2021). China is a chart topper in several areas such as 5G technology, laser, information technology, high-speed rails, agriculture and construction. The comprehensive utilization of its research and development output is making the way to gain supremacy in artificial intelligence.

4.1.2 Key Determinants of Sino-Us High-Tech Competition

The Sino-US technological competition aspires to reach worldwide technological leadership. There are several determinants of US-Chinese technological competition such as Information and Communications Technology (ICT), semiconductor, artificial intelligence, innovation patent, cybersecurity and access to the moon and deep seabed as well. Any powerful actor who wants to dominate has to excel and replace its opponents in these areas of influence. Bill Burns (Director of the Central Intelligence) underlined technology as the spotlight of competition and rivalry with China (Barnes, 2021). The frontline technologies that lie at the center of global competition include artificial intelligence, quantum technology, and biotechnology. President Joe Biden emphasized the leadership of America in key trending technologies while signing CHIPS and Science Act. These frontline technologies have high value. For instance, 5G is launched to forge $13 trillion in global economic value and to create employment opportunities (22 million jobs) by 2035. By 2030, AI is projected to generate $15 trillion in the global economy (Allison et al., 2021). The leading competitors China and the US are substantially investing in these fields that signified the strategic role of these technologies. A brief overview of frontline technologies is given in the following paragraphs.

4.2 China is Closing the Gap with US in Artificial Intelligence

Artificial intelligence is the new battleground for great power competition. It has become an absolute priority of the leading power's administration. The countries that are advancing in emerging tech, predominantly in AI, will be able to build political, economic and military muscle for decades. Leading powers of the world are using AI as a tool to increase their global influence. Even smaller states can punch above their weight by leading in AI technology. States that undermine the potential of AI may jeopardize their national security, economic growth and military competitiveness. It has the prospects to influence the formulation of policies, strategies and resource allocation of a state's national security community. Vladimir Putin (President of Russia) accentuates about the immense potential of artificial intelligence that whoever leads the AI will rule the world (Gill, 2020). Artificial intelligence has an extensive influence in various sectors ranging from education, transportation, finance to military sectors. For military dominance, AI has enhanced the capability by automated vehicles, autonomous weapons, drone swarming, logistics and cyber operations. Furthermore, Fortune Business Insight reported the market value of the AI market accounts for $36 billion in 2020 and is anticipated to project $360 billion by 2028 (Davies, 2021).

The United States has been an innovative leader in key emerging technologies. From 2001 to 2008, America was leading 95% of tech areas. RAND Corporation published a report that highlighted the six areas; Artificial intelligence, additive manufacturing, ceramics, quantum computing and sensors that surge the technology competition. Compared to any other state, the US is the first to file in meeting tech areas as an innovative country (Hadley, 2022). The book "*At the Speed of Irrelevance: How America Blew Its AI Leadership Position and How to Regain It*", highlights key insights about AI competition between the US and China. In AI space, the US has the powerful lead all over the world. With the rise of peer competitor China, the US is failing to maintain its dominance in certain areas. China is leapfrogging while the US languishes. General Mattis issued a Defense Strategy in 2018 for the US that calls for development and implementation at the speed of relevance. Falling to second position in technology competition is a great deal for a leading power. AI has become a driving force in innovation and productivity in every industry. If the US lags behind in the AI field, chances are solid that it will be blanked out of other sectors as well (Naqvi & Janakiram, 2022).

(a) China makes some gains

For three-quarters of century, the United States has been leader of science and technology while China was a follower. From 2009 to 2017, China significantly altered the course. It emerged

as a potential competitor and led in many areas of AI. Eric Schmidt mentioned explicitly that China has gained the status of a full-spectrum peer competitor. Nicholas Chaillan (first Air Force and Space Force Chief Software Officer) boldly claimed China as the winner of the AI race. He asserted the fact that victory of China in AI competition is already a done deal (Manson, 2021). In contrast to the US, AI has become a national priority of China since 2015. In terms of leading the global AI industry, China put out a New Generation Artificial Intelligence Development Plan by 2030. China made heavy investments in the overall AI process and exceeded the US. China holds 48% of AI venture capital while the US accounted for 38% in 2017 (Bradley, 2020).

China is taking intellectual preliminary measures for generational advantage in the age of AI. For instance, in speech technology, Chinese firms are winning against the US firms in every language. iFlytek is a world's leading Chinese AI-based information technology company with over 700 million users that is twice the number of users in Apple's Siri. In financial technology, China's WeChat (multipurpose social media app) that serves as a digital wallet for online payments and transactions has more than 900 million users. It outpaced the Apple Pay of the US with 44 million users. The spending through mobile platforms was 42 trillion dollars in China while one-third of Americans depend on credit cards. This spending makes a treasure house of granular data that can be utilized in other biotech applications. Six years back, there were twenty world's top premium internet companies out of which two were Chinese. Today, Seven Giants of the AI age such as Amazon, Microsoft, Google, Facebook, Baidu, Tencent and Alibaba are prevailing on either side of pacific. For every 10-dollar venture capital investment, five fled to Chinese startups and four went to American companies (Shadlow & Richard, 2021).

The research publications and patents are the significant areas of science and innovation. China witnessed an increase of 35% in AI-citations from 2019. China overtook the US with six times more publications of deep learning patents. Allen Institute for Artificial Intelligence estimated that the US will drop to second by 2025 in top cited AI papers. AI researchers and institutes play a significant role in strengthening the position of a state in international competitions. China is at an advantage with the highest population density that creates an exceptional pool of talent. For instance, China stands first at SQuAD's machine reading comprehension. China won 88 gold medals while the US won 55 at the International Olympiad in Informatics. Howbeit, the US is at an advantage as big names of the AI industry are working for US based companies. Being the superpower, America can recruit the talent from all over the world. While China is restricted to its population due to ingrained insularity (Kalinicenko, 2021).

China put forward various national strategies and plans to lead the global innovation sector and to displace the US leadership. Still it lags behind the US in research and the use of AI. The US topped the chart with a score of 100 in the Investment Monitors AI ranking. China falls at 20th position with an indexed score 50.82. The US headlined in AI investment and innovation out of 40 counties (Denix, 2021). The US is leading four out of six divisions of AI such as research, development, talent and hardware. The US gained 44.2 points out of CDI's scoring of 100 and China received 32.3. The US has an adequate AI start-up ecosystem and the development of semiconductor and computer chips that is the foundation of AI systems. In 2018, China left behind the US in start-up funding (Radu, 2019). Center for Data Innovation (CDI) claimed that China is still lagging behind America in many metrics and the US is leading in absolute terms. The US based National Security Commission on Artificial Intelligence evaluated that if the same trajectory is being followed then China has the power, talent and ambition to overtake the US and become a global leader in AI. As the upcoming decade is the period of implementation. If algorithms and hardware leaps significantly advanced in AI, then the advantage lies with the US.

4.3 Sino-Us Vie for Quantum Tech Supremacy

Quantum technology has become the crux of the Sino-US competition of emerging technology. The US and China indulged in a competition to develop the world's best quantum technology. Both powers view quantum technology as significant to maintain national security and economic growth. Heavy investments are devoted by both the US and China dedicated to their national efforts in leading in quantum science. Quantum technologies such as quantum computing, quantum cryptography, and quantum communication are those technologies that have the capacity to alter the balance of military power and financial equation. Out of which quantum computing highlights its potential to break the algorithm of modern-day computers with high-profile sensitive information. The hype of quantum computing puts national security at stake (Buchholz et al., 2021). Quantum information science (QIS) is a combination of two foundational fields of modern technology; quantum mechanics and information theory. QIS has the potential to transform industries dependent on speed and computing power such as automotive, finance, and aerospace. Quantum science has the potential to cement the technology leadership or undermine it. The first country to invoke quantum technologies will be equipped with the power to dominate the unprepared opponents. Such countries could be able to break down the encryption systems, shade themselves by building firm encrypted

communication networks and develop the sensors with utmost precision. Quantum technologies have huge prospects of market value and is predicted to gain a global market value of $1 trillion before 2035. To commercialize quantum tech will mean dominating the market and having an upper hand in the governance models of the market (Howell, 2023).

The US national program makes competitive strategies for sound footing in quantum science and technology. The National Quantum Initiative Act was passed by the US government in 2018 to keep pace with its peer competitor China and other growing countries in developing quantum technologies. The U.S National Quantum Initiative authorizes NASA and the National Institute of Standards and Technology to make a strategic plan for advancing quantum science and technology. This act aims at sustaining the US leadership in QIS and accelerating quantum research and development. Under this act, the National Security Memorandum (2022) formulated the initiatives and guidelines to promote America's leadership in quantum computing. It outlines the measures to sustain a competitive edge in QIS and abates the chances of cyber espionage (Raymer & Monroe, 2019). A wing of this memorandum deals with sensitive national security issues. It presides and instructs the agencies to introduce quantum-resistant cryptography to evade the vulnerability of computer systems. Another measure has been taken by this act of developing the workforce in Quantum Information Science and Technology (QIST). The workforce landscape aims at creating more job opportunities to hunt the talent pool and explore the quantum frontiers to foster STEM education. Dr. Eric Lander (Presidential Science Advisor) calls for investing in emerging technologies and expanding the high-tech workforce of America (Swayne, 2023).

President Joe Biden increased the funding for research and development to assure the US leadership in quantum computing, artificial intelligence and biotechnology ascertained as future industries of the world. Annual report of National Quantum Initiative (NQI) act observes heavy investment made to establish NQI centers such as the Quantum Economic Development Consortium. The report mentioned the increased funding level with each fiscal year (FY) as the high tech competition surged. The spending on QIS research and development was $449 million in 2019. With consecutive increases in R&D spending, $918million funded in 2022 that went like a shot. The request of $844 million funding is made for 2023 (Annual Report on the NQI Program Budget, 2023).

China leaps forward in the past decade and advanced in quantum technology. Xi Jinping administration underlined the strategic significance of quantum technologies and accentuated

the success of China in critical technologies. Elsa Kania (associate with the Technology and National Security Program at the Center for a New American Security), the focus of her research is Chinese military strategies, innovations and critical technologies. She said unambiguously, China is endeavoring not only to catch up with the US but to surpass it. Advancements in quantum technology such as quantum radar and sensing could locate stealth aircraft and submarines. Without any dependency on space based GPS, quantum navigation could give accurate geolocations. She mentioned in her report that many state- backed research efforts have been made to acquire these hyped quantum technologies. Such state owned sponsorship is portrayed in the form of a highly publicized series of Chinese research. Kania asserted that the ambition to take lead in quantum technologies goes side by side with China's concern over America's intelligence abilities and surveillance moves in its borders. The CNAS report illustrated China as a late comer in this quantum race. So, it is benefitted by a number of resources in developing and advancing quantum science and technology (Kania & Costello, 2021).

Moreover, China launched the quantum satellite (named as Micius) to test the quantum communication links between earth and space. The Beijing-Shanghai Trunk Line is the world's first secure quantum communication line that connects China's confidential communication networks such as Beijing, Jinan, Hefei and Shanghai (BBC, 2016). In the realm of quantum radar, Chinese researchers are able to develop this radar with an increased precision in detecting targets even at 100 kilometers. This improved accuracy is said to be five times more precise than a lab prototype. Chinese researchers claim their next version of this radar has the potential to detect stealth aircraft and has the capacity to track ballistic missiles. The Chinese Academy of Sciences made a quantum detector in 2017 that can detect submarines from far away (Hsu, 2019).

In 2022, China made a successful launch of a micro-nano quantum satellite in space for an efficient quantum communication network. Professor Peng Chengzhi (a satellite developer) claims that this satellite can form a communication network by itself and will become the part of other quantum satellite networks. China will introduce it in the market to promote the Chinese contributions and development in quantum technology. To expedite the strategic and systemic planning of quantum science, China makes its proficient workers and experts to seek knowledge in and out of the country. Xue Qikun (president of the Southern University of Science and Technology) said this strategy proves to be operative not only in basic learning but also in implication of quantum science in industrial development (Grapes, 2022). Pan

Jianwei (Chinese quantum physicist) is known as the father of quantum. He claims that the rapid rise of China in quantum science induced devotion in people and this field is steadily growing. He experimented the transmission between ground stations at a distance of 1200 kilometers and set the world record in quantum states transmission. It makes enough room for China to establish a global quantum communication and information processing network. The Development of photonic and superconducting quantum computing, such as Jiuzhang and Zuchongzhi No.2. is remarkable. For practical application of quantum technologies, the Beijing Academy of Quantum Information is playing the key role. Chinese companies are lined up in this field to generate high revenues. For instance, the quantum sector of Hefei City is predicted to reach 14.5 billion dollars before 2030 (Jia, 2022).

The United States has gained momentum in advanced quantum computing and sensing abilities. But China is going flat out in developing quantum communications along its patents. Baidu revealed its quantum computer that can perform at an extraordinary speed, can decrypt any cipher protocols and enhance the stimulation process. In sensing and communication quantum, China is turning over a new leaf. It has engineered quantum radar that has the potential to spot and infiltrate stealth military technology. This technology served as the basis of America's air and naval superiority with most advanced stealth aircraft and submarines respectively. Chinese quantum researchers declare that they have an algorithm that can break down public-key encryption. It requires the private key to decrypt the public key. As QIS is a pressing tech area for national security. It threatens the US quantum superiority and alarms to safeguard its quantum information science (Howell, 2023). David Awschalom (professor in spintronic and quantum information) asserted China has inaugurated an exceptionally ambitious national program as well as Australia, Canada, the UK and Europe following the same footsteps. So the United States should ponder over launching such a national strategy as well (Lerner, 2019).

4.4 US Vs China: Setting the Site for Biotech Supremacy

Biotechnology is the utilization of living organisms to develop new technologies intended to improve human health and societal standards. Susan Hockfield (neuroscientist) described that hundred years ago, physics and engineering came to light and completely transformed the world. Now the integration of biology and engineering will profoundly shape the future. Biotechnology was hailed as a transformative domain in medical research, agricultural advancement and the environmental realm. It has a wide-ranging application that presents

solutions to the 21st century's biggest challenges (Ulutas, 2022). Biotechnology outperformed other sectors in designing techniques to lessen waste and upgrading the sustainability of the environment. It produced climate-resilient crops that not only stimulate diversification but also mitigate the adverse impact of climate change on agriculture. It increases the yield of agricultural production to deal with the food crisis. Biotechnology applications in the field of medicine include edible vaccines, pharmacogenomics, molecular biology diagnosis, gene therapy and more than 260 novel developments. Bio-economy opened new markets and serves as a tool for creating jobs. A structural boost has been witnessed in the economy in terms of bio-economic contribution (Burrows, 2018).

The biotechnology moment came to light as biodefense during the COVID-19 pandemic. It provoked an international race to develop a vaccine. States went beyond the boundaries to employ biotechnology to develop the solution for the deadly virus and to earn from mass production of it. Biotechnology gained renewed attention and enlisted as among the top priorities of national states. The dual use of technologies indicates their upbeat potential on one hand and an adverse impact on the other hand. The dual use of biotechnology could expand the gray zone of biodefense. There is no clear distinction between defensive and offensive use making the biodefense regime a double edge sword (National Biodefense Strategy, 2020). Old dogs, new tricks; National Defense Strategy (2018) that revived the conceptual underpinning of great power competition. In this defense strategy, the US mentioned that biotechnology rapidly alters the security environment by providing large-scale accessibility to potential weapons. The deliberate or unintentional misuse generates grave national security implications. Adversary states or nefarious actors could exploit the new technologies which would result in mass-scale destruction. For instance, synthetic biology or gene-editing technology is a dual-use technology. Synthetic biology sought to build biological entities from scratch and can easily turn into manipulative work. Genome editing tools such as CRISPR are used to change or alter the DNA and RNA. It can be used to treat many diseases related to the heart or even HIV. At the same time, deadly pathogens can be produced that function as lethal bioweapons. In the 2016 threat assessment, genome editing was enlisted by the U.S. director of National Intelligence (Kirschke-Schwartz, 2020).

Biotechnology spurs the competition between the US and China. The US has been an undisputed leader in biotechnology and China is closing the gaps persistently. The US is leading unanimously in primary biotech areas. Seven out of the ten most valuable innovative companies are US based. The big picture missing is China's efforts to challenge the US

hegemony in key tech areas. China enlisted biotech as a national priority under the Made in China 2025 plan. Indulging in tight competition, China is vying to lead in biotech reserve and development over a full spectrum and winning in some instances as well.

China secured the top ranks in biotechnology research over the past two decades. From 2007-2017, China ranks second following the US in biotech publications with an increase of 20% per annum. The US maintains the lead in publishing 898 research papers but China narrows down the gap by 829. China's shares in the global biopharmaceutical market increased from 7% to 22% and placed second after the US. China's innovative potential is growing day by day but it is still less significant than the American firms in pharmaceuticals (Kazmierezak, 2019). Nature Index for high-quality life sciences research ranked China second after the US with an increased output of 9%. Against this backdrop, China surpassed Germany and UK in 2019 and 2020 respectively. Furthermore, the global share of biotech patents in China increased from 1% in 2000 to 28% in 2019 and witnessed 14.4% growth in 2021, highest among leading states. While the US lost the shares from 45% to 27%. China displaced the US with increased research output in transgenic plants and modified crops (Conory & Placett, 2022). In 2013, after attaining U.S.-based Complete Genomics, China inaugurated the world's largest genetic research center which is six times cheaper than its competitors. The US started the Human Genome Project at the dawn of the millennium and leads in its basic research. In an effort to recognize the genetic basis of health diseases, China inaugurated a domestically designed genome project in 2018. Dr. Wang Yadong (project director) claimed that it will keep track of the genome samples by sequencing the genes of more than 100,000 individuals (Regaldo, 2020).

China gave priority to biotechnology as an emerging industry. To enhance the systemic capabilities of the biotech field, China hit its 10-year target plan and put forward its 20-year plan on track. The tasks assigned to drug firms to lead in biotech areas and provide import substitution. The National Development and Reform Commission (NDRC) released a fourteenth five-year plan in 2022, that laid further emphasis on the bio-economy. The bio-economic five-year plan's central focus is the agriculture sector. It aims to enhance bio-based products with the implication of biotechnology. Chinese-based biotech companies accounted for $180 billion. China witnessed an increase of 135% in five years. The market size of the biopharma industry is estimated to expand from $47.69 billion in 2020 to $111.76 billion in 2025 (Palmer et al., 2022).

In 2020, the biotech sector added 4% to the country's GDP. China bolsters the investments by $45 billion in biotech to be worth it more. Science research parks and biotechnology parks have been developed. There are 111 biotechnology parks (50.7%) and 108 (49.3%) are other science parks. China has Asia's top Initial Public Offerings (IPOs), a process in which private companies are converted into public. For instance, the companies like BeiGene and Asymchem Lab worth of $182 and $130 billion, respectively (Cumbers, 2022). China is aiming to beat the US in the trillion-dollar industry of bio-economy. Greg B. Scott (founder of China Bio Group) has emphasized China's substantial investments in biotech. China's private investors coupled with the government pouring money valued at $14.4 billion and out-investing the US contribution of $10.4 billion in biotech. To restrain China's investment, the US Committee on Foreign Investments enlisted biotechnology in restricted foreign indirect investment (FDI). Moreover, to promote breakthroughs in key technologies, China plans to build up an economy worth $ 3.28 trillion by 2025 (Global times, 2022). China is deemed as a biotech elephant in the room that eagerly utilizes biological engineering for the country's strategic national interest. The leading-edge innovation of the US is challenged by China with its cohesive strategies to upturn the bio-economy.

In science and technology, the United States has a long history and always stands out in the tech industry. Science, technology and innovation are deemed the cornerstone of America's economy and superiority. The US has bolstered the investments and routed the national action plans to encounter its adversaries in the main battleground of high-tech development. National Biotechnology Month was celebrated in January 2020 under the Trump administration. The central focus was to create countless opportunities by expanding manufacturing and agricultural production. The Engineering Biology Research and Development Act was passed in 2019 by the House of Representatives in the US. It recognized the importance of American leadership in maintaining regulations, promoting and safeguarding biotechnology (Begeson & Campbell, 2020). It aimed to sustain America's leadership in synthetic biology and ordered the Office of Science and Technology Policy (OSTP) to devise a national research strategy for biotech. The Biden administration directed executive orders to advance biotechnology and bio manufacturing for a sustainable bio-economy. A report, titled "Safeguarding the Bio-economy," examined the biomedical science, agriculture, energy, research and development in life science are the drivers of America's economy. The National Biotechnology and Bio Manufacturing Initiative has been taken by the Biden administration to boost economic competitiveness. The bio-economy contributed 5% to America's GDP. The US bio-economy

valued about one trillion dollars, approximately. In the next two decades, it looks up to reach $30 trillion (Cumbers, 2022). It is quite challenging for the peer competitors to take a lead on the US in this high-tech competition.

4.5 Other Micro Drivers of the Tech Competition

The US-China technological competition is not only prevalent in aforementioned key areas but it requires leadership in more than one area. The national success lies in providing an operating environment to the talent pools in science and technology. In the development of 5G technology, China is taking a first mover advantage by rolling out the US 5G infrastructure. Pentagon's Defense Innovation Board mentioned that China is routing the same path in 5G technology as the US followed a track in 4G. For more than a half decade, America has maintained its superiority in semiconductor industry. Decades long effort of China enabled it to become a powerhouse of semiconductor. Not only this China has narrowed the gap with the US in semiconductor fabrication and chip design. From the past two decades, the US has been a innovative leader in new green energy technologies. China struggled hard to gain the monopoly in supply chain of green energy technology. China has bridged the gap and become a top manufacture and exporter of green energy (Allison et al., 2021).

Global Finance ranked the countries for national technological strength. This ranking is based on a unique set of integrated metrics. The technological availability measured by two basic metrics; percentage of internet users and long term evolution (LTE) users of a country's population. The third measure is created by the IMD World Competitiveness Center that is known as Digital Competitiveness Score. This score marks out the competitiveness in various aspects incorporating tech proficiency, preparedness for developing new technologies and capacity to create and build the innovative advancements. The final measure counts for the portion of GDP that expends on science, technology and innovation (STI) and research and development (R&D). This metric works out as a representative measure that indicates how important technological advancement is for a state’s potential status. The combination of these metrics yield the ranking of national tech strength. South Korea lags all the countries with the maximum score 6.52. The US attained the second rank with a composite score 5.10. While China gained 0.26 scores and ranked 32nd in national technological strength (Getzoff, 2022).

The following table describes the ranks of tech giants of the Indo-Pacific in key tech areas.

Table 4.1

States' Standing in the High-Tech Domains

	AI	Quantum Tech	Biotechnology	ICT	Green Energy
Credit	Government AI Readiness Index	Quantum Adoption World Wide (Share of organization)	Scientific American World View Scorecard	ICT Development Index	Renewable Energy Capacity
US	1st (88.16)	36%	1st (39.8)	16th (8.18)	2nd rank
China	15th (74.42)	32%	23rd (21.3)	6th (8.61)	1st
Japan	12th (76.18)	24%	15th (24.2)	10th (8.43)	7th
Australia	14th (75.41)	28%	5th (28.0)	14th (8.65)	15th
UK	3rd (81.25)	27%	8th (26.5)	5th (8.65)	13th
India	32nd (56.36)	16%	59th (8.9)	134 (3.03)	4th

Table 4.1 has been generated by the researcher which provides an overview of the technologically advanced countries of the Indo-Pacific region. The development assessment and ranking of countries in significant tech areas offer key insights into their capabilities of technological competitiveness. It not only underlined the country's standing but also indicated the national tech strengths of the regional states.

At the turn of the new millennium, technology has been a significant element in shaping states' behaviors and in states' dealings. It has become the defining characteristic of growing strategic competition among big powers. The quest for technological supremacy is at the forefront of the national interest of great powers such as China and the US. At first, the rise of China as a near-peer competitor to the US in high-tech has been traced. It analyzed three main factors that lead China in gaining a powerful stature in the high-tech domain. China endeavored to gain an educational advantage by increasing the strength of STEM graduates and then achieved a

milestone by surpassing the US Capital funding for research and development (R&D) has played a significant role in assuring China's top position at international assessments (such as PISA). Research publications and patents are the standard parameters of science, technology and innovation (STI). China stands out by producing maximum research work. These attributes are denoted as a measuring criterion of a state's standing in the high-tech domain. The key determinants of Sino-US competition are AI, Quantum Computing and Biotechnology, outsourced from CHIPS and the Science Act of the Biden administration. A narrative has been drawn that the US has remained an uncontested leader in science, technology and innovation, and is being challenged by the robust side of China. It analyzed that China is bridging the gap with the US in these critical technologies. A comparative list of states' (eminently the Indo-Pacific states) ranking in five key tech areas is drawn to summarize the findings. As the Indo-Pacific region is a central theater for great power competition, high-tech strategies are significant to curb the challengers and maintain a strong position. Technology-based salient strategies of both the US and China under various administrations are described in the successive part of this chapter. The emergence of regional security groupings, defense pacts and infrastructural projects of both rivals with their high-tech dimensions are illustrated.

CHAPTER 5

ARTIFICIAL INTELLIGENCE FOR THE INDO-PACIFIC: A BLUEPRINT FOR 2030

5. Introduction

The 21st century is deemed as Indo-Pacific century. This region is going to be the central axis of economic and military activity of the influential actors of the globe. Indo-Pacific is the central theater of great power competition. This region is a host to the four nuclear powers with largest military budgets and a home to emerging economies. Washington and Beijing are the key strategic players and their fierce competition disturbed the balance of this region. The rise of China as a powerful competitor urged the US to opt for rebalance in the Indo-Pacific to maintain its upper hand in this key region. Against this backdrop, strategic competition is inclined towards the competition heeding to adopt Fourth Industrial Revolution (FIR) technologies. The high-tech competition is playing significant role in reshaping the region's balance of power or further exacerbate the scenario. Artificial intelligence has become an integral part of high-tech competition between the US and China in the Indo-Pacific region. With the increasing influence of AI, states with advanced AI capabilities will likely have a significant advantage in all domains. The importance of artificial intelligence stems from its potential to enhance military and economic capabilities. States are investing heavily in AI research and development, recognizing the strategic advantage that can confer.

