Theorizing International Politics of Research, Science, and Technology: Implications for Global Governance, National Security, and Economic Growth

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Abstract

This article examines the value of understanding the international politics surrounding research, science and technology (RST) in today's world.It encompasses intricate connections between nations, international organizations, and multinational enterprises,which is essential for economic growth, social development, and national security.The significance of elements like anarchy, capitalism, welfare, and security that influences the global politics of RST is highlighted in the essay.In order to counteract technology misuse, the authors stress the significance of establishing ethical standards. Those standardsdirect the creation and use of technology and a critical appreciation of the ideologies and values that support such development and use.This paper also emphasizes the crucial role that research, and the network of knowledge-based specialists play in determining policy results.Scientific data and expert opinion frequently influence these results.With examples from nations like the U.K., U.S., Japan, Russia, China, South Korea, Kenya and Nigeria, the impact of organizational and technological innovation on establishing and falling hegemonic powers is addressed.The article concludes by emphasizing the crucial role that the international politics of RST plays for academics and decision-makers, with implications for national security, global governance, and economic growth.

Keyword: Theory, politics, research, science, and technology

1. Introduction

The international politics of research, science and technology (RST) isvital in today's events.Modern society depends heavily on RST to shape national security, social progress, and economic growth.Therefore, for academics, politicians, and the general public, understanding the politics that surround their development, transmission, and usage is essential.With States, international organizations, and multinational businesses all fighting for influence and control, the international component of RST adds another layer of complication.

Realists' assumption highlights the need to maximize power and influence by increasing State's technological capability. At the same time,froma neo-realist perspective, such maximizationhas been propelled through competing technological capabilities of intra-state institutions.Froma liberalist perspective, States are not in complete control of global politics. Significant involvement of non-State actors is witnessed in the increasing technological securitization by private firms and institutions.Through economic theories,States have improved their productivity through science and technology to yield higher returns on investment.

International Relations (I.R.) theories explaining power politics views RST as catalytic to global advancement or influential in motive and advancement of interest that shapes the identity of the international system.In this context, medium theorist argues that RST privileges and gives more opportunity to certain social epistemes and identities while disfavouring others.Marists argues that the massesare at the mercy of the circus of the elitist international system due to the power over control of ideas and information, knowledge and innovations.In the structuration of power, such an international system is fluid and marred with technological industrialization, provided it benefits certain States (or specificindividuals from those States) that own the technology.

Studying the international politics of RST is crucial because it can help us understand the bigger picture of world politics.This field of study provides knowledge on how technology, governance structures, and power dynamics shape international systems.There is a need to learn more about the intricate linkages that define our world by looking at the connections between organizational and technological innovation.In addition, the technological prowess of governments and the effects of technology development on international systemsmust be studied.

In light of the ramifications, this paper makes the case that the international politics of RSTisan essential field of study for academics and decision-makers.This paper theorizes the emergence of hegemonic and regional powers, increased capabilities of the State based on perceived threats,and alteration of the interactions in the international systems.In addition, the fluidity ofthe international system and its effects on policies, cultural hegemony, and the socio-political and economic structure of the international system was also theorized.

2. Literature review

Various fundamental ideas and theories from political science are incorporated into the complex and multifaceted topic of international politics of RST.Hegemony is one such idea, which describes a State or set of States' domination over other States in the international system.(Cox, 1981).Anarchy, which denotes the absence of centralized authority in international relations, is another crucial idea.(Waltz, 1979).Understanding the importance of RST in global politics also requires a grasp of the ideologies of capitalism, welfare, and security.

There is a large and diverse body of writing on the global politics of RST.Previous studies have looked at the role of innovation in the rise and fall of hegemonic powers (Chase-Dunn & Hall, 1997), the connection between technological

advancement and perceived threats (Kugler &Organski, 1989), and the effects of technology on international order (Buzan & Lawson, 1989).Other researchers have examined the use of technology for ideological ends and misuse (Winner, 1986) and the impact of research and knowledge-based specialists on global and local policy(Jasanoff, 2004).Finally, studies have also beenconducted on howSTR can advance socio-political control, economic dominance, and cultural hegemony(Foucault, 1977).