The evolving geopolitical paradigm of the region depicted the struggle of harnessing the Fourth Industrial Revolution (FIR) technologies. The failure in adapting this high-tech revolution will distinguish the laggards from leaders. The transformational power of technologies, especially AI, is being fetishized from military and economic standpoints. The efficient utilization of transformational power of AI has a durable, steady and high productivity led growth. The high-tech advancements and innovations build a strong military muscle and revolutionize the existing ways of war. It provides a distinctive competitive advantage prior to the enemy adaption. Hence, Technological competition stands out in the reconfiguration of the balance of power in the Indo-Pacific region (Gupta, 2022).

Technological competition is at the core of contemporary international politics. This competition has risen to the fore and usually attested between the US and its allies on one hand and China and Russia on the other. The US wanted to maintain its leading edge in critical technologies such as aerospace, Artificial Intelligence and quantum information science. Apart from the Sino-US high-tech competition, other Indo-Pacific powers have also entered the fray to gain technological advantage. The key powers of the Indo-Pacific such as Japan, Australia and India are eager to develop the emerging technologies at home. The collaboration of likeminded countries is being promoted to push the innovating and modern technologies. An international initiative referred as "Global Partnership on Artificial Intelligence" currently consisting of 29 members, aimed at promoting the responsible use of AI and to facilitate collective AI research. Moreover, the research reports of the think tanks pictured the likelihood of forming a greater collaboration of AI at international level and developing an “alliance innovation base (Kliman et al., 2020).

5.1 Artificial Intelligence for the Indo-Pacific: A Blueprint for 2030

The strategic construct of Indo-Pacific is at the forefront of the heated technological competition. The key advocates of this region envisioned the decisive role of the high-tech in shaping the future of geopolitical balance of the Indo-Pacific. The US along with strategic players of this region: Japan, Australia and India called for "free,” “open,” “resilient,” and “inclusive" infrastructure of the Indo-Pacific. Operationally, these attributes signify that the Indo-Pacific remain free from China's influence. It aspires to be open for all and not authorizing the one-sided territorial claims that are at odds with the global commons principles. The prerequisite called for the region to be "inclusive" that aspires to incorporate the visions of all the regional actors and avoid the one sided exclusive assertions.

AI-driven technologies will hold over the coming decades, hence, exacerbating the technological competition. There are three AI-based technologies that can elevate the free, open, resilient and inclusive infrastructure of the Indo-Pacific, down to 2030. Spatial computing technology, Resilient smart infrastructure and Counter-adversarial technologies have extensive strategic use in terms of tech cooperation and competition as well (Rej, 2020).

Spatial computing technology is a source to maintain the attribute of "openness" of the Indo-Pacific. It enabled to grasp the geospatial information. Thereupon, this technology is used to compound and aggravate the traditional military capabilities. Generically, variety of computing

technologies stimulate the interaction of humans with geographical environment. There is a wide range of spatial computing application such as global positioning system (GPS), geographical information systems (GIS) and remote sensing of environment (RSE) are the chart topping. There is a striking possibility that spatial computing is likely to augment the reality system. The tech expert Kevin Kelly anticipated that the augmented reality system is a possibility of mirror world. This exhilarating possibility seems to be merging the physical realities into digital world. The tech guru in his essay "AR Will Spark the Next Big Tech Platform—Call It Mirror world" asserted that "someday soon, every place and thing in the real world – every street, lamppost, building, and room – will have its full-size digital twin in the mirror world" (kelly, 2019). Resilient smart infrastructure intends to resuscitate the regions potential. It is used as a mean of weathering or absorbing the infrastructural shocks. Counter-adversarial technologies aimed to assist the regional actors in combating the misinformation or to curb the cyber espionages. It helps in sustaining the region's free character by defying the non-kinetic coercions.

5.2 Administrations' Response to Escalating High-Tech Competition in the Indo-Pacific

5.2.1 Obama's Legacy: The Most Tech-Savvy President

Obama's interest in science and technology with heavy investments made the way for the US to have leading edge technology. The administration proposed a funding level of $918.9 million to the National Institute of Standards and Technology in the fiscal year (2011) budget (NIST, 2011). The aim of NIST is to promote innovation by fostering technological competitiveness, enhancing economic security and enabling the US to set the global technological standards. Obama declared that the priority of his administration is to make sure that the US leads in the world of science and technology (Crong, 2016). The fundamental technology initiatives of the Obama administration include net neutrality, upgrading the government's digital system, electronic records and huge spending on advanced technology. The stimulus spending and focus on technological advancement of the US is one of the enduring threads of Obama's legacy. The prime concern of upgrading technology is for the betterment of people of America and was not intended for international competitiveness. The Obama administration left an indelible mark by pulling America's economy back from the brink and fostering the technological standards of the US.

(a) Indo-Pacific vision of Obama administration

The Asia-Pacific region has remained of paramount importance for the Obama Administration. Barack Obama prioritizes the "rebalancing to the Asia-Pacific" in his diplomatically prime concerns of 8-years long tenure. This strategy was initially known as "return to the Asia-Pacific ", then restated as a "strategic pivot" and eventually called "rebalancing". In Spite of changing the rhetoric, the main intent of this Asia-Pacific strategy is to contain China. This rhetoric indicated that a balance in Asia was disturbed by the rise China, hence the US is rebalancing it. As the US perceives China as a potential threat. The reason behind this perception is China's powerful rise. China overtook the US in several domains and then the Obama administration locked China as its rival competitor. The US started to shift its pivot to Asia and more precisely to the outskirts of China. The crux of this rebalancing strategy is based on four pillars. To begin with deployment of 60% of the navy and air force in the Asia-Pacific. Secondly, to establish a trade framework named Trans-Pacific Partnership (TPP) which further isolates China. Next is the use of smart power in diplomacy put forward by Hillary Clinton. This is to take advantage by driving a wedge between China and its opponents. And lastly to maintain a formal contact with China (Canrog, 2016).

The rebalancing strategy and all other combative measures of the Obama administration fell flat and provoked a belligerent response in China. It incited a strategic mistrust that is totally against the interest of several key actors. The supporting pillars of strategy were conflicting with each other. The deployment of forces in the outskirts of China alarmed China and prompted it to speed up its military modernization. China took momentous strategic initiatives after its exclusion from TTP. It generated the incentives to advance the Regional Comprehensive Economic Partnership (RECP) and to establish the Free Trade Area of the Asia-Pacific (FTAAP) (Zhenglong, 2016). Over and above, the Belt and Road Initiative (BRI) was a historic move of China to enhance its influence in the region. On top of that China urged the development of the BRICS Development Bank and the Asian Infrastructure Investment Bank. China is making progress by leaps and bounds, thus mounting its power and marking its rise as a potential competitor. There remains a bumpy ride of relationship between the US and China during Obama's tenure. Before the Trump administration, the Sino-US relations were marked with strategic competition and the inception of technological modernization.

5.2.2 Trump Administration (2017-2021)

The geopolitical competition between the US and China intensified after president Trump took power. The resentment between the Trump administration and China's ruling Communist Party exacerbated not only in defense, trade or technology but also at the diplomatic front. Trump's

arrival in power and his policy directions signified in his speeches induces an assertive posture of America. The underlying cause of trade war signaled a tech battle with China. The corner stone of strategic policy of Trump administration was the technological contestation with China.

(a) Efforts to limit China's technological advancement

In the first place, it is hard for the US to reconcile with a rising power that has a distinct political system and a contrasting ideology. The grand national strategy of the Trump administration locked China as the most formidable competitor. The strategy underlines the intention to defer and contain China's aspiration of challenging the US global hegemony by curbing its high-tech industrial development. It is cropping up from Information, Communications and Technology (ICT) that is depicted by 5G technology. ICT plays a significant role in upgrading the industry and Chinese corporations gained much advantage from this 5G technology. For That matter, the Trump administration makes an effort to abrogate the legitimate rights and interests of Chinese corporations to curb its expansion in overseas markets. It attempts to suggest that western enterprises would not deal on equal footing with Chinese enterprises. For instance, China's telecom giant, Huawei faced immense restrictions from the US. It signaled a "asymmetrical war" between an established superpower, the US and a rising power, China's enterprises (Zhang, 2019). Moreover, president Trump looks for high moral grounds in strategic competition with China. It criticized the Chinese practices and policy formulations regarding technology and trade surplus. It labeled the Chinese innovations as intellectual property theft and called it a forced technology transfer (Mercandante, 2019). The Trump administration called China for "unfair" and a "government-led" industrial planning that involves supporting authoritarian regimes. By exaggerating the security risks, it alleged that China is developing such science and technology that is at odds with the regional order and hence, harming the US national interest. China ostensibly denied all the allegations of forced technological transfer or supporting the authoritarian regimes and called it a politicization of economic and technological subjects. As a matter of fact, if China plays as per the US rules of fairness, Perpetually, it will fall-flat in the low end of global industrial chains (Siripurapu, 2022).

(b) Measures to protect American tech leadership

Under the Trump administration, technology has become the main arena of strategic competition with China. The Trump administration has undertaken heavy handed and imperious efforts to insulate the US technological leverage over others. A criminal justice

campaign named "China Initiative" was embarked by the Department of Justice to stop technological theft. The Congressional reforms intended to cease the US funding in joint high-tech research and development to curb the technological transfer to opponent states. The government expanded the authority of the Committee of Foreign Investment to check the tech companies. To enhance the scope and potential reach of foundational and emerging technologies are being showcased to boost the technological advantage (Noone, 2020). The National Security Strategy defined the National Security Innovation Base (NSIB) constitutes all the key actors and intakes that are vital in sustaining America's upper hand in the qualitative edge. This framework is designed to protect the US technological supremacy in a competitive paradigm. NSIB also developed the defense industrial base from traditional inputs and expanded it to the network of knowledge, capacity building and innovation centers. This approach aspired to recognize and build such technologies that provide the sound basis of the next generation military system.

The Obama administration took the initiative of the Third Offset Strategy in 2014 that aimed to leverage Department of Defense (DoD) investments to counterbalance the deteriorating military status in the Indo- Pacific (Scott, 2018). Later, the Trump administration introduced Bipartisan draft legislation, The Endless Frontiers Act, to invest 100 million dollars in the National Science Foundation to sustain Washington's leading edge in innovation. The Statements and remarks of the Trump administration declared that technological superiority of America is the essence of national and economic power (Hight, 2021). In the National Security Strategy and the National Defense Strategy (2018), competition with China is characterized as "Great Powers Competition" due to the growing authoritarian nature of Xi administration and militarization of the South China Sea with unfair defense export and intellectual property theft. At the heart of this growing competition lie the technology and its potential application. When president Trump took office in 2017 up until 2021, the US government along with the Congress, decision makers and key think tanks have issued 209 bills, science and technology policies and reports that are exclusively China oriented. It includes the regulations over Chinese high-tech companies, sanctions, and curbing the science, technology, engineering and mathematics (STEM) talents training (Chen & Lei, 2022).

5.2.3 The Return of QUAD

QUAD regained the spotlight during the Trump administration in 2017 as a coalition of four large democracies to counterbalance Chinese growing influence in the Indo-Pacific. Under the Biden administration, it has gained prominence from a senior-level security dialogue to a

leader-level summit. This premier platform serves for strategic dialogues, cooperation and coordination in the Indo-Pacific and shaping the regional order that is promising to the interests, values and visions of the member states. The revival of the QUAD and its anti-Chinese rhetoric significantly affected the economic, political and security landscape of the region. Quad's future directions are sustained by uncertainty as it overtly depends on the evolution of US-China relations (Wei, 2022).

Technological superiority has become an essential aspect of geostrategic security. Just like industrial and manufacturing powerhouses enable the states to exercise their influence, prowess in the high-tech realm paves the way to dominate the world. Against this backdrop, large democracies of the world collaborated under QUAD, in the apprehension of China's emerging tech domination over the globe. QUAD has been focusing to prioritize the emerging and critical tech areas, setting standards and fostering collaboration. The states which established the tech standards will be capable of scaling up their companies and harnessing commercial opportunities worldwide.

This coalition is working to maintain a balance between national preferences and trade linkages to strengthen business ties between countries. The combined GDP of the four members of QUAD is nearly $34 trillion which plays a decisive role in the tech industry (Agi, 2021). QUAD members came to terms with keeping Chinese companies at bay to deter the threat of its overwhelming power. To avert this threat, a strategy entitled "prevent, prepare and reclaim the supply chain", is proceeding. Hence, this coalition offers alternatives by challenging China's tech dominance in the Indo-Pacific. In terms of cybersecurity, QUAD members collaborated over the collective defense approach" QUAD Cybersecurity Partnership" to counter the cyberattacks jointly. In the domain of 5G and ICT, QUAD members offer "open radio access (O-RAN) networks" to counter China's Huawei telecommunication network. An initiative of the International Standards Cooperation Network was taken to exchange information regarding high-tech standards. Other initiatives are the Indo-Pacific Partnership for Maritime Domain Awareness, a QUAD Investors Network (Hindustan Times, 2022).

The base of high-tech lies in Artificial intelligence and the US is a significant collaborator on AI with QUAD members. AI has become a front burner of national strategic plans relevant to high-tech competition. Quad-led AI coalition is not only for policy coordination of member states but to confront China's authoritative governance of AI practices that could maliciously be used for misinformation or surveillance. The QUAD launched the expert group to work on

emerging technology following the joint statement of QUAD leaders. This is referred to as the Critical and Emerging Technology Working Group. The major principles of Quad's technology called for openness, transparency, integrity, liability and interoperability in order to foster innovation. The way in which technology is invented, developed, directed and used should be coherent with shared national interests and values. Sameer Patil (member of the Observer Research Foundation) argued that QUAD members' efforts to outweigh China's long lead in many high-tech areas depicted the competition to gain absolute power in the Indo-Pacific.

5.2.4 Biden Administration: Anticipating the Growing Competition with China in Science and Technology

In the past few years, Washington has taken a series of strict measures against Chinese companies to delay its technological rise and to curtail its technology industry. The China-minus frameworks such as QUAD and Indo-Pacific Economic Framework for Prosperity (IPEF) gained spotlight under the Biden administration. Biden's recent visit to East Asia and engaging talks with the allied partners validate Washington's geopolitical commitment to this region. The Biden administration stands for the development of science and technology. 300 billion dollars were allocated for scientific research and development under America COMPETES Act of 2022. Out of which 52 billion dollars were allocated to unite the US high tech companies in competition with the Chinese enterprises. The Creating Helpful Incentives to Produce Semiconductors and Science Act (CHIPS Act) was signed in 2022 with executive orders of President Joe Biden to implement it. This act aims to enhance energy independence, to boost America's competitiveness in science and innovation and to catalyze semiconductors manufacturing. The CHIPS and Science Act have authorized $280 billion solely aimed at encountering China's threat that gains 407% increase of cash flow in semiconductors firms (Sykes, 2022).

The Trump administration has taken assertive measures against China and has been primarily followed by the Biden administration. United States Innovation and Competition Act of 2021 (USICA), heretofore known as Endless Frontier Act, was passed by the Biden administration. It aimed to beat China at its own game of tech competition. This act conditioned the Department of Commerce by introducing the Surveillance States Act to impliment additional embargoes or export controls exclusively on Chinese entities. It still counts Huawei as an emerging threat from wireless original equipment manufacturers (OEM). The US containing measures shows extent and limits in the case of Huawei. Huawei is China's leading communications equipment manufacturer that bears the brunt. The US attempts to lead the tech supremacy by exploiting

trade policies. Huawei is being targeted in the US documents under the technical jargons like innovation, artificial intelligence or technological primacy (Chen & Lei, 2022).

The institutional and technological dimensions are important in assessing the Sino-US rivalry. James A. Lewis (senior vice president at CSIS), anticipated that the trade conflicts will shift towards technology subjects which is the main battle line of Sino-US rivalry. The US will exploit the trade issues to crack down on Chinese technology companies. Moreover, Washington spotlighted the Digital Connectivity and Cybersecurity Partnership (DCCP) aimed at assisting the cybersecurity building, infrastructure investment and digital support to the Indo-Pacific states and more specifically ASEAN states.

The US is pursuing a decoupling policy to protect its interests by upgrading the science and technology measures concerning China by following facets. The first one is to inaugurate a comprehensive and targeted sanctions mechanism. Second aspect aimed at containing China's development and retrieving leading edge technologies by building an international anti-Chinese alliance. For instance, the Biden administration can use the Wassenaar Agreement to establish a strategic technology partnership by influencing other states to accept the US standards. Apparently, the Biden administration looks like having a moderate posture in competing with China but a stance of discriminatory enforcement against China will go on. It reflects the alacrity to engage, discuss, and cooperate but the tenets of strategic confrontation and contestation sticks around (Chen & Lei, 2022).

5.2.5 AUKUS: A Trilateral Security Pact

AUKUS is a trilateral security pact between Australia, the United Kingdom and the United States. The hallmark of AUKUS is nuclear-powered submarines for the Australian Submarine Fleet. The AUKUS agreement enables Australia to acquire eight Submarine Ship Nuclear (SSN) that are commonly called fast attack submarines. The sharing of nuclear propulsion technology for SSN under the Exchange of Naval Nuclear Propulsion Information Agreement (ENNPIA), is a historic move by AUKUS members. Six decades ago, such hypersensitive information was shared in the 1958 UK–US Mutual Defense Agreement for nuclear weapons. The AUKUS alliance is not just an agreement of submarines but this trio pledge to develop advanced technology with a deeper collaboration in high-tech areas. Artificial Intelligence (AI), quantum technologies and advanced underwater vehicles (AUVs) are at the central stage of AUKUS high-tech collaboration (Vignesh & Kumar, 2022). Tom Tugendhat (Minister of State for Security UK) pinpointed the sharing of technology and its innovation cost in AUKUS

would be cost-effective and a game-changing step. Australia intended to invest $81 million in quantum technology to strengthen strategic partnerships on this platform and to commercialize Australian research (The Wall Street Journal, 2022). This platform extends well beyond the nuclear submarine act or viable access to America's advanced technology, it is more about the development of dual-use technology collaboration (Bondy, 2021).

Most of the high-tech initiatives and agreements were non-military and highly relevant to patent publications, life science and economic growth. While the AUKUS pact primarily deals with enhancing naval power with the radical integration of cutting-edge defense technologies. The submarine deal engraved the sound footing of the United States and the United Kingdom in the Indo-Pacific region for decades. Predominantly, the US will seek advantage against China by collaborating on high-tech areas. The trilateral security pact seeks to expand the platform of AUKUS and develop the Five Eyes intelligence alliance to deepen the defense technology ties. The five eye nations are the US, the UK, Australia, Canada and New Zealand. These five nations stand up for the free and open strategic vision of the Indo-Pacific. AUKUS promises to deliver state-of-the-art technologies and to share outclass military technologies. It also includes info-tech systems and sensors for maritime domain awareness (East Asia Forum, 2021).

This platform enables the countries to share such technologies that are highly prized and nuclear technology is a case of this class. The US once shared nuclear submarine technology with the UK during the peak of the Cold War. Now, the US is so determined to compete with China that it is sharing this technology with AUKUS members. The Technology sharing mission, closest partnership over emerging intelligence capabilities and cost-sharing of AUKUS is invaluable. AUKUS does not announce to undermine or oppose the QUAD because every collaboration serves different purposes. QUAD will remain critical in maintaining broad cooperation and a common vision of member states against China. QUAD serves as a nucleus in coordinating strategic policies and layout multilateral partnerships to confront China (Tarapore, 2021).

The United States has made significant advancements in the field of technology, especially in the areas of artificial intelligence, biotechnology and quantum computing. The technological development is steered by a combination of innovative measures, government policies and high investments in research and development. The Obama administration is renowned for its efforts to promote science, technology and innovation. The focus was to introduce and expand digital

technology at the domestic level. With the growing competition, the focus shifted towards promoting America's technological leadership. The Trump administration took an assertive approach to curb China's technological rise by imposing high trade tariffs and restrictions on Chinese tech companies. This legacy is followed by the Biden administration to preserve American technological dominance. All the administrations have recognized the importance of technological advancement and have taken measures to promote science, technology and innovation. Even though there have been differences in approach in terms of dealing with China but have a shared objective to maintain America's technological leadership.

5.3 China's Rise as Technological Miracle

China started to stand on its own under Hu Jintao (Chinese President) whose period was of great success. It helped China in its economic rise and made it a truly wealthy country. Jintao's leadership era is known as the phenomenal period of economic growth of China. The size of the Chinese economy quadrupled under his leadership despite grave crisis like the SARs outbreak or the 2008 crisis. China was not at the epicenter of the global financial crisis in 2008 but being a state that is heavily dependent on exports, it suffers market contraction. However, it managed a growth of more than ten percent per annum (Brown, 2017). At the end of Hu's period, China was tangible rich with modernized physical structures such as skyscrapers, speed rails and the inception of technological upheaval. The economic legacy of the Hu jintao provides the basis for the national rejuvenation plan of president Xi. The dream of big China is based on the phenomenal gift of a huge and dynamic economy by Hu. The epic accumulation of wealth boosts the current power of Xi to build a stronger version of China with the technological hallmark. China is making a quantum jump on the technological front under the president Xi administration. China positioned first in the matter of patent filings. According to the Nature Index, China made significant contributions to high quality science and ranked second largest contributor after the US (World Economic Forum, 2106).

Comprehensive national power drives the relations between great powers such as China and the US. The national strength of China increased vehemently in the early decades of the 21st century, thus posing a challenge to the US dominance. Within the stretch of three years, China executed three high-profile events such as the Olympic Games (2008), the military parade (2009) and the World Expo (2010). On top of that, China turn out to be the second largest economy of the world in 2010 and surpassed Japan. China stood the largest economy in 2014 with purchasing power parity 3.759 (PPP) that surpassed the US (OECD, 2021). Just like the

US did in 1872 surpassed the Britain GDP. Moreover, China exceeds the US in manufacturing output and power production. Manufacturing is the base of industry. Potent manufacturing represents a powerful military muscle. And a potent military force has the aptitude to compete for global leadership.

President Xi Jinping foresighted the fierce competition for tech dominance and underlined the significance of developing indigenous capabilities and advancing in emerging technologies. He anticipated that technological innovation is a new arena power's competition. In the eyes of the Xi administration, technological prowess paved the way for paramount power. Chinese leaders asserted with a strong sense of self-reliance that China can make its independent technological development path. Now, the focus is shifted to excel in a broad range of technologies. In 2015, Beijing put forward a strategy for industrial upgrade named "Made in China 2025". This strategy is alarming not only the US but also the leaders of Five Eyes nations. This industrial upgrade is perceived as a grave threat to the Western competitiveness in high-tech sectors. China has become a top high-tech manufacturer of the world in 2020, surpassing the US by building 25 million automobiles, 250 million computers, and 1.5 billion smartphones (Allison et al., 2021).

Technology is playing a vital role as the US and China endeavors to attain dominant position in the Indo-Pacific region. Both the states are in commanding positions and offer assistance to other Asian states to develop their technology sectors, particularly relevant to digital connectivity. Both Beijing and Washington take competitive initiatives to win tech supremacy and to shape the digital future.

5.3.1 Digital Silk Road: A Tech Edge on US

China's historic geopolitical move Belt and Road Initiative (BRI) have garnered much attention as a tool of economic statecraft. BRI is marked as the world's largest infrastructure program to increase Beijing's economic and political influence. The growing digital side of China was introduced as the Digital Silk Road. The Digital Silk Road (DSR) was introduced in official white papers by the Chinese government in 2015. The DSR launched as a technological part of BRI and now it's becoming central to the Belt and Road Initiative (BRI). The aim of improving the AI capabilities, quantum technologies, fintech, sensors and surveillance technology, telecommunications networks and development of smart cities is under the DSR rubric. Moreover, hitherto is under Chinese enterprises which serves as a branding tool for China in promoting its global vision of technology. The two technology giants of China,

Tencent Cloud and Alibaba Cloud has gained grounds and establish its data centers across the border. To make Chinese companies competitive, it underlined information and telecommunication technologies (ICT) as an essential tool to foster the innovation and development of domestic technology firms (Robert, 2022). The Xi Jinping administration underlined the role of the DSR in calling for international cooperation in the high-tech areas and its integration into the BRI to facilitate innovation-driven development. More than 138 countries are participating and coordinating with the DSR projects. It enables China to have an upper hand over large democracies and unilateral corporations in financing the information and communications technology in Africa. Whether it is undersea fiber-optic cables or satellite launch to space, railroad projects in Africa or building seaports in South Asia, marks the growing footprints of China (Lee, 2023).

The growing influence of China across the continents, for instance, in Africa, urged the fierce competitors to halt China's pervasive development. The collaboration of highly developed states such as Quad, AUKUS and some European states is to limit China's tech expansion, to contain technology standards and to ban its soaring 5G infrastructure. To deal with the containment strategies from wealthier states required greater effort and growth in the developing market. China is giving precedence to the Digital Silk Road by making it a foreign policy priority. The World Internet Conference and the Belt and Road Forum is an international summit sponsored by Beijing to promote DSR. China has provided $79 billion in assistance to DSR projects and keeps pushing itself. The Chinese government brought out a Five-Year Plan (2021-2025) with long range objectives of economic and social development up until 2035. Government emphasizes plans such as "Made in China 2025" and "China standard 2035" to be at the forefront of standard setting and advanced manufacturing (Koty, 2020).

Hillman argued in "*The Digital Silk Road: China's Quest to Wire the World and Win the Future*" that the first phase of US-China competition was concerned with the developed world. The real game will begin when competition stages in the developing world. The quest of digital dominance comes from Chinese leadership as the Xi Jinping administration lays out the plan for advanced manufacturing by 2025, directing technology standard setting by 2035 and to become a superpower by 2050. The fight to take over the market, investing heavily in digital infrastructure and expanding the BRI umbrella will enable China to hold the reins of global leadership. All the benefits of global leadership that the US has enjoyed is the geopolitical interest of China. Hillman points out that tech competition is in its early stages and will evolve with the changing political events and advancement of technology. The Digital Silk Road as a

high-tech dimension of BRI has hegemonic ambitions to make China an invincible and indispensable hub. DSR is looking to take over next-generation technology and next-generation markets by making China technology independent (Hillman,2021).

China's rise over the last decade has been spectacular. As China gains more technological power, it grows capabilities to shape the international arena. China aimed to set technology standards at global level so it can then utilize its overwhelming manufacturing power and economic reach to become globally dominant in key areas. China's regional infrastructure diplomatic engagements along with gray-zone tactics and hybrid warfare have generated the concerns regarding the balance of military power in the region. The power shows strong military muscle with advanced arsenals, overseas militarized bases and Al-based systems shifting the balance of power in China's favor. All these Beijing efforts aspired to build the capability to influence global technology standards to gain the maximum digital power.

5.4 A Neorealist Outlook on Sino-US Tech Rivalry

Following the end of the Cold War, the US has enjoyed a unipolar moment in global dominance. The onset of 21st century depicted the rise of powerful competitors that sought to undermine the overwhelming power of the US and hold all the cards. This return of great power competition became the core of the National Security Strategy and the National Defense Strategy of the US. James Mattis (America's Secretary of Defense) called the re-emergence of strategic competition posed a serious challenge to US security and national interest. He classifies the rise of competitors as revisionist states. The rise of such states is directly impacting the global influence of the US.

In the era of great power competition, emerging technologies are the drivers and determinants of this competition. The range of critical emerging technologies radically changes the outlook of great powers competition. Technology is an important component of geopolitical strategic rivalries. In an increasingly bipolar world, emerging and critical technologies play integral role in shaping national interest and formulation of national security strategy (Ariel Kastner, 2021). Critical technologies, especially AI, influence the dynamics of power relations. Economic stature, military capabilities and political influence are the key drivers of national power. The key emerging technologies provide a firm foundation for these driving components. A crude correlation depicts the intuitive reality that high-tech nations are more powerful than significantly low-tech nations. The capability of nations to adopt and innovate advanced

technology lay the first stone of national strength. Heavy investments in research and development make an economic turn that directly benefits the power sector of the military and politics (Lewis, 2022). Technology comes up with leveraging all the indices of national power and across all the domains. This competition requires them to integrate these technologies into new capabilities and operationalize them. The funding and fielding of critical technologies pose challenges in offensive measures and create opportunities for defensive actions. Sino-US competition matches the framework. China is ahead of the US in network communication i.e. 5G, offensive hypersonic weapons and commercial drones. While the US took a lead in quantum technologies, space tech, and a minor lead in artificial intelligence.

Mearsheimer argued that the initial incentive of the state is defensive until the strains of the structure of the international system pressure the state to behave aggressively (Mearsheimer, 1994). To illustrate that, a state's relative power should be analyzed in terms of the international environment. States figured out their maximum security lies in maximum power. Correspondingly, states opt for absolute power to deal with potential threats. The rapid surge of rising power and daunting ambitions to lead generate fear in the ruling power that is ultimately inclined towards security competition. China gains the high ground in most high-tech areas prompting insecurity in the ruling power (the US). This threat of rising entities and fear of ruling entities create structural strains. That in turn causes the state to take offensive actions. The US struggled to sustain its leading edge in the high-tech domains while a potential competitor China expected to take a lead that forces the US to take aggressive measures to contain China. While defensive realists claim that states' primary goal is to be secure rather than compete for maximum power. Even if, both China and the US attain sufficient security, still both opt for power maximization since they are in a contest for supremacy. Mearsheimer sums up the iron law of the game of great powers that absolute power means maximum security. On that account, China's winning tech posture is not only challenging the globally dominant position but national security of the US also challenged that leads to the political tragedy of great powers (Mearsheimer, 2001).

The geopolitical landscape of the Indo-Pacific is under constant flux. The reshaping of the Indo-Pacific from the Asia-Pacific construct also depicts the rise of China as a threat to the underwhelming presence of the US. China's coercive tactics and exponential growth threatened its neighbors that ultimately opt for an influential partner like the US against China. States are shaking hands with the likeminded partners to strengthen their position in the region. Japan, Australia and India are the influential proponents of this region. The US strengthened its ties

with India as a political, military and economic counterweight. India is an emerging economy that offers a valuable alternative to China. The US goes for balancing by alliance formation (Quad or AUKUS) to contain China (Nguyen, 2022).

The founding father of structural realism, Waltz points out that technologies play a key role in shaping a state's capabilities and indirectly impacting the structure of the international system. He emphasized the critical role of military technologies in determining the factors that shape the fate of states and their systems. Another proponent of neorealism, Robert Gilpin shares the same page that technology is the trending arena that causes differential growth of power among states and culminates in disequilibrium. For the most part, military technologies flame up revisionist intentions. Mearsheimer's theoretical perspective of great powers competition is largely based on military capabilities. Technological superiority gave power to the military muscle of any state. Losing the tech battle against China will weaken the US military dominance. Mearsheimer urged the United States to take down China's rise and to contain its growing pace by all means. Since security and survival is a crucial goal for any state in an anarchic system. Mearsheimer pronounced that the effect of high tech in the context of Sino-US supremacy contests is predominant. The underlying reason is that great powers always prefer to be pioneer and take lead in developing new technologies to gain the high ground and ensure that their opponents do not give them a head start (Gong, 2021).

The US and China are locked in a high-tech competition of foundational technologies of the 21st century. In most of the trajectories, China surpassed the US and aimed to overtake in the remaining tracks within the next decade. America's leading technologist and entrepreneur, Eric Schmidt, gave his forthright opinion about Sino-US high tech competition. He pointed out that many Americans have the outdated and obsolete vision of China. He versioned China as a strong economic and military competitor which is reducing the gap in technological lead with the US. He predicted that by 2030, China will become a powerful competitor with a bigger economy, robust computing system, more advanced research and progressive technological deployment (Allison et al., 2021).

The geographical construct of the Indo-Pacific comprises the Indian Ocean and the Pacific Ocean as a whole generating a vast maritime space. The maritime domain of the Indo-Pacific consists of the world's most biodiverse area, significant maritime trade routes, busiest seaports, vital sea lanes of communication, exclusive economic zones and a wide range of Indo-Pacific commons. The crucial maritime space has played a key role throughout history in shaping great

powers' behavior, regional dynamic and security architecture of the region. As maritime domain accounts for a large part of the Indo-Pacific, making it the theater of geopolitical competition among great powers. As the 21st century is marked by incessant technological evolution. The deliberate use of AI in advancing military technologies generates unremitting competition among the heavyweights of the world. Against this backdrop, AI-based naval modernization gains the spotlight to acquire maritime dominance. The US and China are expanding their influence in the Indo-Pacific through AI-powered naval vessels to gain control over blue water oceans. The anarchic structure of the international system urged the states to become dominant and establish a monopoly on the high seas (which is open to all nations). The AI-based autonomous systems are leveraging the powerful states to have power preponderance not only in the near seas but also in the high seas.

CHAPTER 6

ROLE OF ARTIFICIAL INTELLIGENCE IN NAVAL MODERNIZATION

6. Introduction

This chapter highlights the utilization and integration of AI in weapon systems and military platforms that have triggered the competition to gain strategic leverage over others. At the theater of power politics, oceans serve as crucial spaces for leading and emerging powers. States are underlying the strategies for naval modernization with the integration of AI to gain influence in blue water oceans. In this arena, the high seas turned up as a temptation for major powers as these areas are with minimal safekeeping. Moreover, it points out the deliberate use of AI in unnamed/autonomous surface and underwater vehicles with operations tactics purported in detail. Lastly, it delineated the use of AI on the high seas, relevant risks and limitations of international law through the lens of structural realism.

The potential impact of AI on international relations made it a new driving force in this arena. In the late 1990s, the inception of deep learning and neural networks enhanced the interest of leading nations in artificial intelligence. As AI has won the blue-ribbon, nations tend to be high-tech giants in AI and to take a lead over others. AI not only served as a revolutionizing tool of success but also posed challenges to geostrategic relations among the nations. AI has become a central aspect of economic growth which serves as the backbone of any state. It boosts the potential of AI to reshuffle losers and winners. The AI revolution seemed to be more powerful than the industrial revolution as it is already seeping into daily lives of common people from healthcare systems to transportation and from virtual personal assistants to giant tech industries. Just like the first industrial revolution, states compete to gain the control of resources like coal or oil, the nations compete the same way to gain supremacy in AI to dominate the modern levers of international system.

The multidimensional aspects of AI have fervent impact in international dealings of nations. For instance, AI is making its way in foreign policy agenda of many states. The AI tool box of foreign policy refers to policy making, bilateral and multilateral engagements, public diplomacy, gathering and analyzing the information. AI also serves as a main instrument in

dealing international security matters such as use of autonomous weapons, cybersecurity issues or threat monitoring. An AI based foreign policy toolbox is already introduced by China and it has revealed its "New Generation Plan" that aimed at becoming an AI world leader by 2030. Russian government acknowledged AI is the future, whoever is winning in AI will rule the world. The US government also emphasizing the use is AI in making policy changes, enhancing transparency of the working systems and assisting in the development. Antony J. blinken (Secretary of State) recognized AI as a global technological revolution. The leading edge states are competing to develop, deploy and advance the AI based technologies. America being a great power endeavors to maintain lead in AI. Centre for a New American Security report, highlight the role of AI in international relations and governance.

This chapter traces the emergence of artificial intelligence, its inflection and its irrefutable importance in military domains. It outlines the concept of AI-weaponization, its types and its relevant impact. It shed light on the use of autonomous systems in navy and naval modernization efforts of leading powers such as the US and China. It highlighted the importance of oceans and marine resources in the escalating great power competition. Furthermore, a critique on the use of AI-based systems in the high seas and limitation of international law is described under the structural realism.

6.1 Dawn of Artificial Intelligence

John McCarthy coined the term Artificial Intelligence in 1956 and defined it as the science of making intelligent machines. Eric Horvit described Artificial intelligence as a set of computer science disciplines designed for scientific understanding of thinking mechanism, intelligent behavior and incarnation of such principles in machines that can add value to people and society. Sometimes AI used as a blanket term to describe numerous technologies, methods or process that have distinct connotations. The simplest definition of AI is that it is a form of technology that exhibits human intelligence by performing complex tasks, reasoning, understanding, learning and adapting from environment (Boyle, 2020).

The 1955 proposal for the Dartmouth Summer Research Project on Artificial Intelligence kicked off this modern field of AI. The originators of this founding proposal are J. McCarthy, M. L. Minsky, N. Rochester, and C.E. Shannon. The proposal was based on the conjecture that a machine can be made to use and stimulate every aspect of learning along with the feature of intelligence in principle. It will be aimed at making machines to use language, reasoning and

planning, formulation of abstractions and concepts, enable to solve the problems that are subject to human intelligence and further improve themselves (McCarthy et al., 1955). The high-profile AI achievements imparted that this field is delineated by big jump in capabilities. The ongoing stream of innovations of AI is highly visible in research and development. Numerous advances of AI and its sub-disciplines have the widespread use in daily life.

(a) AI at an inflection point

The rate of development and fielding of AI systems has witnessed a signifying inflection over past few years. The acceleration in AI development has been driven by availability of large streams of data (structured or unstructured) of human activities by digitization and augmentation in computing power. This technological revolution is subject to the renaissance in machine learning, rapid advancements in processing power, cloud computing, wireless capability and many more. Eric Schmidst (America's leading technologist and entrepreneur) believed that there is no such technology that will have powerful and transformative impact in shaping the world in the next 50 years other than AI. The concept of artificial intelligence has been on the ball for past 60 years. The AI infection point can be witnessed by the major breakthroughs such as speech and facial recognition, fully functioning robots, Deep Blue (chess-playing computer) victory against Gary Kasparov (world champion), computer Watson's win over two champions of Jeopardy (game show), self-driving cars, and automated systems (Amresh, 2020).

AI has the potential to fuel the market's upward trajectory by increasing the economic growth. Accenture report (2016) anticipated that AI is poised to double the economic growth per annum up until 2035 (New York, 2016). The 2023 AI Predictions report of the Forrester predicted that AI will be the foundational element of many companies. It foresaw AI as a trusted and indispensable coworker of enterprises (Curran, 2022). This report mentioned that AI software will be on mainstream and double the revenues of the market from $33 billion in 2021 to $64 billion in 2025 (Burnside, 2022). Artificial intelligence has become more pervasive at this juncture. States are looking forward to harness the high technology to gain a competitive edge on the world stage. The preeminent leader of the AI development has been the US. The growing interest of other leading states in AI could alter this equation.

The leading states are integrating the AI systems into their weapons platform and military technologies such as fighter aircraft, Unmanned Aerial Vehicles, missile defense systems, Unmanned Underwater Vehicles and naval platforms. Most of the armies around the world

have started incorporating autonomous weapons and AI robots into their forces. It has become a subject of importance to utilize AI potential for national interest and security matters (Roe, 2020).

6.2 Weaponization of AI

The dawn of AI has shown its fruit in economic, political and military sectors. The leading states are inclined to incorporate the potential of AI into defense sector. It has triggered a competition between the states to knockout their opponents in the realm of AI technologies (Arif, 2021). Artificial intelligence as a dual-use technology is a double edge sword. AI has the wide-ranging applications in military domain from incorporating into already existing weapon system to the development of new generation of complex military tools and autonomous systems. AI is revolutionizing the warfare as it is not solely subject to human endeavor and being smarter, faster and autonomous. It has application across all domains such as land, air, sea, outer-space or cyberspace. The states are heavily investing in AI to attain the military modernization. The leading competitors such as the US and China are endeavors to outperform each other and win the power battle in AI competition. States are already utilizing AI-based weapons in their power shows, exercises and armed conflicts as well (Rafiq, 2021)

The term AI weaponization refers to two connected processes. The utilizations and integration of AI in weapons systems and platforms across all the domains to gain strategic leverage over others. It enhances the military power by the accuracy, concentration of force, lethality, faster dispersion and immense destructiveness capability. This first category is usually employed to advantage the offensive operations by eroding the adversary's defensive capability. The second way is the use of autonomous command of AI in computer network-enabled operations to undermine, agitate and destroy enemy's systems (LeLe, 2017). So, AI weaponization is adding up the power to conventional military assets and modern software systems, more particularly in cyberspace. Both ways are used to gain military advantage and maintain strategic surprise for adversaries.

Autonomous weapons systems are classified into three main types;

i. Fully Autonomous Weapon Systems (zero human control)
ii. Semi-autonomous Weapon Systems (partial human involvement in detecting identifying the target while the ultimate decision maker is the automated system)

iii. Supervised Autonomous Weapon System (operate independently but human intervention is possible at any time (Ahmad, 2020).

(a) Two divergent school of thoughts: Weaponized AI

There are two prevalent schools of thought that asses the weaponization of artificial intelligence. The proponents of the militarization of AI believed that autonomous systems (weapons or robots) perform a better function with accuracy, abidance and effectiveness as compared to humans. Autonomous systems outperform human abilities and precision. They are not steered by the idea of self-preservation and are immune to human emotions that often result in biased decision-making. AI machines are not vulnerable to cognitive fallacies, hence can take logical decisions in pressing situations. Moreover, the phenomenal integration of neural networks in AI systems collect data from numerous resources, analyze the scenario extensively and then act accordingly at a faster rate. However, ethical and moral issues generate serious concerns that call for a single ethical framework to make machines ethically sensible. The advocates of this view asserts that harnessing of AI for enhancing security and defense capabilities will revolutionize military capabilities by highlighting the technical specifications of AI (Callahan, 2022)

When Artificial intelligence, autonomy, and unmanned armed systems are used in a row, it generates a sense of piercing competition among nations as they are investing hundreds of billions to gain asymmetric advantage in military. William Roper, Director of Strategic Capabilities Office, mentioned AI has the unmatched influence in military technology since nuclear weapon (Roper, 2021). Furthermore, the changing nature and speed of warfare has exceeded the human brain's capacity to making right decisions in pressing situations. Dr. Alexander, Chief Scientist at the U.S. Army Research Laboratory, accentuated his view that human cognitive bandwidth is impeded in the pressure of battlefield which is a severe constraint in handling one or more things at the same time. AI capabilities sounds to be more productive and considered more effective than human errors (Joshi, 2021).

The opponents of weaponized AI dissented the view of militarized autonomous systems without any human control. They deemed that the decision-making ability of AI machines would result in undesirable circumstances. Any technical problem or failure to terminate attack on time could lead towards unintended escalation. Pre-programmed machines are not able to learn and adapt like humans to take rational decisions. These machines are bound to specific instructions and cannot deviate from them. Such inflexibility or any malfunctioning could bring

about horrific impacts. It argued that AI have grave impacts on international security by enhancing the efficiency of lethal military operations that have adverse effects in a long run. The constant development and deployment in anarchic system could cause horrendous impacts around the globe (Lee, 2021).

6.3 Great Powers Competition at a Glimpse

The 21st Century has witnessed radical change in world affairs, geopolitics, high-tech development and the modern ways of warfare. Global Trends: Paradox of Progress assessed these dramatic changes increase the chances of conflict ever than before. Worldwide Threat Assessment mentioned as the competition among nations is increasing, higher the chances of conflict among major powers and regional aggressors since the end of the Cold War (National Intelligence Council, 2017).

The initial glimpse can be seen as the tensions has increased between the US and its high-end peer competitors. The National Security Strategy of the US underlined the immediate threats to the US security, interest and it is at a mass scale. The Security Strategy outlined the strategic vision for the US in context of great power competition based on high-tech with China and Russia. These opponent states try to gain by a minimal pushback to their adversaries. It mentioned China and Russia as "revisionist powers" and "rivals" discarding the words of "friends" and "partners", hardening the US stance at theater of politics. A Report to Congress on Great Powers Competition and National Defense (2020) marked China's rise as fierce competitor which is paving its path to become a high-tech giant. The Defense Primer: Geography, Strategy and Force Design (2022), describes that the US is exercising power to prevent the rise of any regional hegemon and to preserve its power preponderance (*Report to Congress on Great Power Competition and National Defense*, 2020).

The US military issued a futuristic looking publication in 2016 named as Joint Operating Environment 2035. It has a section entitled to technology that describes a future technological landscape characterized by rapid technology advancement. The US approach to high-tech advancement varies according to the challenging innovation of its adversaries. The National Defense Strategy prioritizes the technological advancement as the security environment is influenced by high-tech development (*The Joint Force in a Contested and Disordered World*, 2016). The harnessing of AI technology to support the military weapons, arsenals and vessels has become the matter of concern. The cultivation of AI based technology and automation of

the systems indicating the winners and losers of future battles based on it. The National Security Strategy under Biden administration dictates that the US is a global power with global interests. The affirmative engagements of the US solidify its position in every region. If any region plummets into the hands of any hostile power, it will affect the US presence in other regions as well. To maximize its power and strengthen its influence, the US deployed its military forces across the boarders in a wide expanse of oceans, land and air space.

6.3.1 Maritime Security and Great Powers Competition

Oceans have emerged as theater of power politics and great power competition. It has become the prime area of interest, cooperation and contestation among nations. The most important maritime theater at the global stage is of Indo-Pacific. The last ten years have been watershed years for this region due to its maritime significance. The hardening of great power competition has directed the attention of the leading states to build the AI based naval vessels to achieve the status of power preponderance in the region (Luthra, 2022).

The maritime realm is a crucial space for leading and emerging powers to shape the regional dynamics. Naval forces have historic prominence in dealing with great power competition. Navy constitutes the complete set warships including personnel and equipment that depicts the sea power of a nation. It comprises air craft carriers, amphibians' ships, warships, armored surface or underwater vehicles and submarine. Navy also worked in multidimensional ways like land and air forces. Navy works at two fronts; protect the sea lanes during wartime by defending against other navies and protect trade channels and ports during peace time by maintaining the security in territorial waters. A report titled as "Maritime Security and Great Power Competition: Maintaining the US-led International Order" accentuates the importance of maritime dominance. High-end naval capabilities along high-tech integration would require to deter and counter America's powerful competitors at sea. The littoral areas, exclusive zones economic zones (EEZ), trade channels and global commons of the Indo-Pacific region are the front line of great powers. A significant point of contention among big powers is the power tussle in the South China Sea. The ongoing friction in the seabed exploration of natural resources depicts the prime interest of nations to gain dominance at sea and build powerful presence of navy (Joshua, 2020).

(a) Measures to preserve the US naval supremacy

The United States unveils new maritime strategy (2020) named as "Advantage at Sea" that placed Sea Services at the center of great powers competition. It mentioned that security

landscape has dramatically changed in the last few years that hostile nations are disturbing balance of power of the region to establish great influence. The high-tech advancement and its incorporation in military illustrates the cycles of aggressive modernizations. The unfettered access of the US to the world's oceans is eroding by the rise of powerful high-tech adversaries. The Tri-Services of this maritime strategy watch over the day-to-day competition, conflict or any crisis and closely observed the sophistication of naval vessels of adversaries. These sea services kept an eye on the growing influence of China and aggressive behavior of Russian federation since the beginning of 21st century. It specifically mentions the growing sophistication and aggressiveness of China. It locked China and Russia as determinant rivals instead of responsible big powers. The most pressing political, economic and strategic threat is People's Republic of China. The growing naval might of PLAN is threatening the US hegemonic position at the global stage (Sadler, 2021).

Michael Esper (former Secretary of Defense) mentioned AI as the top priority of the Department of Defense for technological modernization. AI is a game changer and an essential tool to gain the mastery of any field. The statements of Russian President Vladimir Putin and China's president XiJiping accentuated the importance of artificial Intelligence as the cornerstone of development and advancement. The view of other competing big powers leads the US to harness AI in competitive military paradigm. That's the compelling reason for the US to introduce the AI and autonomy in its weapon system to knock out its adversary before time. The rival powers are leapfrogging in integration of unmanned systems based on AI in military sector. The DoD also set the overarching vision and a road map (FY 2017-2047) to accelerate the integration of unmanned systems. The Department of the Navy has set ambitious goals to develop the rapidly emerging unmanned systems and autonomous systems for naval upgradation. James Geurts (assistant secretary of the Navy for Research, Development and Acquisition) accelerated the high-tech deployment and ensures to maintain naval development at the forefront of emerging capabilities (Galdorisi & Tangredi, 2021).

6.4 Brief Overview of China's Naval Modernization Effort

The United States Navy stands out among all the navies of the world with maximum capabilities. It has emerged as one of the most powerful and largest navies of the world since World War II. The US navy maintains its global presence and sizeable deployment in substantial waters such as the Western Pacific, the Mediterranean, and the Indian Ocean.

China is quickly closing the gaps of deficiencies to reach the level of US navy sophistication. China's unprecedented naval modernization efforts since mid-1990s, made it one of the largest and the most capable force of the world. China has made its navy a formidable military force in near-seas region and conducting number of operations far from home that encompasses the distant waters of the Western Pacific, the Indian Ocean, and waters around Europe. Peoples Liberation Army Navy (PLAN) was largest navy in East Asia. China's navy is numerically the largest navy as it surpassed the US navy in total number of ships within past few years. Department of Defense mentioned PLAN is the largest navy of world consisting of 355 platforms for battle force that include aircraft carriers, surface combatants, submarines, patrol combatants, fleet auxiliaries, amphibious ships and many more. PLAN's number of ships expected to grow to 420 by 2025 and to 460 ships by 2030. Moreover, China has largest coast guard and a sizeable maritime militia (force of fishing vessels engaged in commercial fishing usually in disputed waters) to defend its near-sea claims. PLAN has modern multifunctional platforms comprising sensors and weapons for air, surface and underwater detection and annulation of any threat. Naval vessels and arsenal of China are much more advanced, modern and capable in comparison to 1990s and now analogous to many advanced western navies (Congressional Research Service, 2022).

6.4.1 Tipping the Balance: U.S. Vs China's Naval Fleet

The annual DOD reports on military and security developments shed the light on PLAN's successive growth over years from 2005 to 2021. This gives a detailed overview of PLAN's increasing number of ships that how it bridged the gap and surpassed the US navy. It includes various types of navy ships such as destroyers, frigates, cruisers, corvettes, missile-armed coastal patrol craft, amphibious ships (tank landing or transport dock), aircraft carriers and submarines of varying capabilities. Following Table 6.1, gives an overview of China's growing number of ships as compared to the US.

Table 6.1

Growth of Naval Ships Numbers

Year of Department of Defense Report	Total Number of PLAN Ships (various types and functions)	Total number of US Navy Ships
2005	216	291
2010	276	285
2015	294	289
2021	318	296
Change Sice 2005	+132	+5

Source: Report to Congress on Chinese Naval Advancements

Table 6.1 depicts that PLAN's ships has been increasing numerically with every passing year. Since 2005, 65%, of increase in almost all the types of ships has been witnessed and surpassed the US navy. Number of ships is a one-dimensional measure to assess the relative naval capabilities of both navies. The important thing to take into account is the difference of composition between these two navies. The US Navy has more advanced and powerful form of naval vessels such as nuclear-powered summaries, cruises, destroyers and aircraft carries in number. While PLAN has more diesel attack submarine, frigates and corvettes in number (US Department of Defense, 2021).

6.5 The Next Wave: Role of AI in the Naval Modernization

Various States have underlined the formidable uses of Al in terms of military to maintain its superiority in battle space and daily life operations. Al-based technologies have profound implications in the military domain to perform complex and challenging missions. The execution Al capabilities are preferred in hostile and unpredictable environments such as maritime space. Oceans are usually difficult to navigate and sometimes unmapped. Al-base systems can be used to augment existing capabilities of naval vessels by detecting, tracking, calculating and outlining the whole plan to execute the best actions. Many areas in operation require constant intelligence, surveillance and reconnaissance (ISR) of ocean environment, and Al-based systems functions above the hostilities of marine physics (Mukherjee, 2018). Moreover, navies can harness the Al systems to detect, map and encounter adversaries' vessels as well. The Al based unmanned systems has become an indispensable asset for the naval force.

The maritime space is expected to be the first battle space where autonomous weapons can be deployed. The Al based autonomously capable lethal systems are gaining greater salience in the military sector.

The deliberate use of Al has become the part and parcel of naval operations. First, it is important to differentiate Al based naval combat systems and Al-based naval vehicles. These two Al systems augment the naval capabilities in a distinguished manner. Al-naval combat systems are developed to supplement nautical operations and usually run by human-machine collaboration. Navies prefer the Al application in naval combat systems to upgrade the operational capability and assistance in the decision making in complex scenarios. While Al-based naval vehicles can perform its functions at their best without human supervision. The use of AI in unmanned naval vehicles has been developed from general navigational support to full scale autonomy. These vessels included unmanned surface vehicles (USVs) and unmanned underwater vehicles (UUVs). Most of these vehicles have less autonomy and are operated by tele-piloting by the use of satellite links. A subgroup of these unmanned vessels are categorized as Autonomous Underwater Vehicles (AUVs) and Autonomous Surface Vehicles (ASVs). These autonomous vehicles have a certain degree of autonomy and perform the tasks without any human intervention (Valenti, 2022).