However, with particular emphasis on the enduring themes in I.R., this paper views thepolitics of evolution, power and governance of RST throughtheoretical lenses of realism, liberalism, poststructuralism, feminism, and Marxism.

3. Theoretical Underpinnings

Realists assumes that States are unitary actors in the anarchic international system seeking to maximize power and influence (Stephen, 1983, p. 7).For example, States are vicious to increase their technological capability.The neo-realist thus calls for disaggregated power and influence as a way to ensure that international regimes control the desired outcomes of States in an interdependent world(Dyer, 1987).Enhancing State's technological capacity through competing intra-State institutions illustrates an example of this call by neo-realists.Realist and world system theory assumes that the relationships between organizational and technological innovation aresignificant to the emergence and demise of hegemonic powers.Neo-realists argues that technological advancement alters the interaction capacity of the State and, consequently, the order of international systems(Kratochwil, 1994).

Liberalist school argues that scientific and technological enterprises produce outcomes that affect the power and influence of States.This effect further creates an environment where States are not in complete control of world politics.For example, the heavy involvement of non-State actors is evident in the increasing technological securitization by private firms and institutions.The traditional economic theory assumes that the economic capacity of the State for science and technological innovation sets the basis upon which States are able to improve productivity(Mahmood, 1998).On the other hand, strategic trade theory argues that strategic sectors of the State's economy, like RST,yield high investment returns.

Technology in the form of constitutive power empowers non-governmental organizations (NGOs), enablingcivil society organizations (CSOs) and armed groups to play a significant role in international politics.The use of technology wields power which can be used as persuasion instead of coercion.Technology is unbiased, but its use affects society.Rosenau noted that technology is manifested in meta-power,andit is a network configured and reconfigured, with constituted and reconstituted identities and vested with interest,all existing in institutions.The unfolding of this meta-power creates a shift from the original to new powerholders.Meta-power depends on capabilities, and as such, the developing world is faced with significant challenges as it cannot reconstitute the system easily(Willame, 1987).Poststructuralist, cognitive, postmodernist, structuralist and feminist theorist assumes an agreed standpoint on identity and interest formation issues.While some theorist views technology as a catalytic effect in advancing emerging processes, others view it as an avenue that features new forms of identity and collective meanings(Singh, 2002, p. 15).

Medium theorist argues that the mode of communication in media technology have a causal effect on what is communicated and how(Deibert, 2002, pp. 116–117).For example, there are content regulations for television and radio, film and videos, as observed in the banning of television by the Taliban in Afghanistan.Medium theorists maintained that the technological media privileges and gives more opportunity to

certain social epistemes and identities while disfavouring others.The theory emphasizes how the technological media shapes individuals and society.This emphasis is exhibited through the print media and radio, whereby individuals have no authoritative control nor participation, and through televised and telephone media, where participation and interaction are observed.McLuhan argues that the latter is similar to network technology, which allows for continuedcooperation and conflict in an environment otherwise referred to as a 'global village'(Mcluhan & Bruce, 1989).The language used in non-interactive media unifies communication.Additionally, the print-capitalist media promotes a nation'ssubjective image and creates a language of power.

The Marxist and cultural theory assumes that power is exercised in non-linear spaces between those with the power of behind-the-scenesand those powerless before the screens.The power exhibited here is subliminal and seductive to the subjects through images(Singh, 2002, p. 17).Dependency and neo-Marxist theorists assumes that there is a difference in the technological andcapitalist organization within the international production chain that aids the world order(Devetak, 1997).Systemic theory by Waltz stresses the capabilities of the State based on rational decisions on the perceived threat(Neuss, n.d.).The advancement of regime theory can be anchored on the need to collectively constrain the increased nuclear race and technological interconnectedness and advancement between States(Spindler, n.d.).