6.5.1 AI in Unmanned Naval Vehicles

In the modern day naval structures, the degree of human control is decreasing and AI-based autonomy is progressively increasing to carry out sophisticated naval missions. Primarily, these vessels are employed for non-lethal missions such as Intelligence Preparation of the Operational Environment (IPOE), Intelligence, Surveillance and Reconnaissance (ISR) and Mine hunters and sweepers. Sean Welsh (security automaton and ethics expert) asserted that complete mission autonomy in naval vessels act as a force multiplication in maritime domain awareness (Welsh, 2015). The AI based technology enables the vessels to execute more complex missions with a high autonomous level and interface with other vessels. For instance, Unmanned Surface Vehicles (USVs) provide an optical view of the surface in a video communication to the submarine. The USVs also launches the Unmanned Aerial Vehicles (UAVs) that engages the submarine in surveillance without submerging to laparoscopic depth. The best illustration of such a complex system is depicted by the Raytheon Submarine over the Horizon Organic Capabilities (SOTHOC) (Trevithick, 2021).

In the category of Autonomous Surface Vehicles (ASV), the US Navy's Sea Hunter - best performed the surface level operation. It is called the Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) developed by the Defense Advanced Research Projects Agency. As Sea Hunter is deployed for large area reconnaissance, it operates to track the submarine and then passes the information to nearby vessels or base stations. China is also aiming to develop autonomous vehicles to counter the US Navy's modernization. The uncrewed surface vessel is being developed by China as a rendition of the Sea Hunter (US Navy autonomous surface ship). This information emerged online from Maritime China magazine. It is said that the first trial of the uncrewed vessel was conducted near Zhoushan Island. China is aiming to patrol in those areas where enemy's adversarial activities or summaries are expected to be there. Moreover, China has developed an unmanned vessel named Zhu Hai Yun that functions as a drone ship aiming for research and exploration. The War Zone magazine suggests using it in military context as a hub of unmanned weapons and for surveillance activities (Helfrich, 2022).

Swarming is also a significant development in unmanned systems revolutionizing naval warfare. Swarming implies a group of drones possessing individual autonomy but remotely operated as a whole. It usually involves the mini-tasks of large missions. The US has initiated a research program named "Low Cost Unmanned aerial vehicle Swarming Technology" (LOCUST), to develop this capability (Lachow, 2017). The autonomous and unmanned vessels are constantly learning and adapting from the environment with enhanced capabilities to execute missions. If such autonomous vessels carry out lethal missions with lethal autonomous weapon system, it would mark an unmatching revolution in the history of technology deployment. The untethered ocean environment is deemed a suitable place for the deployment of Lethal Autonomous Weapons (LAWs). The autonomous underwater and surface vehicles can increase the bandwidth of naval functions by detecting accurately and engaging the enemy targets. Such AI systems provide an undeniable advantage in protecting maritime space against any potential threat.

6.5.2 Operational Landscape for AI-Based Naval Systems and Unmanned Vehicles

The US and China are the leading competitors in the development and deployment of AI-based naval systems to augment nautical and surveillance capabilities by introducing unmanned maneuvers. The US is directing its attention to a new strategy of building blocks of unmanned tech. It aimed at making unmanned surface vehicles in the coming years (Eckstein, 2022). Xi Jinping stated at the 20th National Congress of the Chinese Communist Party (CCP) to utilize

artificial intelligence in advancing China's military. He was determined to make China a world class military and elevate it on equal footing with the heavy weights of the world. Jinping mentioned the word intelligence three times emphasizing its significance in the use of weapon systems (Takagi, 2023). Moreover, China is harnessing AI technology to detect and trace adversaries' vehicles.

China seized an unmanned underwater vehicle in the international waters of South China Sea in 2016. Pentagon officials declared that underwater drone was entitled to collect oceanographic data autonomously (Domonoske, 2016). The US Bowditch (US oceanographic survey ship) was retrieving the underwater drone named as ocean glider while the Chinese warship headed to seize the UUV of the US (Chappel, 2016). The Department of Defense calls upon China to return the UUV. The seizure of the glider in international waters is a violation of freedom of navigation norms in compliance with international law (The New York Times, 2016). This scenario demonstrated the escalating competition between the US Navy and the PLAN to gain dominance in the international waters.

The US has embarked on integration of AI in military under the Third Offset Strategy aiming to maintain the battle-space superiority. This strategy was formulated under the Obama administration and then successive administrations focus on developing leading-edge technologies to maintain upper hand over potential adversaries. China concentrates on technological innovation to play on the same level with its US counterparts. Under the Xi Jinping administration, prioritized AI-based development and deployment in the military sector. Both Washington and Beijing are trying to develop cost-effective high probability autonomous vehicles that make targeting difficult and overwhelm the capabilities of the adversary.

6.6 Harnessing the Power of AI in Naval Vessels

The major powers are exploring the means to incorporate artificial intelligence technologies into their naval fleets that will ultimately increase their effectiveness. It requires long-range sensors, weapons integrated with high speed, and connection between air, surface, and undersea domains. The world's leading navies are progressively cultivating AI to enable their naval vessels and war utensils to operate with high situational awareness and surveillance capability. In view of rising China as a threat, the Department of Defense emphasizes the use of AI to gain an economic and military competitive advantage. As Lorin Selby, chief naval

researcher, described the potential of artificial intelligence is going to leave a transformative impact and mastering it is directly proportional to enhancing capabilities (Lee, 2020).

China's growing naval size grabs most of the attention and concern of its rivals. it has surpassed the US in terms of its size (as mentioned in Table 6.2) and harnessing a wide range of advanced technologies. It is claimed that PLAN has progressively become comparable in capability to the US. Rob Wittman, Ranking Member on the Sea power and Projection Forces Subcommittee, asserted that only the modern elements of PLAN are concerning for the US. The thing that matters is that they are capable of comparing their ships to the US rather than the total number of ships. The gap between the US and China in quantity (larger navy) is growing by quality, China lags behind (Osborn, 2022). Table 6.2 enlisted highly capable AI-based unmanned or autonomous vessels of both China and the US.

Table 6.2

Integration of AI in Naval Vessels

Country	**Name of Vessels**	**Types**	**Specifications**	**Range**
United States of America	Orca UV	Extra-large Unmanned Undersea Vehicle (XLUUV)	Silent hunter for submarines	6500 nautical miles (autonomous navigation)
	Sea Hunter	Class-III Medium Displacement Unmanned Surface Vehicle (MDUSV)	Anti-submarine Warfare (ASW)	10000nautical miles
	Sea Hawk	Medium Displacement Unmanned Surface Vehicle (MDUSV)	Upgraded version of Sea Hunter Anti-submarine Warfare (ASW) Anti-surface Warfare (ASW)	12000 nautical miles

People Republic of China	Zhu Hai Yun	AI-operated Mother Drone Ship	Seaborne drone carrier (touted as maritime research tool)	Scan a 3D Section of Ocean up to 54 nautical miles
	A45 USV	Unmanned Surface Vehicle	Autonomous, High Swarming Capability, Not Easily Detectable	280 nautical miles
	JARI-USV-A	Unmanned Surface Vehicle	Anti-submarine, Anti-missile, Over-the-horizon strike	Search and Strike Submarine within Range of More than 7 kilometers

Source: Compiled by the researcher from

Four prototype uncrewed surface vessels participate in RIMPAC-22, https://www.naval-technology.com/news/four-uncrewed-surface-vessels-rimpac22/; Orca XLUUV, https://www.naval-technology.com/projects/orca-xluuv/**;** SEA HUNTER: INSIDE THE US NAVY'S AUTONOMOUS SUBMARINE TRACKING VESSEL, https://defence.nridigital.com/global_defence_technology_may18/sea_hunter_inside_the_us_navys_autonomous_submarine_tracking_vessel**;** China Showcases New A45 USV At NAVDEX 2023, https://www.navalnews.com/event-news/navdex-2023/2023/02/china-showcases-new-a45-usv-at-navdex-2023/**;** China's AI-Powered Drone-Ship and Super-Carrier, https://www.spsnavalforces.com/experts-speak/?id=516&h=Chinas-AI-Powered-Drone-Ship-and-Super-Carrier**;** China's JARI-USV unmanned ship has its first trial: detailed characteristics, https://www.china-arms.com/2020/01/jari-usv-first-trial/

Table 6.2 elucidates AI-based vessels of the US and China. There is a broad range of naval vessels and platforms with integrated high-tech and AI-based autonomous systems. While only highly proficient and recently launched vehicles are described. Table 6.2 depicts that the US has launched AI-based unmanned wide range naval vehicles long before China. The powerful unmanned vessels have defensive capability while China embarked on the journey of introducing AI-based autonomous systems as scientific research tools.

The above mentioned view is contradicted by researchers who warned the US over a bigger fleet of china. Sam J. Tangredi, former US navy captain, asserted that large fleets facilitate the navy for extensive training, high operational capability and have potential to gain strategic edge over smaller technological fleets. The bigger naval fleet is recognized as a pacing threat to the US. There are 167 warships of the reflected state of the art and highly capable to perform multiple tasks in the unfettered ocean environment. The total number of larger and smaller warships are 340 in 2022 and expected to project 400 in the next four years. While the US comprised 300 ships in 2022 and aimed to build 350 ships until 2045. Counting on technology

is not enough to compete with such a larger fleet. The integration of technology with larger fleet size tends to give an upper hand over others (Lendon, 2023). However, AI is still in the nascent stage in the navy and many research programs are underway to test the capabilities and deploy them in the case seas.

In an era of renewed great power competition, China's Formidable military force development has become the center of focus of America's Department of Defense. China's navy emerged as key challenged to the long-standing status of the US since the end of the Cold War. The pace of PLAN's naval development is viewed as a potential threat to the naval might of the US. China's aspiration to attain a greater degree of control in near seas region particularly in the South China Sea. China is making obstinate claims to defend its foreign military activities in distant waters. China is making its navy an anti-access/area-denial (A2/AD) force capable to deter the intervention of the US in its near-seas area. The attempts to displace the US influence to become an indisputable power is alarming the US superior status in the region. In spite of substantially improved naval capabilities, PLAN has limitations and shortcomings in certain areas. It has loops and holes in conducting the successful joint operation with military forces of China. It has limited capacity to resupply the combatant ships in distant waters and also limited number of overseas bases. It requires to overcome the limitations to fulfill the big dream of China. While the US has taken number of steps and steel itself to counter China's growing naval influence. A greater percentage of fleet constituting most capable warships, aircrafts and high-tech weapons shifted to the Pacific. The US is enhancing the engagement, exercises and cooperation with allied navies to make its presence influential in the region.

The next chapter is the continuation of this debate which highlighted the role of AI-based naval modernization in attaining superiority in the marine environment. The high seas have been emphasized as open to all where all nations have equal rights. The high seas are the quintessential global commons that are the home to maritime ways and pivotal to global trade. The use of artificial intelligence in naval vessels and platforms to gain access to the high seas is part of the discussion. The following section will also cover international law regarding the high seas and its limitations in dealing with AI-based naval platforms.

CHAPTER 7

ARTIFICIAL INTELLIGENCE IN THE HIGH SEAS

7. Introduction

The high seas, also known as the international waters, are part of oceans beyond the control and jurisdiction of any nation-state. These waters lie outside the exclusive economic zone and are considered global commons, belonging to all nations on equal terms. In the anarchic structure, states are endeavoring to gain control of the high seas to attain maritime supremacy. This chapter has analyzed the role of Artificial Intelligence based autonomous/unmanned vehicles in gaining access to far waters efficiently. The use of AI-based naval vessels, especially in the high seas, and the legal frameworks in this regard have been critically analyzed through the lens of structural realism.

7.1 Beyond Borders: Strategic Significance of Oceans

Oceans are considered as the lifeline of the economy and have a profound significance for the national interest of any state either coastal or landlocked. It is the home to more than half of the world population who settle along the coasts. Oceans comprises marine highways, water channels and strategic choke points that ensure the flow of exports and imports all over the globe. Historically, Oceans remain a source of exercising power and become a theater of conflict. It is the space where traditional navies are struggling to extend their sovereign claims and exploiting others' interests. As Bruce Jones mentioned in his book, "*To Rule the Waves: How Control of the World's Oceans Shapes the Fate of the Superpowers*", characterizes oceans as a chessboard on which states had been battling to dominate for centuries. The nuclear age, missile arsenals and Al based autonomous systems are generating the security concern among nations. States opting for maximum power at land and at sea as well. He enunciated that naval power is crucial to maintain the US supreme standing in any region. Ruling the waves in every domain to gain power preponderance has become a prime interest of big powers (Jones, 2021).

Oceans with their untethered environment, abundance of natural resources and significant sea ways are fueling the rivalry. In controlling the world's oceans, the next domain of big power competition is the high seas. The return of China to the seas after almost 500 years posed a grave threat to the US long standing position. The research event at Chatham House, titled

"Controlling the world's oceans: The next domain of great power competition?" focused on the increasing strategic importance of the world's oceans and the potential for great power competition in this domain. It examined the role of new technologies, such as artificial intelligence and autonomous systems, in shaping the future of maritime security and the potential risks and opportunities that these technologies present. The struggle to dominate the high seas is shaping the nations' interest to harness the AI-capabilities to deal with their adversaries on equal footing (Jones & Vinjamuri, 2021).

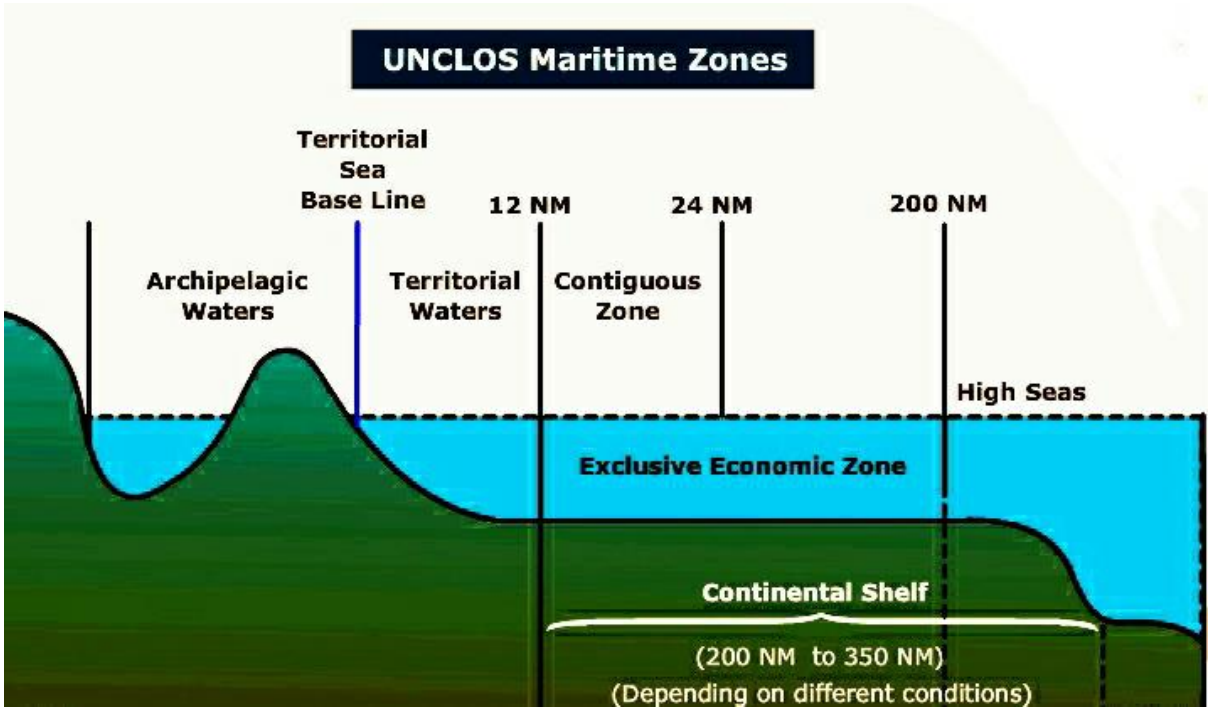
7.2 Understanding the Concept of the High Sea

High Seas are the part of the ocean outside the jurisdiction of any country. The United Nations Convention of the Law of the Sea (UNCLOS) defined the apparent boundary of the high seas started 200 nautical miles from the coastline. Geneva Convention on the High Seas (1958) declared that all parts of the sea excluding the territorial waters of a state is characterized as the high seas under Article 13(1)(a). The part VII of UNCLOS retains the permissible and impermissible on the high seas. It declared that the high seas or any part of it is not subjecting to national sovereignty of any state (Cornell Law School, 2022). The section 1 entitled as General Provisions that regulates the application of prescribed articles of the law. Article 86 defined the high seas as the parts of sea omitting the territorial waters, exclusive economic zones, archipelago waters or the internal waters of the state. The freedom of navigation to fly over in exclusive economic zones is preserved in Article 58 (1) of the Geneva Convention on the High Seas. Article 87 entitled as *freedom of the high seas* assure the principle of freedom of high seas as it is open to all states (coastal or landlocked). It allows the freedom of navigation and overflight. While the freedom of laying the submarine cables/pipelines, freedom of fishing and freedom of scientific research are subjects to the conditions laid down in the various sections and parts of law. The exercise of this freedom is bound to the regulations given by the Convention and should not harm others interest in the high seas (United Nation Law of Sea, 1982). The international law also declared that the highs seas are not directly owned or regulated by any state. The International Law categorized the high seas as the global commons. The law defines four areas as global common included; the high seas, atmosphere, Antarctica and outer space (Harper, 2022).

The two thirds of earth's surface covered by the oceans that hold 96.5% of all earth's water. 64% of the ocean is deemed as the high seas. The high seas are the home of ocean giants and considered as the most biologically productive area in the world. The littoral states control 200

nautical miles protracted from their coasts and are known as exclusive economic zones (EEZ). It includes the water column and seafloor where the use of marine resources is a sovereign right of the state. The high seas are referred to as the open ocean that lies beyond the territorial boundaries of the states, hence, not subject to the national jurisdiction of any states (Sapsford,2022). Figure 7.1 illustrates the various maritime zones according to the Law of Sea.

Figure: 7.1: Maritime Zones – Law of Sea



Source: Maritime Engineers Knowledge

7.3 AI on the Helm: Maritime Competition at the High Seas

The high seas are considered a global common where all the nations have equal rights and allowed the peaceful exploration entitled to scientific research. As maritime law described the high seas as all the parts of the seas excluding territorial, internal, adjacent waters and Exclusive Economic Zones (EEZ) of coastal countries. However, the exploration of deep sea beds is halted as this area has ceased to be free. This action has been taken under the advocacy of the United Nations Convention on the Law of the Sea (UNCLOS) and the International Seabed Authority (ISA) to protect the fragile marine ecosystem. The exploitation of resources and sea mining is posing an unprecedented threat to the ocean environment. It also leads toward hostility among nations to gain maximum benefit from the resources of global commons. The

advent of advanced technology and autonomous systems made the high seas easily accessible for exploration, surveillance and countering any formidable threat.

The high seas are pivotal in the flow of global trade and commerce. They are the home to Sea Lane of Communications (SLOCs) deemed as maritime highways for sea transportation between countries and continents. With the passage of time and changing geopolitical landscape of the world, the marine routes and shared space has become a disputed matter. The unlawful claims, forceful deployment of military vessels and personnel and aggressive behavior towards other states have imperiled the freedom. For centuries, states had been challenging the free navigation and sovereignty in the high seas. In the current paradigm, the South China Sea has been a subject of dispute over sovereign claims extending beyond the territorial waters. The South China Sea is of utmost importance as it is a semi-enclosed sea space comprising the sea lanes of communication connecting Europe, Middle East, Northeast Asia, Southeast Asia, Pacific Ocean and North America. This sea is home to a number of islands, natural resources and strategic choke points (Basu, 2020).

(a) Uncovering the power play in the age of artificial intelligence

China made a virtual claim on almost all over the South China Sea and exhibited assertive behavior to protect its claims. The freedom of navigation operations has been a source of tension among the potential competitors. The US has been conducting freedom of navigation operations since 2015. It demonstrated that the US will fly, sail and operate in accordance with international law. If any state having excessive maritime claims such as China is against international law and cannot halt the freedom of navigation. Under the Biden administration, the US Navy has completed its freedom of navigation operation (FONOP) in the South China Sea. John S. McCain (guided-missile destroyer of the US Navy) set on freedom of navigation in the international waters of the South China Sea and sailed around the Paracel Islands. This is a disputed area along China, Vietnam and Taiwan as their territorial area. As China makes claims over Paracel islands, it accused the US Navy of intruding into China's territorial waters. China's stance about FONOP of the US Navy as seriously violating the sovereignty and security of China. The PLAN's spokesperson states that John S. McCain's transit was overstepping into China's territorial sea without permission. He indicted the US Navy in gaming the regional peace and stability. The Southern Theater Command of China is engaging its air and naval assets with high capability to track the US warships and warning to stay away (Haver, 2021).

The US sailed the Theodore Roosevelt Carrier Strike Group twice into the South China Sea to conduct routine operations. Doug Verissimo, (commander of Carrier Strike Group Nine) gave remarks about returning to SCS that it is to ensure the allies and other states that the US is committed to the freedom of the seas. Zhao Lijian (Chinese Foreign Ministry spokesperson) stated that the US is aiming to drive a wedge between countries to exacerbate the militarization of the South China Sea. China also has passed the Coast Guard Law that allows the coast guard ships to encounter any threat from foreign vessels in Chinese waters. China declared that any foreign naval or military vessel should seek permission to transit through the country's maritime space (Lee, 2021). The areas which China claims as its territorial waters are declared as the high seas or open waters by UNCLOS. The international laws constraint the excessive claims of China, hence limiting its freedom of action. So China is acting against this aspect to protect its sovereign historical claims.

The US calls out China for the militarization of the South China Sea over the past two decades. China's fishing in the distant waters and presence of fishing fleet in the high seas is breaking up the long term influence of western countries in the high seas. The rise of China as a competitor power is threatening for the US influential presence in the region. Under the blanket of freedom of navigation, the US keeps on challenging China's claims to curb its potential rise. The FONOP of the US is an act to challenge China's sovereign claims and to promote the" free and open Indo-Pacific" (McCabe, 2021). China's rapid modernization in military capabilities and AI-based development alarmed the US. The US carrier strike group begins operating in the South China Sea to deter China and bolsters America's position in the region. China claims much of the sea as its sovereign territory. This action heightened the tensions between Washington and Beijing. Two Chinese ships started to tail the Nimitz Carrier Strike Group. This carrier strike group has both lethal and non-lethal capabilities across all the domains. China asserted it as an illegal entry without China's permission. Beijing called the US a true producer of security risks (Liebermann, 2023).

Such events highlight the escalating maritime competition in international waters among big powers. The new generation of intelligent systems are playing a significant role in competing adversaries' naval might and giving an edge to maintain upper hand not only in territorial waters but also in the high seas.

7.4 Structural Realist Approach and AI as a Strategic Technology

Artificial intelligence (AI) is deemed as a strategic technology that heightened international competition as more than fifty states indulge in drafting strategies to become pioneers in this field. At the international stage, the two competing high-tech giants, the US and China are altering the balance of power. As John Mearsheimer remarked, states opt for strategies to improve their national power by strengthening economic and military capabilities. John J. Mearsheimer has emphasized that States are likely to pursue technological development to enhance their military power. He has not specifically addressed the use of artificial intelligence but underlined the significance of technological advancement. The AI has remarkable potential to augment the states' national, economic and military capabilities (Simbar & Lakani, 2018).

The profound impact of AI on the international system can be witnessed as the world's militaries have engaged in militarization of artificial intelligence. The AI has the capacity not only to develop the autonomous systems but also add power to the conventional weapons. The militarized AI plays a critical role in shaping the perspective of great powers for the hegemonic ambitions. The lens of offensive realism clears the picture of an anarchic international system that urges the states to go for maximum security and power. The states with substantial power go for regional hegemony while it generates insecurity among the smaller actors of the world. The states are being compelled to enhance their military power and AI has become an effective source to enhance power. The defensive measures of states are perceived as potential threats and offensive for others. The big powers such as the US, China and Russia have engaged in pursuing AI militarization. Artificial intelligence has overcome the spatial and temporal obstacles and the stopping power of water. The harnessing of AI technology across all the fields could be offensive but seems the only way to secure the survival of smaller states and powerful status of great powers as well (Tinirello, 2018). Kenneth Waltz also argued that the states are inherently desperate to gain power and survival in the international system. Hegemonic aspirants commenced on advancing their economic and military capability over others. The mutual distrust led others will act in a similar way. The artificial intelligence gives a way to states (leading-edge or smaller actors) to compete more efficiently and ensuring the survival under anarchy (Wu, 2020).

7.5 Critique of AI in High Seas

The use of artificial intelligence (AI) in the high seas is a relatively emerging phenomena that brings forth the benefits and generates several concerns. The AI-based autonomous systems

are more efficient, cost-effective and perform functions with greater precision and accuracy. The autonomous systems are of great advantage in performing non-lethal tasks such as increasing the general nautical capability at sea or in trade for unmanned cargo ships. AI has the capability of improving the efficiency and security of maritime activities such as sea transportation or vessel navigation. The use of artificial intelligence in naval operations has transcended the applicability in many other military domains. The sheer size of the ocean with unpredictable and hostile environments made AI use indispensable. AI is enhancing the effectiveness of manned operations. It has become a crucial asset for naval force structure as it provides constant intelligence, surveillance and reconnaissance (ISR) and can negate the physical hostilities of the marine environment. The naval forces can use AI in mapping the target and engaging enemy vessels, hence providing an unprecedented advantage. It helps the nations in maintaining supply chains and shipping operations more effectively (Ocean News and Technology, 2018).

7.5.1 Navigating the Risks

The use of AI in the high seas generates safety concerns, ethical obligations, environmental concerns and legal implications. Relying too heavily on the AI systems in the complex and untethered environment of sea is perilous in many dimensions. Unmanned or autonomous systems are becoming a part of everyday life across all the domains. The small platforms are primarily used for surveying, research purposes or in near-seas operations. While large cargo vessels or highly capable AI based warships are designed to use in the high seas. The use of such AI based utensils are questioned in threatening other sea users. It provokes concerns that AI based autonomous systems are reliable enough to freely navigate in the uncluttered environment of the high seas. The capability of responding in interacting with civilian vessels or enemy vessels in the high seas put it into question (Felski & Zwolak, 2020).

At first the question raised about the reliability of machines and their decision making capability in complex situations. One potential issue with the use of AI in the high seas is the risk of accidents and malfunctions. The development of high accuracy and reliable designs cannot guarantee the infallibility of AI systems. Any breakdown in a pre-programmed autonomous system can trespass into the exclusive economic zone of any state which leads towards grave conflict over violation. The malfunction can lead to catastrophic events. The US Congress expressed concerns over the use of Unmanned vehicles (UVs). The operations of large unmanned surface vehicles such as freedom of navigation particularly in the areas that are near the potential adversaries. For instance, the Chinese military is attempting to intercept

the autonomous vehicles of the US such as the seizing of underwater autonomous glider. The lower threshold of military actions in autonomous systems can leave serious implications in the volatile regions. Without the human-machine teaming the risk of miscalculation is high. The unexpected escalation due to unmanned systems could spark a potential conflict (O'Rourke, 2022).

The exercise of power through AI-based systems in the high could lead to potential conflicts over excessive claims in international waters. The freedom of navigation is allowed for peaceful purposes subjected to particular conditions and laws. While states are using the autonomous vessels for military purposes under the blanket of scientific research on marine ecosystems. Concerns have been provoked over the complete autonomy with lethal capabilities. The autonomous fleet designs of the US and China in the disputed waters are exacerbating the conflicting scenario. The counter intervention AI based technologies depict an offensive approach in enhancing power projection to dominate in the far sea regions. The excessive claims in the seas by China and making it the area of anti-access and area denial is demonstrating aggressive behavior. The use of AI-based fleets in such conflicting domains can have detrimental implications. There are high chances of striking first in the pre-programmed autonomous vessels in perceiving the threat from enemy vessels. Both the US and China aim to underpin the military advantage over others to gain supremacy in the region (Caverley, Dombrowski, 2020).

Moreover, a potential issue surged relevant to the marine environment. The use of AI with high frequency waves and radiation causes disruption in marine life. AI-based underwater transmitters such as SONAR waves affect marine life. The noise causes an interference in their communications, unbalancing the predator-prey relations and emigration of sea animals from their ideal environment. The military training, vessels carrying lethal autonomous weapons, or any military confrontation leaves contaminants that have adverse impacts on marine life. It includes habitat alteration, environmental pollution, biodiversity and population loss. The modern capabilities of military activities have potential consequences on the structure and function of the ecosystem (Chandrika, 2022).

The ongoing debate over the concerns regarding the AI-autonomy have generated a cottage industry of books addressing the unmanned systems in military context. Following books are included: "*The Manned-Unmanned Team is the Future*", "*Remote Control: The Ethics of an Unmanned Military*", "*A.L. Still Needs H.L. (Human Intelligence)*", "*Rethinking the Drone*

War", "*Army of None: Autonomous Weapons and Unmanned systems*" and many more. Most of the books suggest the man-machine teaming in operational context rather than fally autonomous systems. The current autonomous systems have humans in the loop but the growing level of sophistication can lead them out of the loop (Galdorisi & Tangredi, 2021).

The global commons are crucial for worldwide connectivity through trade and telecommunication. The use of maritime ways, the high seas and outer space have been a critical source of augmenting military power. These vital zones have become fragile due to exploitation by human activities. Particularly, the high sea being a free space without any sufficient legislative framework, effective governance and monitoring to stop the rogue behavior of states to exercise their influence. The high-technology capabilities let them exploit the high seas commons. The principle of open access is being misused by the states to hunt the limitless resources and deterring their enemies in the open oceans. The emergence of new global players such as China intensifies the great power competition. The geopolitical upheaval and changing strategic dynamics have surged the importance of global commons for strategic and military purposes. The most powerful players of the world have demonstrated their power shows of highly capable naval vessels in the high seas. As Garret Hardin expressed his views in his book "*The Tragedy of the Commons*", about the inexorable tendency of destruction towards common property resources. This illustration can be employed in terms of the high seas. The open access and the freedom to act independently caused the states to function according to their national interest. Consequently, the common good for all users will be neglected on a mass scale and result in the depletion of resources and violation of prescribed laws. The unfettered access to a common pool of resources ultimately is provoking the quest of maximum power (Harper, 2022).

7.6 Charting the Course: Maritime Laws

In the case of the oceans, technically nobody controls the vast environment as a whole. The high seas are the global commons that remains as free and open-access area for all nations with unfettered access. The 1982 United Nations Convention on the Law of the Sea (UNCLOS) provides the maritime laws and international norms on the seas of the world. The UNCLOS defines the maritime boundaries of the states. The territorial sea starts from the country's baseline and extends to 12 nautical miles while the exclusive economic zone extends to 200 nautical miles. All the states have sovereign rights in the defined zones and their sea beds. Outside the exclusive economic zones are the high sea (McCabe, 2021).

(a) Challenges to law enforcement

The maritime laws essentially cover the extent of state's actions in the designated territorial waters. However, in terms of the high seas, international law has an indefinite relation to the state's actions over any perceived geostrategic threat or malign attentions of an adversary. These maritime laws are subjected to the conditions of peace or case of war and not address the in-between possibilities. Hence, states are left with developing their naval capabilities and augmenting their naval might in the self-help arena (Basu, 2020).

International maritime has an intricate web of treaties, conventions and customary law to regulate maritime activities of the states. The key assumption about the vessels or ships noted to be commanded by a master and managed by a crew. The AI based autonomy at sea is challenging to such assumptions. There are more than 1000 autonomous ships successfully operating in the seas. Even though these are small platforms with remote operation, fully autonomous vessels are also on the doorstep. It raised the question of how UNCLOS accommodated and dealt with maritime autonomous vessels. The anchor point is that UNCLOS presented the body of laws in the 1970s and 1980s with no anticipation of AI-based autonomy. Furthermore, these laws address the flagship state to ensure compliance with international law. If any autonomous ship is involved in some violation or seized by an adversary state, then the laws to deal with it have not been drafted yet. For instance, the seizing of an American glider by China in the high seas. The development of code of regulations for the maritime autonomous vehicles according to their varying capabilities should be drafted to overcome the arduous challenges (Parker, 2022).

7.7 Mearsheimer's Take on International Law

Mearsheimer's debate over the relevance of international law for international politics and its impact on state's behavior enunciated the realist school of thought. He negated the erroneous view that realists believe that International institutions or international law do not matter all. The international institutions and their rules are as effective as the international law and consider these entities as same. Therefore, he used the term law or rule interchangeably. In a highly globalized world, states are interdependent in terms of politics, economy and security, hence, required international laws and institutions to run the world. Even the great powers like the US require rules and regulations for the things like trade, so these are absolute essential. Meaesheimer asserted that these laws are helpful in coercing the minor powers and are suitable for great powers like the US in achieving their goals. For instance, the Non-Proliferation Treaty

introduces after the US acquire the nuclear weapon. So the law prevents others from getting the nuclear weapon under the blanket of safety and stability.

The ground of argument is that international law or institutions cannot force the states to obey the laws, even when their national interest is at stake. States operate in an anarchic structure where the state is the absolute authority and no one above it. States have to make sure for maximum power as much as possible. In a self-help world, these laws are usually at odds with state's vital interest. States disobey the rules or break the laws for vital interest and survival. Mearsheimer asserted that great powers write the rules that suits best for their interest. He referred Lowes Dickinson's book, named "*The European Anarchy*" which states that in anarchic world, states are going to behave as they like. Under the anarchic structure, the great powers are never going to obey those laws or rules that are in clash with their national interests. These entities are the powerful players that decide the rules of game and can break whenever they want. Powerful states may use their influence to shape the development and interpretation of international law in ways that serve their interests, hence, undermining its legitimacy and effectiveness (*Journal of International & Comparative Law*, 2021).

Artificial Intelligence (AI) has swiftly become a critical part of modern levers of military systems. Conventional systems equipped with AI have performed better functions than before. States are funding heavily for the development and deployment of AI-driven Combat systems to maintain an edge over adversaries. Military strength has become a criterion to determine how powerful a country is and the utilization of AI-augmented the power capability of a state. The cultivation of AI in weapon systems and military platforms adds up the state's power to conventional military capabilities. AI-based autonomous weapon systems with partial human involvement, human in the loop or out of loop have generated a stark contrast among scholars. Some are in favor of autonomous decision-making of AI weapons due to precision and accuracy while others are against it due to its imperiled outcomes and noncompliance with international law. The leading competitors, US and China along with other major powers are formulating strategies to harness AI and win the power battle in AI competition. In the surfing great power competition, the maritime realm is of immense significance. A powerful Navy with high-tech capabilities ensures unfettered access to the oceans. Al-based autonomous/unmanned surface, aerial and underwater vehicles add up to a great deal of power.

The naval modernization efforts of China to bridge the gap with the US over years have been traced. It excels in changing the number of ships over the US. The composition of both the

navies is different as the US has more advanced, highly capable and AI-integrated naval vessels than China. Naval primacy is crucial to have absolute control of maritime domains to become a potential hegemon. In the maritime domains, the high seas are outside the jurisdiction of national sovereignty, hence open to all. The area with minimal gatekeeping in the anarchic system invites the temptations of aggressors and competing states. The vastness and natural resource richness made the high sea an area of intersecting interests of nation-states. States prefer the AI systems with high operational capabilities for research, exploration, and surveillance in the high seas. The risk of contestation increases manifolds with AI based autonomous vehicles as they are just acting according to the programmed instructions and have no knowledge of international law. It raises the questions about the reliability of machines in the decision making process in the complex marine environment. The Marine laws are limited to the state's actions in their sovereign territorial waters and general guidelines about the high seas demarcation is outlined. The use of autonomous vehicles in the far seas is still unaddressed and needs a development of code of conduct to regulate them. The neorealist thought highlighted the limitation of international law due to an anarchic international system. It justified the states' behavior as up to the mark in cultivating the AI defensive capabilities to ensure their security and survival. The limitation of international law and institutions is outlined as structural realists claim that great powers are the lawmakers and breakers. Such anarchic states led the rational actors to engage their capabilities to gain maximum power that enables them to exert influence and meet the national interests on point.

The US and China are competing fiercely to be the dominant AI powers of the globe. This competition has significant economic, geopolitical, security and technological based implications for other stakeholders of the Indo-Pacific. States are perplexed in formulating their security strategies in the chaotic environment of the Indo-Pacific that is largely influenced by the leading competitors. The race to develop artificial intelligence (AI) is gaining momentum in the Indo-Pacific region, with several countries investing heavily in this field. States are devising their national strategies of AI development and pursuing the AI engagements with formidable partners.

CHAPTER 8

REGIONAL RESPONSE OF THE INDO-PACIFIC STATES

8. Introduction

The coming of great power competition in the Indo-Pacific region with an eminent dimension of high-tech fostering the development and deployment of AI across all the domains leaves greater implications for the regional states. Major powers such as Japan, India, Australia and middle or smaller powers of ASEAN ventured to develop their national AI strategies. The regional states are cultivating AI to cope with the emerging challenges and maintain a technological influence in the region. At first it described that the power play in the Indo-Pacific between the US and China is the competition for influence. Neorealistic rhetoric that the great powers opt for alliances to contain the rise of any potential challenger is narrated. The response of regional states in formulating the security strategies and making tough decisions to camp with one power or remain neutral is analyzed under the structural realism paradigm. An in depth analysis of persuasion of major and smaller actors' security strategies in the uncertain environment is traced out in this chapter.

The advent of artificial intelligence and its use in the domestic, economic and military spheres have introduced a new era of competition. AI-based operations have the capability to accelerate economic growth and augment military power. This has shifted the balance of power on a dime. States are investing in the development of AI to accelerate the innovation and retention of a high-tech-based literate workforce. States are striving to create this innovation pipeline before any adversary cultivates the AI capabilities and accelerates them (Serebryany & Spirk, 2022).

The US-China competition is being characterized as a race to become the leaders in artificial intelligence. Xi Jinping has vowed to make China an AI world leader. Michael Krastios (Deputy Assistant for Technology Policy) stated that the US and China are locked in a competition to become a hegemon in artificial intelligence. The US National Security Council memo of 2018 clearly mentioned the US-China battles for AI supremacy. This competition is framed as "winners takes all" denoting that high-tech nations will reap the maximum benefits across all domains (Kratsios, 2019). Accenture Research and Frontier Economics estimated that the economic growth of developing nations with AI utility will be doubled by 2035. PricewaterhouseCoopers anticipates that AI may induce $15 trillion in the global GDP by 2030

(Stern & Nomani, 2023). All these forecasts are varied but precisely predict the full blown use of AI across the world. AI adoption at a faster rate usually can be seen in developing states. AI development could increase the influence of developed states over developing states by gaining an additional economic advantage. Hence, the US and China are already economic giants that are maximizing the use of AI to gain massive advantages in power status and influence on the global stage. As Michael Horowitz, American attorney and government official. jotted down the underlying cause of maintaining supremacy and military might, is a strong economic base. A long term military superiority is not possible without a powerful economic foundation (Sherman, 2019).

8.1 The Strategic Imperative: Developing National AI Strategies for a Changing World

The great power competition acts as a catalyst for Indo-Pacific nations to formulate national AI-based strategies and plans to maximize benefits and accelerate their growth. States should develop and govern the technology because if any third foreign party introduces and controls the technology, that would be much more perilous. The Chinese communist party stated that core technology control by others is the greatest hidden danger (Chesterman & Lee, 2021). The surge in the use of AI has tightened the technological and economic competition that sent ripples in the Indo-Pacific region. The countries started to devise their national strategies that redirect the importance of AI in shaping the future of society, economy, and international relations. Following are national AI strategies and action plans of the powerful actors of the region as a response to escalating AI development competition.

8.1.1 Unleashing India's Potential: A Comprehensive Strategy for Artificial Intelligence

India has experienced a significant increase in the use of artificial intelligence (AI) in recent years. India's government and private sector have been investing in AI research and development, and the country has become a hub for AI startups and companies. Government encourages the development and adoption of AI at a faster pace under the National Artificial Intelligence Portal and the National AI Mission. Such platforms are being used to share knowledge, resources and expansion of AI. The state level reforms have been introduced to promote India as a talent hub of the region. The National-e- Government Plans and the MeitY Startup Hub are working to cultivate the high-tech in collaboration with research institutions and international organizations across the globe. India is a country that stands to gain a great deal from the adoption of artificial intelligence (AI). Greater financial inclusion of AI can help

bring more people into the formal banking system, giving them access to credit and other financial services. The AI generated revenue of India in 2022 is estimated as $12.3 billion (Adhikari, 2022). The widespread integration of AI and pervasiveness in daily life serves as a driving factor in strengthening the economic stature of the state. The estimated potential to add $500 billion to the economy by 2025.The AI market share of the Indian IT sector is recorded at 51.8% in 2021 that demonstrates the drastic technological uplift with 4 million employees. In 2000, the exports of the IT industry were $6.2 billion that skyrocketed to $156.7 billion in 2022 (Sun, 2022). It is estimated to reach soaring heights with an increased rate of 20% in annual growth rate by 2025 (International Data Corporation, 2021). India has improved its stature in the Global Innovation Index from 67 in 2013 to 40 in 2022 among 132 economies of the world (Global Innovation Index, 2022). AI has the potential to be a transformative technology that can unlock new levels of economic growth and prosperity.

(a) National strategy of AI

India has also launched several initiatives to promote AI adoption and development. In 2018, the Indian government released a national AI strategy that aims to establish India as a global leader in AI research and development. The strategy includes initiatives to promote AI education, research and development, and ethical considerations in AI adoption. The AI Task Force of the Ministry of Commerce and Industry took the first initiative and submitted a report on artificial intelligence. The Ministry of Electronics and Information Technology (Meity) formulated the four expert committees that suggest the ways to promote AI development and formulate the policy frameworks for India. The main aim is to leverage the AI in National missions, enhancing the key technological capabilities and to address the cyber security issues for safety and ethical concerns.

National Institute for Transforming India (NITI) Aayog (directional and policy think tank of India) has announced a "National Strategy on AI" in 2018. The NITI Aayog's report put forward the principles of Responsible AI in compliance with Indian law.

- The guiding principle of this AI based national strategy is to bolster the AI for inclusive growth in line with the developmental approach of the government.
- The underlying theme of AI strategy is AI for All: Technology Leadership for Inclusive Growth. This strategy not only aims to boost the economic growth but also an optimization for the social good.

- The three main objectives are broadly defined in the AI strategy document. The main objective is to leverage the AI for economic growth. The emerging potential of AI is capable of enabling the intelligent automation, capital augmentation, and diffusion of innovation. The inclusive growth in the social sector is based on AI and leaves a transformation impact in improving the life standard of people. AI development induces enormous benefits in the healthcare, transportation and agriculture sector.
- The cardinal point of this strategy is to develop India as "A I Garage". The strategy anticipates making India a field for global enterprises and institutions to invest and develop at a scalable pace. India is acting as an AI Garage for almost 40% of the world. This projected India as the ideal destination for AI based research and development (Mahurkar, 2023).

Moreover, the strategy aspires to build the common platforms at national level to connect the research centers and international centers for transformational AI. It proposed platforms such as AI Research Analytics and Knowledge Assimilation Platform (AIRAWAT) to work in collaboration with the National Knowledge Network. Moreover, it also undertakes the key incentive policies. The underlying strategic goals pertains to the application of AI in agriculture, education, healthcare, building of smart cities and infrastructure and AI research centers. The strategy aims to ensure India's active participation in global confabulations on governance of AI that will ultimately help India in shaping the governance architecture (Kumar, 2021). Overall, the increasing use of AI in India is expected to drive innovation, improve efficiency, and create new opportunities for businesses and individuals.

China and India are one of the fastest growing economies of the Indo-Pacific region. China's rise is perceived as a revisionist power but such debates are not as prevalent in India. India views the assertive rise of China with caution. Even India faces challenges in the land and maritime domain that disturbed the status quo of the region. Talking about India's vision of China in the Indo-Pacific is more constructive. The approach is drawn on a dualist outlook in choosing the power partner that counter the challenges and cultivate the opportunities as well (Panda, 2020). China progressed remarkably in the field of AI and threw down the challenge to the world to bridge the gap. This is the big push to India in AI adoption and to catch up with China. China indulged in intensive efforts to diffuse AI in military capabilities, especially into weapon systems to upgrade them. The automated systems of military arsenals with modernization in all domains is alarming for India. As India's efforts to modernize the military capabilities with AI are modest relative to China. Hence, New Delhi is in need to be strategic

to take mandatory steps to take lead in AI (Bommakanti, 2020). The adoption of AI and its implication in India is at a nascent stage. India requires urgency in investing and boosting the AI sector if it aims to bridge the gap and come close to China's AI souring power.

8.1.2 Driving Japan's Digital Future: The National Artificial Intelligence Strategy

Japan has been making significant strides in the implementation of artificial intelligence (AI) technology in various industries, including manufacturing, healthcare, transportation, and finance. Japan has a long history of being a technology leader and has been investing heavily in AI research and development. The government has increased spending on research and development by 7% to keep pace with the growing capabilities of neighboring countries. Japan is the second country to devise a national AI strategy after China. The Strategic Council for AI Technology was developed under the guidance of Prime Minister - Shinzo Abe which aims to enhance research and development and revolutionize the industrial sector with AI. The plan, entitled Artificial Intelligence Technology was given in 2017 that takes significant measures and a road map for industrialization. AI utilization is divided into three phases; implications of data-driven technology in various domains, availability for public use, and building of high-tech ecosystems. The end-user expenditure on AI systems is JPY 277.2 billion which is expected to grow with the increase of compound annual growth rate by 24% in 2026. The AI market is expected to grow to JPY 87 trillion by 2030 (Statista Research Department, 2022). The collaboration of the Cabinet Office, the Council for Science, Technology and Innovation and the Strategic Council for AI Technology is to devise the AI strategy.

The AI strategy will be executed by various ministries such as Science and Technology, Internal Affairs and Communication, trade and economy. The core technique in formulating the AI strategy is Society 5.0 which distinguishes Japan from other states. This approach is to improve lives by forming an AI-saturated society (Kuczynska, 2020). The boom of AI in Japan is pervasive from daily life to industrial firms. Japan became a chart-topper in supplying robots and ranked third after China and the US in research and development. Toshiba Corporations attain the 3rd rank after IBM and Microsoft as the highest contributor (Abdoullaev, 2021). The government of Japan released the Artificial Intelligence Strategy in 2019. This strategy assesses Japan's status in AI development. Despite developing AI at an accelerating pace, Japan lags behind the competitive position. There are four underlying objectives of this strategy are; develop the human resources to overcome aging or declining population, enhance the industrial competitive edge, growth of inclusive and sustainable society and increase research and development.

A follow up study indicated that maximum objectives have been achieved and others are in progress in line with the strategic plan. The pandemic (COVID-19) led to the awakening of several issues that left a call for full-scale digital transformation (DX) and to update the AI Strategy 2021. A new strategic objective calls to cope with extraordinary situations. The goal is to rapidly implement AI systems that would protect people against any major disaster. The reforms emphasized increasing support to the small and Medium-sized Enterprises (SMEs). To promote the implementation of AI in the manufacturing industry, increase the capital investment in SMEs and provide support for a maximum of three years. The strategy aims to strengthen the participation of Japan in cross- border collaboration and presence in international discussions and dialogue regarding AI. Japan aspires to work with the international community to ensure the ethical and safe use of AI to overcome any restrictions and advance in the AI field as well (Maruyama & Nicola, 2022).

Japan has to do a lot of catching up in AI development and it is increasing the research funding to keep pace with the competitive neighbors, such as China and South Korea. The states are banking on AI-industries as a key to gain success in future. Overall, Japan's booming AI implementation is driven by a combination of technological innovation, economic necessity, and government support. As AI technology continues to evolve and mature, it is expected to see even more widespread adoption of AI across different industries and sectors in Japan and beyond.

8.1.3 Charting Australia's Path to a Smarter Future: The Article Intelligence Action Plan

Australia is actively working to accelerate its capabilities and adoption of artificial intelligence (AI). The Australian government has recognized the potential of AI to drive economic growth and improve productivity, and has implemented several initiatives to support the development of AI in the country. One of the key initiatives is the National Artificial Intelligence Action Plan, which was launched in 2019. The Artificial Intelligence Action Plan of Australia put forward the vision to be a global innovative leader to develop and adopt the ethical and responsible use of AI. This plan ensures the participation of government bodies and the talent pool to share the benefits of an AI-based economy. The Minister for Industry, Science and Technology acknowledged the incredible use in stimulating the business, creating jobs and growing the economy at a faster rate. It is predicted that AI has the potential to add $20 trillion dollars to the global economy by 2030. This leverage urged the nations to compete in cultivating the AI opportunities. The action plan of Australia paved a path for the government

to ensure the responsible use of AI and to enhance the collective capabilities of AI. It sets out the path to make the country not only an early adopter but also a significant contributor in the AI sector. The Australian government is committed to strengthen the position as a world leading economy and global leader in AI development.

The strategic vision of this action plan is to become a global leader in AI adoption and development. As soon as the country is able to harvest the benefits of transformations, it will be a leading state in AI. The innovations in digital technologies are estimated to increase the economy up to $315 billion by 2028. The expected high-tech jobs are of 1.2 million (Faethm 2020). To elevate human knowledge, research and development will unlock numerous opportunities. Action Plan focus on four major areas; adoption of AI in business sector to boost the productivity, create a sustainable environment to attract the world talent, to enhance the AI in research capabilities of the state and make sure the responsible use of AI in compliance to Australian values (Department of Industry, Science and Resources, 2021).

Artificial Intelligence (AI) is deemed as the "new electricity" in revolutionary technologies. The Albanese government has to meet the challenges in enhancing the AI capability of the country. As the former Morrison government called for low level efforts in the technology sector. It announced only AU$29.9 million investment for four years for commercialization of AI and support for the research. International Development Research Centre (IDRC) criticized the Australian budget as very small for AI for Development (AI4D). It noted that Canada is investing ten times more than Australia in AI development. The adoption and implementation of is not important for national economic growth but also for defense capabilities of the state. Australia is lagging behind due to low budget spending on research and development. Other national leaders have also acknowledged the importance of AI in development. Theresa May, Former British prime minister, illustrated AI as being a "game-changer" for countries looking to remain competitive and securing their future. Indian prime minister Narendra Modi (Indian PM) enunciated his view, the national who fails to adopt the AI technology would remain a backward state. Such competitive stance urged the Albanese government to enhance the capital investment in AI.

The Advanced Strategic Research Agency (ASRA) was established with a $1.2 billion capita start-up. ASRA is based on the model of an AI super research hub of the United States - Defense Advanced Research Projects Agency (DARPA). This agency is more inclined towards a defense strategic view to make the country a defense innovation hub. The core focus is on

artificial intelligence, cyber security, quantum computing, robotics and automation. The 2022 Government AI Readiness Report ranked Australia at 8th number globally, that defines a good position to embrace AI acceleration. This ranking is based on analyzing various variables such as comprehensive AI capability of stars, data, infrastructure and government technology sectors that are accelerating at faster pace. Global AI development is soaring with the nation's huge investments in driving a sustainable digital environment. This is alarming for Australia and with minimal budget, it is difficult to maintain its rank in AI development. This makes clear that early adopters with sustainable capacity to invest, reap the largest benefits (Warren et al., 2023).

Against this backdrop, the federal government aims to invest AUS$44m in AI and digital centers to stimulate growth. It provides support to the small and medium-sized businesses (SMEs) and attracts a talent pool to adopt AI technologies. It fosters the collaboration of enterprises and provides a sustainable environment to adopt, adapt, test and deploy AI. To drive the innovations and uplift the capabilities, the government granted AUS$11m to adopt AI technologies (Aldane, 2022). Australia has put significant efforts into developing its capabilities and adoption of artificial intelligence (AI) in recent years. The Australian government has recognized the potential of AI to drive economic growth and improve productivity, and has implemented several initiatives to support the development of AI in the country.

8.1.4 Unlocking the Potential of Artificial Intelligence with ASEAN States

The Association of Southeast Asian Nations (ASEAN) is viewed as the fastest growing economies of the region. The interest in AI development in ASEAN is driven by the potential benefits that AI can bring to the various sectors. The artificial intelligence adoption rate is said to be in its nascent stages among ASEAN states. This fourth industrial revolution highlighted the need to develop and adopt AI technology and ensure a future proof economy. The S-curve is viewed in the embrace of new technologies by ASEAN states which includes early adopters and innovators as well. In terms of AI implementation in advance stages, only 15% of companies are in the row. While 83% of companies are devoting 0.5 % capital investment in embedding AI in conducting operations (Chua & Dobberstein, 2020). The inflection point of AI adoption leads to exponential growth that marks the importance of high-tech development.

The Association of Southeast Asian Nations (ASEAN) has gained the leverage of cultivating AI and extending it to various sectors for technological development. In the early phase of AI

adoption, most of the member states discuss and design their government policies and strategies for AI development. Most of the strategic applications of AI are made for domestic purposes. For instance, Biofourmis is a health analytical AI tool utilized for domestic purposes. Singapore is the first member of ASEAN that formulated its national AI strategy in 2019. Singapore has witnessed the potential growth in AI and has made an investment of $68 per capita. Malaysia announces the investment of $1billion to build an AI park, highlighting the growing interest of states on AI technology (Kearney, 2020). The emerging relevance of AI has a beneficial impact in the ASEAN region. In the financial sector, Hong Leong Bank of Malaysia is using AI based IBM Watson that helps to identify the customer's satisfaction. Similar sort of trend in digitizing financial services is to run the system more efficiently. ASEAN as a platform gives the opportunity of regional connectedness and proposed the ASEAN Digital Masterplan of 2025. This plan emphasizes the collaboration of high-tech member states, regulators and market participants as well.

All the member states have shown interest in the current AI advancements and take government level initiatives. At the individual level, states are pursuing the goals to become innovative leaders. For illustration, Vietnam has put forward the national strategy to become an AI based hub and innovation center of the region. The ASEAN member states show commitment to enhance the AI developments in a collaborative manner. A number of initiatives such as Asia Pacific - Information Superhighway platform (AP-IS Action Plan) 2022-2026 has been taken to serve as the region's template and to promote digital connection. It aims to take cooperative measures and to initiate the digitization of the economy (Jumawan, 2022).

Despite having economic growth at a faster pace, it has faced problems in achieving Sustainable Development Goals (SDGs) such as environment related, production and consumption. For instance, Singapore, Thailand, and Vietnam have induced AI in their policy instruments and strategies to achieve their sustainable development goals. In terms of sustainable growth in industry and innovation, it is making progress by leaps and bounds. The research study reveals that artificial intelligence has a powerful impact on a region's economic status. It is estimated that an uplift of 10 to 18% in GDP by 2030 is expected. The estimated powerful impact on economic growth is 18% ($110billion) in Singapore while the least impact is 10% ($41billion) in Cambodia, Myanmar, Brunei and Laos. The use of AI technology is accelerating the economic potential of ASEAN. It is predicted that AI can add up $1 trillion to the ASEAN economy by 2030 (Korwatanasakul et al., 2022).

Moreover, ASEAN countries are also collaborating with each other and with external partners to share knowledge, resources, and best practices in AI. The ASEAN platform is ensuring a sustainable environment to attract the foreign companies to aid AI research. To give an example, Salesforce (American software firm) has opened its AI research center in Singapore. This first overseas center enhances the status of regional firms just like YITU Technology, Alibaba, Dyson, and DataRobot. Singapore and China have established a joint AI laboratory, while Thailand and Japan have signed an agreement to promote AI cooperation. The development of AI in ASEAN is expected to bring numerous benefits, such as increased productivity, efficiency, and innovation across various sectors.

8.2 The Indo-Pacific Power Play: Competition for Influence

The US and China are competing to maintain their influence in the Indo-Pacific region. Influence is defined by Robert Dahl as the ability of one actor to shape the behavior of another actor. As Waltz has characterized the states are rational actors in the international system. There are various forms of influence such as inducement, coercion, use of force or power, manipulation and authority. The influence can be the intentional or unintentional efforts to wield it on its target (Meierding & Sigman, 2021). Both the powers, the US and China are competing over partner alignment to strengthen their position in the region. They use various forms of influence to shape the behaviors, perspectives and choices of the other actors along with their own interests and standpoints. The US and China are aiming to garner the support of other stakeholders of the Indo-Pacific region on various issues. For instance, in case of any major issue, whether the partner chooses to give military access to China and the US or not. The more important matter than this is whether the partner will continue to choose the side of the US or China repeatedly, in numerous decisions over time. It is necessary to support every single decision but to support major decisions. The aligned partners have to make choices based on their national interests and objectives. The decision-making process to align with the powerful states is usually weighed by the relative benefits offered and also measured by the potential costs of going against these powers i.e. the US and China (Lin, 2020).

The Sino-US competition is also characterized by geotechnological rivalry taking place in the Indo-Pacific. It is defined as the economic surge of innovation in the market or the potential militarization of technology (Goodman & Allal, 2016). The US and China understand the significance of this region as of commercial crossroads and the potential for development in the coming decades. The critical technologies are the intersection of economic growth, national

security and geopolitical issues of the world. Thus, hinges on the significance of AI-based technologies in gaining the state's security, sovereignty and resilience (Liao et al., 2021). The Indo-Pacific region is highly strategic for the big powers due to its geographical construct with numerous states and vital trade channels. Technology is being used as a tool to increase the alignment and engagement with the stakeholders of the Indo-Pacific to maintain a certain status of power. The United States is usually known for its powerful and coercive tactics to make the states choose it. While this region is of immense strategic importance for China as it has proximity to this region. The diplomatic and economic engagements under the umbrella of BRI with numerous stages across the region. The technology deals for Huwavai and 5G networking make the states closer to China (Oh, 2021). The growing expansion of China more profoundly with technological engagement is a serious concern for the US. The US is not only maintaining its ties with the traditional allies but also working to limit the growing influence of China in the region.

The Indo-Pacific is technologically an underdeveloped region that signifies the competition between rival powers to invest in it and harness the benefits. Beijing and Washington are exercising their influence on most of the Asian states as they are in the commanding position. Both the powers are assisting the states to develop high-tech sectors. This region is witnessing its early days of exponential growth which represents a promising future. The big powers perceive these regions as a digital frontier (Runde et al., 2020). The game of investments and offered assistance has provoked a web of alliances and treaties. It ultimately gave rise to the threat and jeopardized the security, sovereignty and independence of the Indo-Pacific's states. This technological rivalry urges divisions, alliances and strategic partnerships for the Indo-Pacific states. These states by aligning with the big powers try to gain national strength, security and potential benefits of AI for their developments (Louedin, 2022).

The Great Powers Competition is a permanent, compulsory and exclusive contest of supremacy among the major players of the world. The competition varies in intensity with time and space but remains a permanent aspect of the international system. The competition over power, security and influential status among the big players is always there. Great power competition is sparse into various domains such as military, economic and technology, that remains a touch stone for strategists and policymakers of the states (DiCicco & Onea, 2023).

8.3 Why U.S. Opt for Alliance Formation

The stakeholders of the Indo-Pacific region are the lynch pins in the US-China competition in the region. The geopolitical status of these states, being the neighbors of China, made them a valuable asset for the US. The power preponderance of the United States is undeniable in the international system. It is said that states will not find a better aligned partner than the US. To achieve the free and open Indo-Pacific against the assertive behavior of China, the alignment with likeminded states will stretch the footsteps of the US in the region and foster freedom in the seas. The great powers expected that small states ought to roll out the red carpet to achieve their strategic goals (Carafauno, 2018). Alliance network formation has been an ensuring and a successful aspect of the US in completing the adversary states. The nature and priorities of alliance formation has evolved over time. The central geostrategic challenges are not only in the military domain but also include the non-kinetic areas of Sino-US competition in the Indo-Pacific. The prime objective behind the networking alliances is a collective response to China's potential economic, military and technological rise (Ford & Goldgeier, 2021).

8.3.1 Assessing the Credibility of Alliance Structure: Legitimacy of QUAD and AUKUS

The US as a leading Indo-Pacific power aims to ensure the free and open structure of the Indo-Pacific to maintain peace, and stability and strengthen economic affluence. The contradictions in the security standing of the region are unfolding with the hegemonic intentions of China on the board. The rise of China as a peer competitor and assertive claims undermine the free and open character of the region. China deemed it as a containment effort of the US to confront China. Washington views the assertive rise of China as upending the US powerful status in the region. The US dwells on its way to forming a strong network of alliances with an abiding interest to maintain an upper hand in the region (Bush et al., 2022). The Quadrilateral Security Dialogue (Quad) and the trilateral security partnership-AUKUS are strong indications of balancing strategies in the Indo-Pacific. Out of bilateral or multilateral engagements of the US in the Indo-pacific region, QUAD and AUKUS are considered the most significant groupings to cope with the security architecture of the region. However, the official status of these groupings as a form of an alliance is in ambiguity.

In most international relations literature, an alliance is described as a security-minded grouping in which member states commit on military bases either offensive or defensive. The exact definition of the alliance is defined as the agreement between two or more sovereign states based on a written treaty that serves to conform military policy toward at least one common goal (Lanoszka, 2022). Glenn Snyder defines alliances as a formal association of sovereign

actors for the military force used in specified circumstances against states outside their member states (Synder, 2021). The leaders of the QUAD members (US-Japan-Australia-India) are reluctant in defining it as a formal alliance. To give an example, a senior official of the US accentuated in his interview in September 2021, that QUAD is an unofficial gathering and there is no military or security dimension to it (Carvajal, 2021). Japan emphasized the democratic identity of the four nations as partners. M.M. Naravane, Chief General of the Indian Army, enunciated that there would be both bilateral and quadrilateral military cooperation between QUAD members, but it did not make it a military alliance in that sense (The Economic Times, 2021). Scott Morrison, Australia's Prime Minister, stated that QUAD is a partner, whether it be for China or any other state in the region. It aims to make the region stronger, more stable and more prosperous (Diss, 2021).

Quad can be categorized as an alignment rather than a formal alliance. As Michael Ward describes, alignment is more extensive than alliance. The reason behind this is alignment does not solely focus on military coordination but also on other aspects of international politics as well. It is argued that alliances are forms of alignment that prioritize mutual defense (Wards, 2005). Alliances are usually bound to specific commitments (in terms of collective defense). These commitments are interpreted in the form of treaties that can be open or secret. It can reinforce politics from time to time counting on scenarios such as a bilateral visit, important anniversaries or tensions with third parties. The joint statement of QUAD depicts extensive cooperation covering the areas of COVID-19 vaccinations, technological innovation, and promotion of the free and open Indo-Pacific. It also supports the rule-based order in the East and South China Sea. The broad range of cooperation includes the support for other actors such as ASEAN to sustain its unity and centrality (Hemming, 2022). It depicts that this grouping does not rest on the principle of mutual defense or any agreement to come to the defense of any member in case of hostility with a third party. This broad range of engagements characterized QUAD as an extensive alignment.

AUKUS is a trilateral security pact that is interpreted as an emerging grand maritime alliance. Under this defense pact, the Anglo-American agreement was to provide submarines to Australia. Many security analysts and media persons describe AUKUS as a new trilateral military and political alliance (Kortunov, 2021). Such portrayal led China to allude AUKUS as Asian NATO (Wang, 2021). But AUKUS does not match the standard definition of a military alliance that requires a formal collective security treaty. It can virtually be categorized as an alliance in terms of deep and extensive cooperation in military dimensions. Technically AUKUS is not a de jure military alliance. The treaty instrument is a significant element of a

genuine alliance that bound the partners to provide mutual military aid in terms of any external attack. AUKUS is called a defense pact but it lacks the essence of treaty-based military alliances. The terminology used to describe AUKUS during official announcements is as follows. The Australian Prime Minister, Morrison denoted it as an “enhanced trilateral security partnership”; the US President, Joe Biden declared it a "new phase of the trilateral security cooperation" and UK Prime Minister Boris Johnson stated it a “new trilateral defense partnership” (The White House, 2021). These differing terms illustrated AUKUS as a joint intent of defense and security cooperation in the Indo-Pacific. As it includes a deeper integration of science and technology relevant to defense and security. An apt way to describe AUKUS is to term it as a "defense-technological pact" (Wilkins, 2022). Hence, AUKUS should be portrayed as a group of traditional strategic partnerships to solidify security relations and collaborate on science and technology in defense.

Neorealism interpreted that a state's behavior is mainly driven by the distribution of material capabilities in the international system. Any disruption or changes in the distribution mechanism anticipates anxiety in the state's behavior. The rising power posed challenges and led the states to balance against it. The balancing can be internal by strengthening its army or emulating military practices and high-tech adoption to fortify itself. Or it can externally balance by allying with powerful states (Ripsman et al., 2016). Against this backdrop, QUAD members are steeling themselves internally with enhanced military capabilities. As a multilateral engagement, it can be categorized as a quasi-alliance. Whereas China also criticized QUAD as a quasi-alliance that intends to formulate an exclusive approach of security encircling containment and confrontation (MEDCALF, 2022). The underplay of the military aspect that eschewed mutual defense commitment pointing it as a form of under balancing. It may point up the possibility that QUAD members do not perceive China as a sufficient threat. The leaders of the AUKUS also do not explicitly mention countering China via such defense pacts. The states may be not willing to cover the entrapment costs of the alliance as they do not find a sufficient threatening rationale. Even though China's assertive rise is widely debated. This creates a blurry line that either such groupings wanted to avoid the aggression of China or did not find it a sufficient threat (Silver et al., 2020).

8.4 China’s Non-Alliance Policy: Forging a New Type of Security Partnership

China has been playing an active role in restructuring the economic dynamics and investing heavily in the security governance of the Indo-Pacific region. China is taking institutional and conceptual initiatives to balance the power preponderance of the US in the Indo-Pacific and to formulate a suitable security architecture in Asia. Since the creation of the People’s Republic of China in 1949, it has not embraced the concept of alliance systems. Under Xi Jinping, the rejecting notion of forming alliances has become clearer. China called the US endeavors to form alliances, especially in its neighborhood an illegitimate act (Lal, 2021). China considered the alliance system as old fashioned with many bindings and obligations attached to it. It prefers flexible frameworks over rigid alliances. Chinese foreign-policy think tanks answered negatively in response to having formal allies (Yi, 2017). China is not aiming to replace or imitate the US alliance system but to formulate flexible security partnerships that are aligned with Chinese national interests.

As China is not in favor of or encouraging the alliance system, instead it is inclined towards regional cooperation frameworks to counter the US influence. For instance, the 2015 White Paper on the military strategy of China explicitly promotes a regional framework for security cooperation in the Asia-Pacific. This regional framework was reaffirmed in the 2016 and 2017 White Paper. Yang Jeichi, former foreign minister of China, stated during his speech at the 55th Munich Security Conference that China promotes the security dialogue among the Asia-Pacific nations and aims to explore a flexible security architecture for the region (Xinhua, 2019). China has launched a series of institutional initiatives and mechanisms to increase a significant influence in the region rather than forming formal alliances. Prominent institutions such as Shanghai Cooperation Organization (SCO)and the Conference on Interaction and Confidence-Building Measures in Asia (CICA) (Ford, 2020). China also prioritizes ASEAN-centered meetings such as ASEAN Regional Forum (ARF) and ASEAN Defense Ministers Meeting-plus (ADMM) to enhance dialogue, mutual trust and confidence building (Ministry of Foreign Affairs of People Republic of China, 2021). The institutional bridging is backed by China's financial contributions to align the multilateral agendas with China's interest as best as possible. Moreover, China is also diversifying its ties with developing and emerging countries under the framework of South-South Cooperation. It promoted quality, mutual trust and win-win cooperation that attracts a large number of participants in multilateral engagements.

Other regional security forums such as Beijing Xiangsha Forum are deemed an important element of China's diplomatic toolbox for dialogue over defense and security in the Asia-Pacific region. The subject of the 2022 conference is "Maintaining International Order and Promoting Peace in the Asia-Pacific ". It covers hot topics such as great powers relations, the interest of smaller actors, artificial intelligence, maritime security and international security. The creation of such a multilateral platform for dialogue and security cooperation and to build the military to military relations indicates China's will to establish a regional security leadership (Yuandan, 2022).

Institutional activism is built along conceptual activism that intends to clarify China's regional security architecture. The conceptual initiatives include "Asia for Asians". This security concept called the Asian community of common destiny was unveiled by Xi Jinping. It is deemed as a security vision laid out devoid of a strong US presence (Pei, 2014). The Ministry of Foreign Affairs and the People's Liberation Army entitled the regional security architecture as a new type of security partnership and made it clear that it should not be based on an alliance system. Chinese researchers and think tanks underline the divergent approaches regarding the geographical construct of the Indo-Pacific and strategy development along the US and its aligned partners. The divergence between the allies, the US withdrawal from the Iran deal and from other multilateral platforms observed by China as the West is making mistakes on its own (Ebbighausen, 2022). While China is opting for diversification of diplomatic channels and bilateral and multilateral engagements to strengthen its ties with regional states. The competition is analyzed as the US-led alliances versus China-led partnerships of developing states. China welcomes states of all sizes even beyond the Indo-Pacific region as flexible members. While the US Indo-Pacific grouping contains a limited number of states having significant economic and military size. China welcomes not only the non-aligned countries but also the security allies and partners of the US to join an informal circle of friends. This overlapping of security ties creates a blurred polarization of regional states. The growing ambiguity is problematic for the US while China responds positively to it (Ekman, 2019).

8.5 Security Strategies of Small States in Response to the Escalating Competition

States are formulating their security strategies to ensure their survival in response to the great power competition in the changing world. States focus in two domains, first is to strengthen their defensive posture to secure their survival and to sustain their autonomy. The challenges

and national interest best reflect the security strategies of states. The lack of two main elements such as autonomy and influence heightened the security dilemma of the states. Small states have limited resources to exercise influence and maintain autonomous status as compared to the great powers. States seek to maintain a neutral posture or go for active engagement. The realist thought asserted that neutral posture is almost impossible to maintain. So these states go for security strategies in case of facing an existential threat. The high-tech advancements enhanced the capabilities of smaller states and made them active and influential players of the region. Smaller actors are shorthanded with inadequate security and influential power. They struggle to ensure their survival in the international anarchic system and formulate the security strategies. There are several choices to craft the security strategies.

States either opt for balancing against the potential threat, engage with big powers, develop the hedging strategy or stay neutral. In the case of the US and China, the regional states have various options, either to align with potential threats (bandwagon), join an alliance to balance against the threat or to opt for hedging (that involves cooperation and conformation). Alliances can be bilateral or multilateral and consist of both small and big powers.

First of all, states focus on internal balancing by building up capacities and then intend for external balancing by engaging with major powers. Balancing can be classified as hard or soft. Hard balancing is rarely pursued by small states as it hinders diplomatic flexibility. Bandwagoning is defined as alignment with the policies of an already existing great power or the rising power (Levick & Schulz, 2020). The act of bandwagoning is characterized as defensive when the state bandwagon against the rising power to avoid any conflict and as offensive when states aligned with other sides to gain profit (Carter, 2022). Another strategy is Buck Passing pursued by the states to stay neutral in terms of staying out of it altogether. Whenever the states feel threatened, they pass buck to the other state. The most reviewed and important strategic option is Hedging. It is said to be the smart way for states to compensate for their shortcoming of hard power and influence. Smaller states opt for hedging to maintain a middle ground position. It intends to avoid confrontation with the competing powers and reduces the scale of threat for itself. This approach allows the states to take in cooperative and competitive policies to protect against the threat. States adopt cooperative and competitive policies to hedge their security bets. This is what Medeiros called a "geopolitics insurance strategy" in his comprehensive writing Strategic Hedging and the Future of Asia-Pacific Stability (Medeiros, 2005).

As states' perceptions varied regarding the external environment. In the anarchic structure, states have strategic interests, threats and opportunities differently. Strategic hedging intersects

with defensive realism tenets that states balance against a potential threat by strengthening its defense capabilities to enhance its security. The shared aim of these precepts is to sidestep the consequences of the security dilemma situation. Unlike defensive realism, hedging allows some bandwagoning to enable the security, economic and sociopolitical cooperation with the threatening power to avoid any future conflict with it. If this practice would not be wholly beneficial, then the state can use economic, diplomatic and institutional instruments to undermine its power or to align with the existing big power in the region.

In the anarchic international system, states are subordinate to the powerful states, hence subject to ally with great powers. It would result in maximum security and a powerful status at the world stage. Rather than balancing against the great power, states tend to align and subordinate with great power in exchange for maximum benefits (Vaicekauskaitė, 2017).

(a) Caught in a quandary: The dilemma of states in making tough decisions

In the case of the Indo-Pacific, the regional actors have deep ties with both the US and China. They are surviving on a double edged sword. The emerging powers and their views about Sino-US high tech competition in the Indo-Pacific are staggering. China being the biggest market and presence at the center of the region with economic might cannot be ignored by the stakeholders of the Indo-Pacific. States find themselves in a challenging position and wedges between the US and China. The major powers states such as Japan, India and ASEAN states have a highly integrated economy with China. But the physical security of these states lies with the United States (Hill et al., 2020). The polarization of the Indo-Pacific seems to ascend in the context of Sino-US tensions. The regional actors are in hot water to shape a clear-cut position. On one hand, some states are identified as US allies and some are pointed as China's friends. The United States lobbies the states to ally with it for a collective responsibility of preserving the rule based order. On the flip side China persuades the states to work collaboratively in building a community of common destiny. China is portraying itself as the wave of the future.

8.6 Regional States' Response Through the Lens of Structural Realism

In the anarchic international system, there is no absolute authority that would defend the states against the aggression of others. In this arena of self-help states are responsible for their own security and survival. The state of insecurity is intensified when a neighboring state or a peer competitor rapidly accumulates power and military capabilities. Structural realist thought declared that rapid accumulation of power by a state with hegemonic ambitions depicted the revisionist intentions, hence threatening the status quo of the region. It left the neighboring

states or peers with limited choices to ensure their survival and security. The regional states (middle powers or smaller states) to pursue bandwagoning (ally with the potential threat) or to deter adversaries by enhancing capabilities through balancing. Waltz argued that if a state attains too much power then balancing will take place against it. Great powers will enhance their military capability and form balancing alliances. He upholds the notion that balancing is the behavior incited by the anarchic system rather than bandwagoning. The balancers strive to lessen their risk by confronting the powerful country. Bandwagoning pursues absolute gains by aligning with the potential power to achieve maximum benefit. While balancing seeks relative gain (Bloor, 2022).

Bandwagoning is a risky proposition. In the anarchic system, there is uncertainty that the rising aggressive power may be benevolently disposed of or will not be threatening anymore in future. Moreover, it presses the states to compromise their sovereignty and autonomy. Usually, weak and small states opt to bandwagon with the regional aggressor. The circumstances such as not being able to balance the external threat or internal political strife and duress directed the states to take the risk and ally with the potential threat (Carter, 2022). Both structural realists agreed that bandwagoning is a rare phenomenon among great powers. There is no guarantee that the aggressor will remain satisfied with bandwagoners or turn on them in the future. Realists consider that states generally opt for balancing over bandwagoning. Those who go for balancing have to strengthen their military capability to confront the aggressor (internal balancing) and to increase the security cooperation with likeminded states (external balancing). In case of rising power's perception about the defensive-minded maneuvers as offensive, balancing could also set the risk of triggering the security dilemma and intensifying the competition.

Another response described by Mearsheimer is Buck-passing which means imperiled states prefer to buck pass rather than form an alliance. In simple words, avoiding the responsibility of keeping checking adversaries' intentions and passing this burden to others by keeping themselves on the sideline. In a bipolar system, states opt for balancing because there is no big power to catch the buck. Buck passing usually occurs in a balanced multipolar system. Geography also interprets the buck-passers and buck catchers in a multipolar world. For instance, the states that share a common border prefer balancing while barriers encourage aided buck-passing. The states in the Indo-pacific have geographical proximity of regional states with

China prefer the balancing in this scenario. While the US being the great power passes the buck to India, Japan and Australia to contain China by third parties (Adami & Dashtgerd, 2013).

In case of Indo-Pacific power play, China is locked as revisionist state which results in a biting response from the regional states to stave off it from gaining regional hegemony. John Mearsheimer stated that the neighboring states are certainly fearful of China's rise and will do whatever they can to prevent it from achieving regional hegemony, including to enter an American led balancing coalition to check China's rise. Mearsheimer argues that China's assertive trajectory has charted over the past years that elevated balancing activity in the Indo-Pacific (Mearsheimer, 2020).

8.7 Balancing Act in The Indo-Pacific: Exploring the Scope and Limits

Balancing is one of the oldest and intuitive notions asserting that states will seek to form a favorable balance of power in order to deter the aggressor. There is clear evidence that a wave of Indo-Pacific balancing activity is prompted. In absolute and relative terms, defense spending has witnessed a strong upward trajectory from 20% to 28% of total global military spending (Janes, 2020). The tangible web of security networks in the Indo-Pacific has substantially increased. The declaration of joint vision statements, security dialogues, defense agreements and quality and quantity of joint military ventures illustrate that balancing is underway across the Indo-Pacific **(**Fountaine, 2017).

8.7.1 Internal Balancing of Major Powers

Major powers of the Indo-Pacific region endeavor to enhance their relative power by strengthening economic and military stature to gain strategic edge. China is increasing its defense budget and has the highest spending among all regional peers estimated at about $224.79 billion (Xinhua, 2023). Beijing's quest of power preponderance and gauging military strength has raised eyebrows in the region. This heightened the security dilemma and led the regional actors to increase defense spending. Against this backdrop, Australia is setting a record in increasing the defense budget calculated up to $48.6 billion (Dougherty, 2023). AUKUS is also intended for the military graduation of Australia by providing nuclear powered submarines. Japan's defense budget for 2023 was approved by cabinet on 23 December 2022 is estimated as $52billion. The proposed hike of 26% is witnessed. The main focus is to gain stealth jets and long-range missiles (Liang & Tian, 2023). The alternatives to BRI projects have

been initiated by Japan and India such as the Asia-Africa Growth Corridor to counter the growing influence of Beijing (Richter, 2018). The border clashes between China and India have impacted the relations of both the powers. China has a strategic advantage over India with advanced military capabilities. India raises the defense budget with a 13% hike to $72.6 billion (Kumar, 2023). India is bridging the gap with military modernization often backed by the US. New Delhi is pulling up its socks to combat China's assertion from continental shelf to maritime domain.

8.7.2 Beyond Borders: External Balancing in Practice

China's rise as a potential competitor that posed a significant challenge to the US since the end of the Cold War. So the US is investing all its focus in tackling the challenge. Leon Panetta, Secretary of Defense, disclosed that 60% of the US navy has been deployed in the Pacific since 2020 (Kaushik, 2021). It made numerous bilateral, multilateral security partnerships, informal alliance, coalitions and defense pact with other major powers of the region to keep check and contain China's rise. The US is forming coalitions such as Quad, AUKUS, Five Eye Alliance and multilateral security and economic engagements in order to attract the major powers of the region to camp with the US. It wanted to curb China's rise and shift the balance of power in its favor (Fodale, 2021).

Different tiers of balancing such as soft and hard balancing are underway across the region. QUAD is the most debated and analyzed coalition in the Indo-Pacific in terms of external balancing. The joint grouping of Australia, India, Japan and the US named as QUAD is enunciated as hard balancers. The multilateral defense and strategic relations among four democracies are prompted by shared concerns regarding China's assertive rise (Smith, 2020). The coalition of four well positioned strategically and militarily countries are capable enough to resist Chinese aggression. QUAD is a unique mix of power, capabilities and geopolitical alignment. It has the proficiency of saying no to China. They aimed at cornering China's growing influence through BRI and stone walling its thriving high-tech development. This coalition held a joint counterterrorism exercise in 2019 (Smith, 2020). Joint naval exercises conducted in 2020 by the member states (Shelbourne, 2020). The US and Australia ensure the freedom of navigation in the South China Sea while Japan and India withstanding China's skeptical movements along the disputed waters. The attempt of balancing is not only to temper China's economic rise but a broader range of concerns generated. China is riding towards an internally repressive power and an externally aggressive one with revisionist ambition and

Wolf Warrior Diplomacy that have become more hostile (Smith, 2018). The brazen use of sharp power is alarming as states fear its might make the right intention.

In region wide balancing, this activity is a highly uneven phenomenon. The immediate neighbors of China show a modest range of balancing. Balancing is non-existent in some states that prefer to bandwagon with China despite a spike in matters of security. The underlying reason is that most Indo-Pacific capitals have economic ties with Beijing that grow exponentially with its economic might. To give an example, ASEAN states include from stark bandwagoners (for instance, Laos and Cambodia) to the variety of soft-balancers and hedgers. There is tangible heterogeneity in pursuing the acts of balancing and hedging. To give an example, Indonesia and Malaysia along their disruptive maritime claims with China take modest steps to maintain the defensive posture and invest more into economic engagements with Beijing (Smith, 2019)**.** Despite volatile maritime disputes in the South China Sea, Vietnam and Philippines take low key defensive measures to preserve their security while maintaining the investment ties with Beijing. ASEAN states view China more as a challenge instead of a threat and avoid any hard strategy that invokes China's ire. Because they are not resilient enough to withstand China's pressure and capable of handling assertive behavior like the QUAD countries can do. So, a modest, soft balancing and an ambiguous posture is observed in the Indo-Pacific region by the smaller states.

8.7.3 Presumption of Under-Balancing in the Indo-Pacific

The standard form of external balancing and attempt of making formal alliances is questioned in terms of their legitimacy and practical implications. The prominent currents of balancing in the Indo-Pacific is summoned as more of an under-balancing in the book titled as Asia's *Question for Balance, China's Rise and Balancing in the Indo-Pacific* (2018). It described the contributing factors such as economic independence, growing force of globalization and reluctance to depict overt balancing posture. The official statements of informal groupings or defense pacts members entrusted the attributes of quasi alliance or general coalitions. Balancing is driven and mitigated by the cost-benefit parameters of the states. Moreover, China's efforts to obstruct the balancing activity is commendable. China is implying both carrots and sticks to influence the patronage networks in the region and persuade the states to join Chinese led security partnership (Silver, et al., 2020).

In the international anarchic system there are high stakes and uncertainty that led the states to go for insurance seeking behavior termed as hedging. States gear towards hedging to develop robust relations with both competitive powers to cultivate maximum benefit and to ensure the protection to offset the risks, hence, keeping all the options open as far as possible. The attributes of hedging such as an affirmation on not taking sides, attempt to reduce multiple risks across all domains and diversifying the benefits with a fallout plan (Zha, 2022). These attributes distinguish the hedging from balancing and bandwagoning. These two subsequent strategies anticipated a clear-cut choice in allying with one power over the other. It entails single-directional measures that are explicit. For instance, in case of balancing is counting a threat unambiguously while in bandwagoning states intend to maximize the benefit and minimize the risks. Both strategies require the states to put all policy eggs in the basket of the aligned power. Whereas, hedging serves as a face saving strategy that is not only a middle position but an opposite and a fallback position as well.

8.8 Strategic Hedging of ASEAN States

ASEAN states and many other nations including some US allies or partners headed for hedging in one way or another. States adopt different forms of hedging with varying degrees and different rationales depending on their perception of the potential threat. Sino-US competition generates high concerns among smaller actors and middle powers of the Indo-Pacific. They are uncertain whether the US will remain a residential power in the region or not. It also casts the doubt that with the power increase China would be more assertive or remain peaceful with the status quo. Southeast Asian states embraced the rebalancing strategy and pivot to Asia of the former President of the US, Barack Obama and then witnessed despair as the US downgraded partnerships and reduced the multilateral and bilateral engagements under the Trump administration. Under the Biden administration, the posture of "America is back" again raised the hopes of Southeast Asian states. Since the 1990s, ASEAN states enjoyed the diplomatic charm of China that turned into offensive acts, especially in the most pressing case of the South China Sea. The ASEAN states have over-dependent relations with China in terms of trade and economy.

The biased interpretations of big powers about smaller states' posture to enhance the cooperation as a sign that these states are left with only one choice - alignment. These powers overemphasize the provision of statecraft, military security in terms of the US and economic prosperity in case of China. Hence, habitually neglecting the individual and collective need of

states for security and survival in the international system. For instance, the US believes that ASEAN states and the rest of the world have the same strategic outlook as the United States. It locked China as the principal threat and viewed the pressing situation in the South China Sea as due to China's military tools for assertive claims. The principal way to respond to such seminal challenges is the formation of a coalition of likeminded democracies. Whereas, these states do not necessarily view China as the most pressing problem to tackle at all costs by camping against it with other great powers. Southeast Asian states wanted to constrain the profound power of China but not aim to contain it explicitly. So, they do not want to fasten themselves in one camp against another (Kuik, 2021).

China's narrative is also problematic for regional actors. Beijing put all its focus in dealing the tensions with Washington and its containment strategies. China overtly neglects the growing concerns of its neighbors about its assertive actions in the Indo-Pacific waters. It assumes that Asian nations have a shared history of western colonialism and imperialism, hence, aspiring for an Asian-led order in the future. In this context, China emphasizes a community of common destiny. China also hyperbolizes the plea of BRI economic statecraft. It erroneously assumes that smaller states only yearn for developmental and economic benefits even at the expense of its territorial interests. China seems to misinterpreted the sole goal of smaller states (survival) to take deference for granted. Such misapprehensions and uncertainties led the states to become hedgers to have a safe side.

8.8.1 Persuasion of Hedging Strategy

Hedging is defined as a risk management strategy that prioritizes autonomy, offsetting the uncertainty and sticking around security. It aims to maintain an ambiguous posture in military, politics and economic domains to prevent the cost of alignment (Chang, 2022).

Indonesia has also depicted quintessential hedging behavior by pursuing open defiance and partial deference. Indonesia and China engage in high level dialogues and arrange inaugural meetings for bilateral relations. Both the states jointly conducted naval exercises in the waters near Jakarta (Ong, 2021). Following the year 2021, Indonesia and the US performed the largest defense military drills near the islands of Sumatra, Sulawesi, and Borneo. It aimed at strengthening cooperation and support for free and open Indo-pacific architecture (Lai, 2022). Apart from this, Indonesia also maintains bilateral ties and security talks with other powers of the region such as Australia and Japan (Ministry of Foreign Affairs of the Republic of Indonesia, 2021). Geopolitical location of Indonesia as the world’s largest archipelagic state that forms the crossroads between Indian and the Pacific oceans made it more valuable. It

bridged the two continents Asia and Australia. Indonesia is the largest member and one of the founding fathers of ASEAN forum. It acts as a middle power that plays a leading role in promoting ASEAN centric inclusive and multilateral frameworks. Indonesia's policies to manage growing uncertainty amid the great powers competition in the region are best described as hedging plus. The double hedging strategy to maintain economic pragmatism on one hand and defensive posture for military assistance on the other hand (Anwar, 2022).

Lee Hsein Loong, Singapore's Prime Minister, stated that Asia-Pacific countries are in favor of making forced decisions between the US and China. These nations want to develop good ties with both powers. Instead of camping with one power, they intend to cultivate good relations with both the US and China (Lee, 2020). Ultimately, tied to a fundamental policy aim of preserving a fallback position in uncertain situations but stakes are high. The city-state has adopted persistent hedging in order to protect its national security outlook in the uncertain environment. Singapore has a strong strategic alignment with the US which entails deepest defense and security ties since the 1990s and it serves as a host for the US military assets as well. This island-state also fosters productive economic ties with China. It forged closed relations under the umbrella of BRI. Both the countries have broad ranging engagements especially in the high-tech sectors. Singapore has smartly teamed with China for trade and economic ties. Simultaneously, gravitated towards the US in case of political and military collaboration (kao, 2022).

Vietnam's posture amid the growing tensions of Sino-US competition, pictures it as an appropriate hedger. Vietnam has openly and persistently confronting China's maritime assertiveness. It pushed back against China and constrained it by keeping company with the United States. It also harnesses closer ties with stakeholders of the Indo-Pacific region. However, Vietnam has not burned its bridges with China to constrain it. It works to maintain party to party ties with Chinese Communist Party (CCP) and declares "four no's" that asserts; no military alliances, no foreign military bases in Vietnam, no overdependence on one country to fight another, no use of force or threat to use it. It also proclaims that Vietnam does not form alliances with one country against any other state (Liao & Dang, 2019). It makes a lot of sense to cultivate good relations in the economic sphere with China and to maintain strong ties with the US in the defense sphere. Vietnam strives to walk a fine line between sustaining ties with the United States and China (Giang, 2022). Bamboo diplomacy that denotes the notion of bending with the wind, best defines Vietnam's and Thailand's act to balance the conflicting geopolitical interest in the growing polarized international environment. It aims to secure

national interests with a highly flexible and pragmatic approach. The bamboo analogy illustrates the attempt of ASEAN states to maintain its position in the face of escalating great power competition in the region (Hussain, 2022).

Malaysia also opted for a hedging strategy in the recent spat between China and the US. Even Malaysia has claimant status in the South China Sea and divergence of interest with China. But still promotes the comprehensive partnership with China and engages in a broad range of activities via the ASEAN platform. It underlined the economic interest to promote bilateral and multilateral relations with China. China is a largest trading partner and recently their trade volume surpassed $200 billion in 2022. First time it reached the historical record of $203.6 billion (Ministry of Planning and Investment, 2023). At the same time, Malaysia contested China in pursuing legal actions to protect its maritime claims and continental shelf from Chinese assertive claims (Abuza, 2020). Correspondingly, It has long standing strategic ties with many western powers predominantly with the US. The US has a significant role in bilateral trading (estimated US$59.2 billion) and strengthening military posture. Malaysia receives 25% of its foreign direct investments from the US that are higher than China in the development ladder of the state (Rizwan, 2020). It pursues hedging to avoid any stark contrast or confrontational approach against a single entity (Ahmed et al., 2021).

Furthermore, other claimant states of South China Sea such as Philippines and Brunei have hedged lightly. While Cambodia is actively inclined towards a robust and productive partnership with China. It hedged equity at the same time by diversifying its cooperation with Japan and other significant powers of the region. They pursued hedging albeit more lightly. The cooperation and defiance at the same time, upholding the deferential acts in a low key manner. It depicted that ASEAN states have been pursuing hedging persistently. They avoided putting all the eggs in any power's basket. Rather they remained equidistant in diversifying cooperation and cultivating maximum benefits.

8.8.2 Second-Tier Big Powers: Hedging Strategy

Hedging is not just smaller states' strategy or only ASEAN's way of dealing in an anarchic international system. The second-tier powers of the Indo-Pacific including the allies and partners of the US are also adopting hedging of varying degrees and forms. States hedge quietly and intermittently according to their perception of structural imperatives (Rozman, 2015). The growing tensions and unpredictable moves of the Trump administration generate

concerns among aligned states. In the case of Japan, the Shinzo Ab administration shifted to ameliorate tensions with China on one hand and maintained its aligned posture with Washington on the other hand. It also pursues partnership with likeminded nations under the umbrella of QUAD and courting with ASEAN states as well. Such multi-pronged policies have been pursued by Abe and its successive governments (Koga, 2018).

Another major power of the Indo-Pacific, India also adopts hedging more intermittently. Despite having strategic partnership with the US that expanded far and wide. India attempts to stimulate the bilateral relation with China. Even after Dokhlam stand-off with China, Indian Prime Minister, Narenda Modi met with Chinese President, Xi Jinping and institutionalized informal summits. Then again, New Delhi attended Western-backed Shangri-La Dialogue to declare India's vision of free and open Indo-Pacific. Hence, maintaining the ties according to the structural environment (Lim & Mukrejee,2019). This is the essence of hedging that directed the states to pursue multiple "just-in-case" acts. States collaborate with both powers and diversify the partnership in the areas of converging interest. It aims to preserve the autonomous status with selective defiance and minimum deference to mitigate and reduce the multiple risks.

China's growing assertive behavior to exert influence and the US attempt to sustain its power preponderance in the wider Indo-Pacific is overturning the balance of power in the region. The use of high-technology and artificial intelligence strategies has exacerbated the competition, having implications for other stakeholders of the Indo-Pacific. The second tier powers and even smaller states embarked on developing their National AI strategies to meet rapidly changing. A debate has been conducted to examine the US and China's quest to exert influence in the Indo-Pacific region. This is endeavoring to form alliances with the major powers of the US with to thwart the growing footprint of China in the region. The legitimacy of alliance structure is in ambiguity. The statements of official members of security groupings proclaimed it as security engagements among member states. The use of AI and high technology by the great powers to gain military and economic might threatened the survival, security and national interest of the regional states. The growing might of a state in their neighborhood compel the regional states to formulate their security strategies. The security strategies based on the neo-realist school of thought includes balancing, bandwagoning, buck-passing and hedging. Structural realist Scholars such as Waltz and Mearsheimer argued that states are responsible for their own security and survival in the anarchic system. They have to gain relative or absolute power to ensure their survival and have a sound footing in the region. States opt security strategies according to their threat perception and their power stature in the region. For

instance, major powers such as Japan, India and Australia are internally balancing themselves by increasing their defense spending and externally balancing by allying with the US with multilateral security engagement and defense pacts. The most debated grouping, Quad, is illustrated as a balancing act to thwart the growing influence of China in the region. While the diversified ASEAN states have opted for the middle grounds and avoid camping with one side. Most of the middle powers adopt hedging strategies to cooperate and confront the rising threat at the same time. The external balancing act mandates the formation of a formal alliance while QUAD does not meet the criteria and falls into the category of quasi alliance. It yielded the fact that the major powers are aligning with the US in preserving the free and open structure of the Indo-Pacific.

CHAPTER 9

ANALYSIS

9. Introduction

The Sino-US competition is described as a new era of great powers contest with the rise of People's Republic of China (PRC) as a potential competitor in high-tech and artificial intelligence. China emerged as a credible strategic competitor to the US in almost all domains. The epicenter of renewed great powers competition between the US and China is the Indo-Pacific region. The Indo-Pacific is a value-laden region that inherently holds strategic and political significance at the great powers' chessboard. The confluence of two oceans with strategic choke points, water channels, global commons, abundance of natural resources and home of emerging big powers with broad range of diversity made it the hub of global contest to gain influence. There is a varying degree of perspective about the geographical construct of the Indo-Pacific and states demarcate it according to their perception. The vast stretch of territory was known as Asia-Pacific supplanted as Indo-Pacific. Traversing the strategic narrative is viewed with skepticism by Chins who called it an attention grabbing concept that will dissipate like ocean foam.

The chief protagonists of the growing power competition are the US and China. Both the dominant actors have divergence of interests on a broad metrics of power. The prism of the US- China competition depicts the contest of ideology, geopolitics, security, economics, and science and technology. The US underlines a double strategic goal; to maintain its status of being a superpower and to curb the rise of China in the Indo-Pacific framework. Both the rivals have distinct ideological tinge and are engaged in a certain degree of revisionism, retaining an impact of insecurity and struggle for survival. The National Security Strategy (2022) of the US explicitly mentions that China has intent to reshape the US-led international order and expand its economic, military and technological leverage to become world's leading power. The national rejuvenation plan of China aims to be on rolls and fly with colors. The economic might is aiding China in maintaining an influential posture despite the US long standing in the region. China's economy is essential to the health of the global economic system. The IMF calculated that China's contribution will exceed the US by three times that almost accounts for 30% of

global growth (Kewalramani, 2023). The conflict looms larger with time and is shaped into a great powers competition at the site of the Indo-Pacific region.

9.1 Structural Realist Thought

The structural realist approach of international relations offers attention on the pursuit of power in the relations between States in the anarchic international system. The theory obtains its name from analyzing the impact of the structure of the international system on power politics and states' behavior. The father of structural realism, Kenneth Waltz, emphasizes two basic components of structure; anarchy and distribution of capabilities. States are the rational actors and their sole goal is to attain relative power for survival and security in the anarchic system. States pursue the goals that suits their national interest at any cost. While Mearsheimer emphasized achieving absolute power for security and maintaining leading posture is necessary. The security of one state (either defensive or offensive) leads to insecurity of others, consequently a spiral of rising security generates the security dilemma. If a state strengthens its military and economic stature, either it strives to rise peacefully as a status quo or assertively as a revisionist state. It leaves other states in perplexity and that uncertainty leads the major powers to form a balancing coalition. While middle and smaller powers opt for other survival strategies in a competitive and anarchic environment. States have engaged in science, technology and innovation competition and placed science, technology and innovation at the forefront of their national security strategies to gain dominance in technology. This lens provides a clear view of surging Sino-US competition and its impact on regional actors of the Indo-Pacific.

9.2 Examining the High-Tech Dimension of Us-China Competition: Battle for Technological Supremacy

Great powers have traditionally played a superior role at the global stage. Historical analysis depicts that every superpower cultivates advanced military capabilities, economic might and has an influential impact over other states. The digital era of the 21st century extended the capabilities to comprise the technological realm. As the World Economic Forum interpreted the leading technologies (artificial intelligence, cloud computing, biotechnology, the internet of things and many more) to wield as much influence as possible over the coming decades.

Mari Coccia (member of national research council of Italy) conducted a research study that the basis of strategic General-Purpose Technologies (GPTs) is linked with the goal of global

leadership entailing the purpose of gaining economic potential and influence. The superpowers persistently cultivate innovation and advancement according to the needs of their era. To give an example, Romans developed civil engineering and carved their name as the first builders in the history of architecture. Great Britain is known for the industrial revolution and the curtain raiser of steam engines and electricity generation. Such innovations help in advancing the Royal Navy and its arsenals and gaining global leadership. The US became a superpower by investing in technology fields such as the development of computers, aircraft or satellites. The advent of internet and computer networks turned the tables for American dominance (Coccia, 2015). The advent of the new millennium urges the states to harness technological superiority to gain worldwide influence. It entails that this is an era of high-tech and states need to excel in the technological field to become a global leader. The technology has become a defining parameter of Sino-US competition.

Technology has gained center stage in the ongoing strategic competition between the US and China. Technology serves as an arbiter in Sino-China competition. The coming of great powers competition in the 21st century is described as technology driven competition. State officials such as Suzanne Maloney, Director of Foreign Policy, and Mark Warner, Senator, stated that competition with China over dominance revolves around technology (Cha, 2022). The national security documents of both powers elevated the role of emerging technologies and are developing them at exponential pace. China claims innovation is the heart of its modernization drive and aims to become world-leading innovator by 2035. To achieve breakthroughs in core technologies is the top priority of Beijing. It formulated Actions for Developing China through a Science and Technology plan to turn over a new leaf in the whole of the nation system. This system aims to mobilize national resources for strategic objectives such as the induction of technology in the military domain. States are indulged in a competition to develop high-tech before the adversary states achieve them.

As the tensions between the US and China stepped up and showed no sides fading, the US is fostering development and deployment of critical technologies. A legislation passed by the US House of Representatives and Senate that emphasizes the government incentives to stimulate innovation in high-tech areas to gain a competitive edge against China. The high-tech competition is not limited to the economic sector but it has a direct influence on the national security of the states. The scenario exacerbates as both the competing governments have widely divergent views in utilizing the technology. The winner is ultimately able to proliferate its views of governing critical technologies.

The technological front of great powers competition is prevalent in the Indo-Pacific because this region is devoid of high technology development and fits more into the competing scenario. Meanwhile, China sits in its home that has become a theater of power politics. Both Washington and Beijing are investing in technologically underdeveloped regions to cultivate influence. The region has potential to become a digital frontier.

9.2.1 China's Technological Advancements: Can they Surpass and Replace the US?

The US remained an uncontested leader in science and technology over the years. The US preeminence in high-technology is challenged by China as Beijing is reducing the gaps in science, technology and innovation. In the majority of high-tech (37 out of 44) areas China excelled and attained monopoly in areas for instance synthetic biology (Hurst, 2023). China is catching up to the US in the critical tech areas such as Artificial Intelligence, Quantum Computing and Biotechnology. Not only the US but other regional actors are lagging behind China in retaining talent and developing advanced technologies. However, China takes the main lead in research publications and patents. The US is the dominant patent power but the pace at China is catching up is alarming. China is well placed to accomplish its goal to become a world leader in AI. China retains the most world-class patents in high technologies and is positioned in the top 3 leading countries. China has turned over a new leaf by stepping up from an inward power to an open power. It thinks out of box in developing a technological edge. Beijing went an extra mile from copying the inventions of others to producing innovative technologies. The US is endeavoring to maintain its unending monopoly and investing in the AI innovation industries. The US lead in research and development is impressive but China's dynamics are more so.

The US has long been a forefront leader in cutting edge technologies that are essential to uplift country's stature. This monopoly is being challenged by its peer competitor China. China emerged as the economic powerhouse of the region with its economy ballooning by manifolds over the last decade. It is argued that the high-tech advancement assists the state's economy and military to stand out from the competition. So, technology works out as an endogenous driving force in shaping military and economic stature. It equipped the great powers with influential bargaining chips and a viable competitive edge. Therefore, great powers strengthen their economic and defensive capabilities by persistent cultivation technologies. China witnessed an extraordinary economic growth from 1985 with the GDP equivalent to 15% of the US GDP to 118% of the US DGP (PPP) (Bayer, 2023). The stealth economic growth paves the way for China to enhance defense spending to gain maximum power in the region. Each of

China's investments aimed at expanding the sphere of influence to erode and disrupt the power protecting ability of its rivals.

The breakthroughs in the fourth industrial revolution were described as artificial intelligence and other key technologies such as big data, telecommunications networking (5G), nanotechnology and biotechnology, robotics, the Internet of Things (IoT), and quantum computing. These critical technologies led the states to compete aggressively and politicize them by going beyond the horizon of economy and military. The US has been losing a little ground perhaps, but it still has a solid grip over China across all critical high tech domains.

9.3 The Power of Technology: Facilitating Access to Global Commons for All

Global Commons are global resource domains which have been the subject of attention for decades. They are the common pool of resources that cannot be relegated to substantial actors of the international system. As they are not under any state's national jurisdiction and experience minimal gatekeeping. The unmitigated overexploitation of common resources has upshot the tragedy of commons. Historical accounts depict that the global commons such the high seas have been an important dynamic of state's strategies for the big powers like the British Empire and small states as well to suppress and ban the maritime pirates in the 18th century. While in the 19th century, the focus of the British Empire remained to immunize the flagship vessels of the empire in various maritime zones. Even the US as a young power has measured the commons as of strategic significance. It entails the establishment of a nascent Navy aiming to safeguard the US interests in open waters. Moreover, in the Cold War, the US underlined the strategic role of commons to leverage power and tried to secure and constrain any emerging threat in the commons (Tallis, 2022). The global commons are again on the front line of strategic competition. Today, China is viewed as a potential competitor to the US for its free and open architecture of maritime domains outside the national jurisdiction. China is tied to its inherited claims in the seas and seeks to become a polar great power.

The quest of great powers to dominate the non-sovereign spaces directly shapes the strategic competition in global domains. The global commons such as the high seas, outer space or deep sea bed or Antarctica are subject to competition since they are at the fringes of sovereignty. If they were easy to dominate, then states would have long before incorporated them in their sovereign claims. The high seas, space or the poles required special equipment and large investments to operate in these commons. Usually the military intend to operate in these

domains due to insecure anarchic structure. Dominating these commons would materialize the country with a competitive advantage.

The emerging technologies are sharpening competition between powers. Advanced technologies made it feasible to access the global commons. The development of AI based autonomous and unmanned systems with high situational awareness and long range attributes have introduced transformative impact in the maritime domain. The disruptive capability of AI bases autonomous platforms trespassing the maritime introductions to create new normal in the global commons. States have been indulged in a competition to cultivate increasingly autonomous vehicles. For instance, unmanned underwater and surface vehicles have been led by the UA in the Indo-Pacific. In turn China embarked to develop a large number of Unmanned autonomous vehicles to maintain a high saturation strike against the US and its allies in case of any conflict. The autonomous decision making capability with long range access to far seas and sheer numerical strength earns the high stakes of confronting and eroding the enemy's defensive capability. It jeopardizes the high seas as they have minimal gatekeeping, hence vulnerable to great powers' temptations. Despite growing automated systems and their deployment in open waters, there is no noteworthy mass scale conflicting scenario happening in the global commons. Most of the competitive paradigm is witnessed in the South China Sea with contested sovereign claims.

9.4 Surging Competition and Implications for Regional Actors in the Indo-Pacific

The US-China competition is described as full scale, full-spectrum strategic great powers competition to gain absolute power and influence. The rise of China as potential challenger is often viewed as assertive and aggressive. Mearsheimer predicted the rise of China would be more assertive and offensive to gain influence in the region. Assertiveness has become a catchphrase to describe Beijing's conduct in dealing with other states. States have been engaged in hotly contested territorial waters of the Indo-Pacific. China asserted about 1.3 million square miles of South China Sea as its sovereign territory. Beijing not only made sovereign claims but also built military bases on artificial islands. Brunei, Malaysia, the Philippines, Taiwan and Vietnam have similar sovereign claims upon which China is building its artificial islands. The People's Liberation Army (PLA) is considered as a political entity that always attempts to undermine internationally agreed norms and rules across the region.

The great powers are increasingly at loggerheads entailing a manifold of risks and security challenges for the stakeholders of the Indo-Pacific region. The exacerbating competition between the US and China spurred the regional states to formulate their security strategy. These strategies are more in compliance with neorealist thought. The balancing strategy is prominent as states are formulating their national AI frameworks and as a form of their internal balancing attempt. While external balancing requires balancing coalitions. The most debated US-led multilateral engagement in the Indo-Pacific; QUAD and AUKUS are deemed promising mechanisms. The QUAD plus and AUKUS mechanism entails to accommodate more regional powers in order to form a balancing coalition to constraint China. The revival and inaugural of such security engagements are emerging as more of a quasi-alliance and alignment with a great power the US. While China viewed the alliance formation as old fashioned with too many binding obligations. It prefers flexible security partnerships and engagements at international level organizations. It enhances its influence in the region with economic engagements with states of all sizes even beyond the region. Under the flagship of BRI, or also welcomed those states that are the allies of the US as well. Such diversification of diplomatic and economic channels with assertive military postures at land and seas aggravated states' dilemma in making clear-cut decisions.

9.5 Rising Dragon: Assessing China's Potential to Become a Regional Hegemon

All the power play and the competition in the Indo-Pacific is indicating that the major powers aspires to become a regional hegemon. First of all, take a look at what defines being a hegemon. The concept of hegemony illustrated that a state is said to be a hegemon when it is the single great power in its region. If a region has more than one great power, then it generates a sense of competition to become the hegemon over the expense of other states. Whereas a state is referred to as a potential hegemon that has the capability to overpower other regional states and dominate the region. However, defensive realists assert that hegemony is rare since the coast of expansion out ways the benefit even before the dominance is attained. Therefore, potential hegemons pursue domination when the expected cost is low. It indicates that the decision to dominate the region does not drive directly from the state's capabilities but the measuring of cost-benefit relation is also included.

Taking the Indo-Pacific region into account, the most important strategic attribute of this region is that it has both parts; continental and maritime. A regional hegemon requires to gain

domination over both parts of the region. China stands as preeminent continental power in its home region. China's economic rise and military modernization efforts are paving the way to gain the status of a potential hegemon. In the maritime domain, the US act as countervailing force in the littorals of the Indo-Pacific. The US behaves as offshore balancers to the continental superiority of China. Hence, the US along its allies maintains a powerful continental and maritime presence in the region. The US is in an extremely powerful offshore position with its strong allies, having access to its naval and military facilities with great diplomatic as well as economic influence in the region. As it is illustrated that in the presence of a second regional great power, China cannot be granted the status of a regional hegemon until it overpower the US presence.

Global Trends report by the National Intelligence Council (NIC) of the United States sought to assess the key challenges and uncertainties that will shape the strategic environment for the Us over the next decades. A recent report "Paradox of Progress", has predicted the increasingly turbulent future with hegemonic struggles among major powers. It assessed that much of turmoil and instability would emanate in the declining phase of the US being a superpower. It is predicted as the US seems to temper down its commitments with allies to let them bear the burden and perform as offshore balancer against an active balancer, China. Despite such grim perceptions about the US decline and China's attempt to replace it as a hegemon is not readily evident in the uncertain international system.

9.5.1 Chinese Regional Hegemony is a Bridge Too Far

At first explore the characteristics that define a regional hegemon. There are three main attributes that define a hegemon. At first, regional hegemon should be able to effectively control both the continental and maritime parts. Secondly, it presses for the neutrality of all possible rivals to maximum extent. Ultimately, the hegemon must exude an amiable and benign character that seems conducive to the regional state's interest.

Analyzing China's status whether it is eligible to become a hegemony according to the aforementioned attributes. By nature, China is characterized as a continental power fringed with land frontier from three sides. Some of the borderlines are disputed with neighboring states such as Sino-Indian and in Central Asia with Russia. China pacified most of the border disputes but the uncertain environment made them active anytime. Even though China has growing influence in continental sphere by some means, the maritime frontier is a far cry.

The maritime presence of China is limited by its geographical position. The access to the Pacific Ocean is obstructed by the ring of hostile Island Chains. The presence of a major power

Japan and other actors such as the Philippines and Taiwan hinder and impede China's maritime influence. Moreover, the access and consequential presence in Indian Ocean is jeopardized by Indian presence (more as a watchdog of the US) and Malacca dilemma (the dilemma stems from the possibility of a foreign navy (likely the US or Indian) obstructing Chinese shipments due to a conflicting scenario by sieging its access to Malacca strait.

Another impediment is that continental powers provoke more friction than maritime powers. For instance, the rise of China has spurred many countervailing balances. Maritime powers have limited capacity to entail territorial aggressions while continental powers are more hostile in this regard. Whereas China has both maritime and continental disputes adding fuel to fire. The regional states intended to opt for balancing activity both internally and externally. The growing powers attempt to cultivate maximum benefits from the ongoing strategic flux.

Nonetheless, the bottom line is the unparalleled control and presence of the US Navy in the maritime domains of the Indo-Pacific. The substantial submarine fleet, defensive systems along naval modernization efforts enhance China's capability to project power. As David Shambaugh (author of Where Great Powers Meet: America and China in Southeast Asia) stated that China lacks the conventional global power projection capabilities. It requires capabilities such as a large fleet of aircraft carriers. The US has 11 aircraft carriers while China has 2 and the 3rd one is underdevelopment.

The US Navy has a more technologically advanced naval fleet while China is growing in number and has become the largest fleet in the world. The current dynamics generate the sense that the integration of technology gives qualitative edge over bigger fleets. While the historical accounts show a contradictory stance. Sam J. Tangredi, former US Navy captain, illustrated that a bigger fleet is more important than a smaller technologically advanced fleet. All the wars or competitions were won by superior numbers or of equal forces, superior strategy, or admiralship. In the 1800s, Napoleonic wars depicted that French military arsenals were technologically superior but a large fleet of Royal Navy ships hindered Napoleon from crossing the English Channel. The same is the case of World War II, Imperial Japan has superior technology but the US's large naval fleet ground out the victory. As the matter of fact is that the integration of technology in the vehicles and maintaining a large naval fleet will provide optimum benefits over others.

A remote possibility is there if the US moves out of the Indo-Pacific completely but still China has to meet almost equally capable navies of Japan and India. Therefore, the possibility of dominating the Indo-Pacific maritime domains for China is bleak in the current scenario. The historical analysis unveiled the fact that a state cannot be a regional hegemon without absolute

control over maritime domain. It is arguably said that China is closing the gap as a peer competitor to the US but the idea of becoming a hegemon and replacing the US is far-fetched and way off.

The US is striving to withhold China's revisionist ambitions but the traditional underpinning of containment strategies are highly inadequate for the intricate scenarios of the 21st century. The present day containment does not intend to completely isolate China because it is deeply embedded in economic chains of the world. The US attempt of constrainment is to keep in check China's strategic outreach, its military advancement and deployment and material check on its revisionist intentions. This is basically an anti-hegemony strategy to secure and defend the legitimate interest of the regional states having back of the US and ensures the US supremacy in the region.

China may not be capable enough to surpass and replace the US as a superpower but it is powerful enough to seek its legitimate core interests in the region. This made it a pivotal factor in all regional flash points. This subsequent assertions of China portrays its revisionist intentions that spread the wave of threat beyond the horizons and generate a perpetual cycle of security competition. Even though China still does not have a comparative advantage to the US military capabilities, as a big player it exercises influence in the international sphere. China has almost every tool such as economy, population and military to build the capacity to compete with the US. As Lee Kuan Yew, Singaporean president, called China is not only a big player but the biggest player in the history of the world (Allison & Blackwill, 2013). The development of technology, revolutionizing and adapting high tech foster the US leverage over other states being a superpower. Despite having robust challenges, the US is still a leader in radical innovation and development.

CHAPTER 10

CONCLUSION

Great Powers' competition re-emerged on the global stage at the turn of the 21st century. Over time, it is getting more intensified with the assertive rise of China, across the world but more specifically in the Indo-Pacific. Such a new round of competition has made China to appear as the potential competitor to US power preponderance. Technology is a notable element of the Great Powers rivalry that will be deciding factor in determining the high-tech leader of the world. The rise of 5000 years old civilization with well-trained human power and a blistering rate of development made China a credible threat to the current global power-US. For the very first time, the long-standing position of the US in science, technology and innovation has been challenged by such as potential competitor- China. If China continues, its current rate of progress in research and development, it would be quite prolly that it can surpass the US. Nevertheless, for attaining such a position, huge gaps are required to be filled on the part of China for countering US power preponderance and international standing. Research claims that China is closing gaps with the US in key tech areas including artificial intelligence (AI). In terms of AI-based maritime competition, despite China having attained a bigger naval fleet with naval modernization efforts over the few past decades, but still the US outpaced and outplayed Chinese bigger fleet with more technologically advanced and powerful naval vessels and platforms. The US has a powerful presence in open waters, while China is still struggling to maintain its dominance in the near seas regions.

This body of work has contributed to the current knowledge by providing a comprehensive understanding of how high-tech advancements are shaping the US-China competition through the lens of structural realism. It provides a better understanding of key tech areas and assesses their potential impact on the balance of power in the Indo-Pacific region. It provides an overview of how AI can enhance the capabilities of naval vessels and leverage the strategic advantage of the states that possess it. The intersection of AI and naval operations provides a novel comprehension of the growing importance of oceans and the high seas in the ongoing Sino-US competition for supremacy. This research also explores the impact of high-tech competition on other stakeholders of the Indo-Pacific region. It assesses their response to prioritizing artificial intelligence in their national strategies and opting for realistic strategies that best suit their national interest.

This research finds that the Indo-Pacific region has become a central theater for Sino-US competition. It explores that the exclusive aspect is high-tech competition between both powers for dominance in the next wave of technological innovation. It unveils the ambitions and strategies of the administrations of the US and China that aimed at becoming AI leaders of the world. The US has long been an uncontested world leader in sciences and technology. This research identifies the key tech areas in which China is closing the gap with the US at a faster pace that has threatened the US long-standing tech leadership.

(i) Exploring the strategic and political significance of Indo-Pacific

In the 21st century, the Indo-Pacific has emerged as one of the pivotal theaters of competition, contestation and cooperation among the rational actors of the international system. The key position of the Indo-Pacific in economic, political and military dimensions enunciated the control over this region is synonymous to the control over the world. Therefore, making it a hotly contested space for the powerful actors. The substantial development in the Indo-Pacific is the rise of China as a peer competitor to the US. This dynamic region is witnessing the rewiring of economic and security lines essential for national interest. The US has been a leading Indo-Pacific power that persists in maintaining its presence in the region through strong allies and powerful naval presence. Both the rivals have divergent social values, political systems, intersecting national interests and threatening the security structure of the region.

Strategically, both powers wanted to maintain the supremacy in maritime networks of the Indo-Pacific, thus enrooting the unfettered access across the globe. China's irredentist maritime claims and endeavor to establish its influence beyond the horizons of the Indo-Pacific under the flagship of BRI is in process. China is shifting its lie low and biding your time strategy to more assertive posture in order to fulfill the Chinese Dream to become number one power status. Beijing is making its way to gain maritime prominence by gaining access to the straits, ports and sovereign waterways of the states that are part of the Maritime Silk Road. China is engaging the states in the economic corridors to enhance its prestige and status in contrast to the US. While the US has abiding interests of maintaining its influence and powerful position not only in the region but all over the globe. It has locked the Indo-Pacific at the forefront of its economic, political and security policies to overcome the traditional and non-traditional challenges. Washington not only has economic pacts with the allies but also defense ties to cement its relations with the major powers to keep in check China's exponential growth. It

provides investments for strategic projects, military assistance, humanitarian aid and develops a code of conduct abiding by international law. Therefore, providing its partners with competitive advantage over its rivals. Hence, acting as an offshore balancer, sharing the responsibilities and benefits with the regional states to shape the security architecture of the region. The US has made strategic adjustments to retain its military superiority, nipping the enemy in the bud, and safeguarding its national security. The maritime competition and overlapping interests coupled with the power quest of both great powers, hinges the significance of the Indo-Pacific region.

(ii) Structural Realism

The Structural Realist school of thought analyzes the inherent strategic competition of Sino-US. Security, survival and domination are speculated as the central idea of defensive and offensive realism. The uncertainty and structural and material factors of the anarchic system are shaping the state's behavior. The strategic behavior of both states is driven by their grand strategy ambitions, security and power maximization. Over the past several years, powerful states around the world have increased interest and investment in the development of artificial intelligence (AI) to support a diverse set of defense and national security goals and to maintain their regional dominance. The potential brought about by high-tech and Al to shape security, national interest and accumulation of power has triggered competition between various powers regarding who will be leading in Al-based technology. The Indo-Pacific region is the most dynamic geopolitical area that has emerged as the economic, political and strategic hub of the world. It becomes the central theater of world politics as two major powers are at odds. The powerful presence of China in this region is endangering US interests. The development and deployment of Al-based autonomous systems in the Indo-Pacific aim to outpace each other's influence.

(iii) Unveiling the high-tech between the US and China

The underlying driver of the 21st century great powers competition is the quest to gain technological supremacy. The high-tech capability will determine the country's economic power and standing at the global stage. Technology is serving as the endogenous force in progressing the political, economic and military stature of the states. The fierce competition between China and the U.S. has shifted its posture from regions' strategies to trade and now

over cutting-edge technologies. Hence, making technology a prime arena of great powers competition with intertwined geo-economics and geopolitics aspects. The think tanks and research institutes are racking their brains to compete and excel in every field of science, technology and innovation. The rush to technological dominance to gain economic and military privilege to exert substantial influence has become a prerequisite of an anarchic system. Both the powers view the technological prowess as the accouterments of power.

Sino-US competition for power and status has several dimensions underlying the facets of military threat, discord over trade policies, political and ideological facets. The competition is more inclined towards technological supremacy as a considerate element of power quest. The flash points of Sino-American entanglement can be described as "3Ts" inferred as trade, technology and territorial/maritime contests. The trade war started with the introduction of tariffs under the Trump administration to curb China's economic rise. The underlying cause of trade war is to block technological theft to delay the technological rise of the adversary. This cutthroat competition mainly shifted in three prime areas; quantum computing, biotechnology and artificial intelligence that serves as the backbone of technological advancement. These primary areas are enunciated by the Biden Administration under CHIPS and Science Act as the very source of piercing competition. The uncontested leadership of the US is challenged by China as it is closing the gap with the US. China is leapfrogging in developing cutting-edge technologies and high-tech growth has been spectacular over the last decade. China takes a lead over the US in research publications and patents but development and deployment of high-tech, the US stands number one. As the US has a long history and stands out in high-tech. So, it is quite challenging for a peer competitor to altogether replace the US as a tech leader.

(iv) Exploring the interplay of AI-based autonomous systems at sea

As the 21st century is marked by incessant technological evolution. The significance of dual use of AI in domestic surveillance and military operations went like a shot. The crucial digital technologies such as AI, are blazing the trail by revolutionizing the traditional combat systems and have taken the center stage in operating in complex environments. Technology is largely being politicized and militarized even though militarization of AI is considered as the bad side of innovation. The deliberate use of AI in advancing military technologies generates perpetual competition among the heavyweights of the world. Against this backdrop, Al-based naval modernization gains the limelight to acquire maritime dominance, which is the very source to

become a potential hegemon. The US and China are augmenting their naval capabilities through Al-powered naval vessels to gain control over blue water oceans. Both the great powers aspire to win the AI competition that has become a defining feature of intensifying strategic competition. China still has a long way to go in bridging the gap with the US preponderance in the maritime domain with highly capable automated naval platforms.

AI-based naval vessels and platforms have high proficiency to navigate in the hostile and unpredictable marine environment. The degree of human control in autonomous or unmanned vehicles, especially in marine complex environments has sparked the debates of divergent perspectives. The progressive faction favors the autonomous systems with high accuracy and proficiency that is not subjected to the idea of self-preservation or emotionally susceptible, hence maintaining a logical posture in the complex situations. Traditional camp has an antagonistic standpoint that pre-programmed machines are not capable of taking rational decisions and are bound to instructions. The inflexibility or any malfunctioning in the pressing situations would result in an unintended escalation. Artificial intelligence is not a type of weapon itself, it is basically an enabling technology that adds up additional power to the conventional military combat systems and arsenal. AI is not offensive itself, the directional role, utilization in warfare, and integration in weapon systems and military platforms made it a disruptive technology. It lowers the threshold of offensive military actions as there is partial or no human intervention with programmed automated capability of decision making. However, it has become a prevailing necessity to achieve the benchmarks for being a significant player of great powers competition.

(v) Harnessing the power of AI in the high seas

Apart from the assertive claims of territorial waters in the Indo-Pacific rim, the high seas emerged as an epicenter where great powers seek to gain overall mastery of the maritime realm. The AI-based autonomous vessels with high proficiency enable easy access to the high seas that have open access for all. The anarchic structure of the international system urged the states to become dominant and establish a monopoly not only in their territorial waters but also on the high seas. The use of AI-based utensils, especially warships, are being questioned about their reliability to freely navigate in the far seas and the ability to differentiate civilian vessels or enemy vessels in the high seas. Trespassing into sovereign waters, any accidental confrontation or malfunction can result in a gross violation of law, hence leading to undesirable circumstances. Oceans remained a chess board of contestation among nations to rule the waves.

There is a gap in international law that specifically regulates the use of autonomous vessels in the high seas. The existing framework of international law for maritime transport is developed primarily for human-operated ships. It does not fully address the legal, safety, and operational issues that arise with the use of autonomous vessels. The structural realists address these loopholes as limitation of law in the anarchic structure. It is argued that the present legal framework only suits the great powers to achieve their strategic goals. The absence of a central authority led to the undermining of the legitimacy and effectiveness of international law. It justified the states' behavior as up to the mark in cultivating the AI defensive capabilities to ensure their security and survival.

(vi) Implications for regional Stakeholders

The surging Sino-US competition to become technological leaders has significant, economic, security and technology based implications for the other stakeholders of the Indo-Pacific. States are perplexed in formulating their security strategies in the chaotic environment of the Indo-Pacific that is largely influenced by the leading competitors. The high-tech competition is fostering the development and deployment of AI across all the domains leaving greater implications for the regional states. Major powers such as Japan, India, Australia and middle or smaller powers of ASEAN embarked to develop their national AI strategies. The regional states are cultivating AI to cope with the emerging challenges and retain regional leverage at a technological front. The subject of AI National strategies of the regional actors is based on common good for all that harness the AI for domestic upgrading. It indicates such steps are for inward capacity building of the state. The cost of maintaining and operating the autonomous system and vehicles is so high that it is out of the reach of most of the regional actors. In the anarchic structure of the international system, the only way to maintain the safety of the state is to have power.

The use of AI and high technology by the great powers to gain military and economic might threatened the survival, security and national interest of the regional states. The growing might of a state in their neighborhood compel the regional states to formulate their security strategies. The security strategies based on the neo-realist school of thought includes balancing, bandwagoning, buck-passing and hedging. As states are responsible for their own security and survival in the anarchic system. They have to gain relative or absolute power to ensure their survival and have a sound footing in the region. States find themselves in a challenging position and surviving on a double edge sword as they have deep ties with both the US and China. The

security strategies are formulated according to their threat perception and their power stature in the region. For instance, major powers such as Japan, India and Australia are internally balancing themselves by increasing their defense spending with harnessing high-tech capabilities and externally balancing by allying with the US with multilateral security engagement and defense pacts. The most debated grouping, QUAD, is illustrated as a balancing act to thwart the growing influence of China in the region. The provision of nuclear submarines to Australia to strengthen its military stature categorizes it as a defense pact. While the diversified ASEAN states go for a middle of the road stance and avoid putting all the eggs in the basket of one great power. Most of the middle powers adopt hedging strategies to cooperate and confront the rising threat at the same time. The external balancing act mandates the formation of a formal alliance while QUAD does not meet the criteria and falls into the category of quasi alliance. It yielded the fact that the major powers are aligning with the US in preserving the free and open structure of the Indo-Pacific and a form of under-balancing is being pursued in this region to contain China's rise.

(vii) Findings and Analysis

This research provides insights into the complex interplay between high-tech advancements and the US-China competition in the Indo-Pacific region. The US and China are cultivating key tech areas such as artificial intelligence, biotechnology, 5G and quantum computing to gain an edge in the competition for supremacy. This research explores the benefits and challenges of AI in maritime security and pertains to its potential impact on the balance of power in the Indo-Pacific region. Apart from the wide-ranging applications of artificial intelligence, the potential of AI in aiding naval operations to leverage the capabilities of the US and China is the focus of emphasis.

The research sheds light on the significance of the high seas in the ongoing Sino-US competition to gain dominance in the oceans. AI has the potential to significantly transform the dynamics of the US-China competition on the high seas. The theoretical lens of Structure Realism provides a better understanding of the complexity of technological interplay in the growing competition between the US and China. Moreover, it also contributes to the broader discussions on the implications of emerging technologies, particularly artificial intelligence, for regional stakeholders of the Indo-Pacific. States have indulged in a perpetual cycle of

competition to cultivate artificial intelligence to gain strategic advantages and compete effectively in the global arena.

The research emphasized the importance of artificial intelligence as an emerging arena of high-tech competition and its potential to enhance the naval capabilities of the US and China. It traces back the modernization efforts of China in comparison to the US. It deduced that apart from the fleet size, the US has more technologically advanced naval vessels, and AI-based naval platforms and has a greater degree of control in the waters of the Indo-Pacific region.

China is catching up fast but it requires much more capabilities to compete with the US on equal footing and to gain the status of a regional hegemon. It also maps out the section of maritime laws regarding the high seas and critically analyzes the use of AI-based vessels in the high seas to gain the dominance of global commons in the anarchic system. The study found that international law has limitations in addressing the use of AI-based autonomous systems and harnessing the use of such technology in these global commons. Furthermore, this research analyzes the implications of Sino-US high tech competition on other regional actors of the Indo-Pacific. It underlined the fact that the growing might of the US and China compel the states to security strategies. States opt for security strategies based on neo-realist thought and according to their threat perception and their power stature in the region.

Despite the significant attention given to the AI-based high-tech competition between the US and China, several areas require further investigation and some potential directions for further research are as follows. There is a need to examine the broader implications of high-tech competition on international relations that covers other significant regions and states on the globe. Furthermore, there is a need to explore the potential of international collaborations and cooperation to develop responsible governance and legal frameworks for the efficient use of AI-based technology.

(viii) Recommendations

- The US should develop strategic and technological partnerships with regional states to share knowledge, resources and innovations in technological development. Such sharing of technological knowledge will help in building an environment, promoting

technological innovation at global as well as regional level that can compete with China.

- China should collaborate with foreign partners to gain access to advanced naval technologies. It should ally with such countries that have naval tech expertise and ultimately aid to modernize its naval infrastructure in terms of AI-based systems. Furthermore, apart from patent publications, China should excel in the development and deployment of high-tech systems across all domains.

- AI should primarily be used for defensive purposes. This should involve the implementation of appropriate safeguards and oversight mechanisms to prevent the development and use of AI for offensive purposes.

- International law should effectively address the ethical and legal considerations regarding the use of AI-based systems. They should be clear accountability and responsibility for the actions of AI on the high seas, which includes appropriate measures for monitoring and addressing any unintended consequences.

- Regional states should take a proactive approach to respond to the surging AI competition in the region. States should increase investments in AI research and development to foster local AI talent infrastructure and expertise in all domains.

- International collaboration is crucial in developing norms and standards for the responsible use of technology and the development of AI. Moreover, such collaboration will assist the nations in sharing information and high-tech expertise to cultivate the potential benefits.

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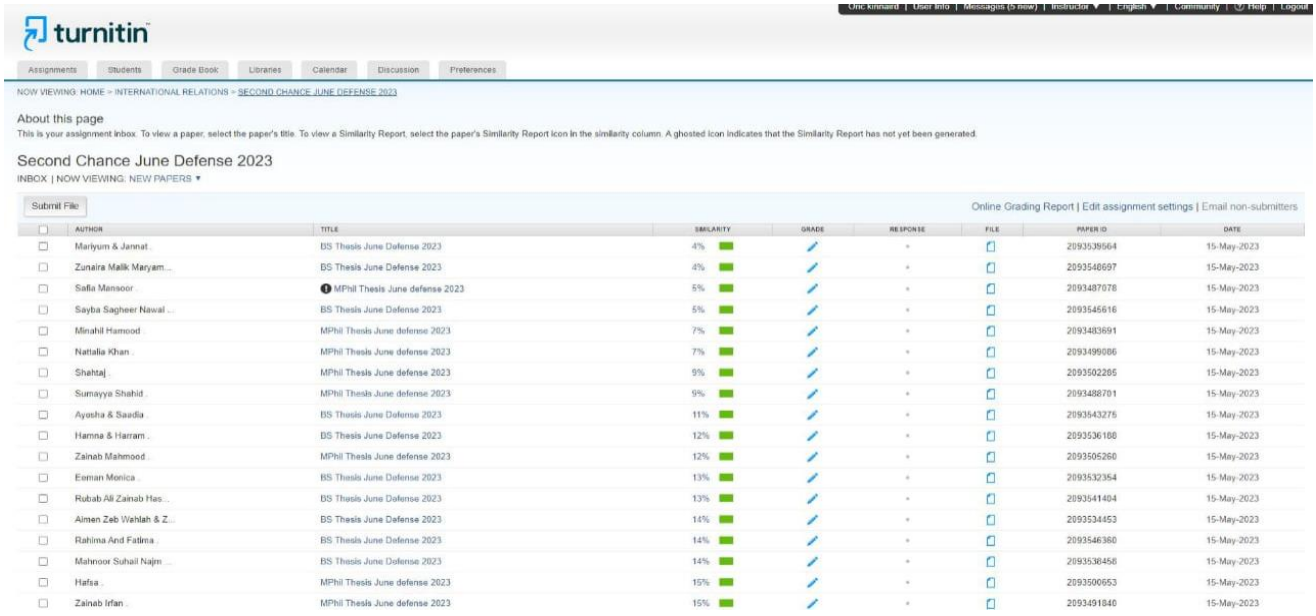
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