Technology have given rise to the promotion of specific ideas and theories by those with control or power, thereby privileging them with a decision of what constitutes a security threat and what does not.Structural power in the international politics of research and knowledge can be significantly observed in international security, trade and finance.Strange argues that structural power resides with those able to acquire and deny others access to knowledge respected and sought by others. Such identities also control the channel through which knowledge is communicated.She further stated that the knowledge most sought after in the 21st century is technology, through which other forms of structural power are reinforced(Finlayson & Strange, 1989).

For example, the neoclassical economic theory illustrates that the United States (U.S.) influenced the prominence of international capitalism and deregulation.This prominence haveshaped the evolution of international telecommunication and air transport regimes.In addition, theU.S.promotedliberalization accords for technological industrialization during the post-cold War era.Similarly, the international political economy (IPE) theories areessential in the politics of science and technology and the distribution of technological power.However, mercantilism is still present in today'sglobal affairs. TheState promotes liberalizationbecause their nationals own such technological power and may try to delegitimizeor downplay tech not owned by their national/State.

The substantial and explicit contribution of I.R. theories in technology faces ideational bias.This bias is due tothe history of technological spread, structuration, and reconstitution in I.R.These concerns are conceptually externalized from realism, liberalism, constructivism, poststructuralism, and systemic theories.Thus, the explicit understanding of the international politics of RST requires not only integration with traditional I.R. approaches but also the conceptualization of new concepts which enhances integrative pluralism.

Subaltern realists and critical theorists emphasise anarchy, capitalism, welfare and security as central to the science and technology in I.R.(Siba, 1996).These factorsare evident in the cold war and the agricultural green revolution for the developing world; virtual warfare and politics of the war on terror through media, entertainment and communication technology; and politics of covert and open surveillance industrial complex, border control and migration.

Critical and constructivist theorists can be used to unveil and challenge the technological misuse and ideological service of technology as a tool in the hands of powerful military, political and commercial elites(David, 2011).While medium theorists view science and technology as a digitally structured communication tool,Marxism views it not only as a capitalist machine for exploitation but also as a tool that can be used for liberation, emancipation and empowerment of the masses.The functionalist view posits that research and a network of knowledge-based experts in science and technology can process informed data for politicians to use in policy formulation and implementation that shapes international systems(Ernst, 1990).

Gramsci's cultural hegemony posits that certain political groups are able to pursue their interest, using cultural power in a way that such interest is common-ised into general and unavoidable interest.(Gramsci, 1971, pp. 180–182)For example, Asian technologies/machines/Cars built with non-English language communication, British cultural transfer through BBC Hausa, Yoruba, Igbo, and Swahili; China'sinfluence through Chinese Radio International broadcasting in the Hausa language; and French's cultural transfer through Alliance Française group in African countries are a few examples of cultural hegemony disguised as diplomacy.Social constructivismposits that social actors decide how technology evolves and its various or limited socio-economic applications. Thus, it introducesa technological tool for socio-political and economic control in the world space(Jacobson et al., 1997).

4. The Polity of Research Science and Technology

Western [1] and non-western [2] thinkers acknowledged the politicization of innovation(Berman, 1983; Matthewman, 2011; Mishra, 2012; Mitcham, 1994).For example, Mahan's book "The Influenceof Sea Power Upon History, 1660-1793" on the technological power of naval capability influenced the rise of Theodore Roosevelt, Kaiser Wilhelm and Michinomiya Hirohito in the United States, Germany and Japan, respectively, and other leaders of hegemons before WW2(Morris, 2001, p. 433).

As stated by Lim(Lim, 1990), the point to be noted in Mahan's argument is that naval capability does not directly lead to a hegemonic position. Instead, he noted that being the first to acquire technological capacity and the ability for such technological capacity to influence other sectors of the State's commerce and economy is what matters.Thus, technological hegemony is politically usedto influence militaristic and economic hegemony(Bahrisch & Kim, 2011, pp. 570–571).This notion is evident in the rise of hegemons like Portugal, the U.K., and the U.S. The political negation of science and technology has not changed, as manifested in white supremacy, racism, neo-colonialism, and resource exploitation.

Innovations through new production technique available to highly industrializedState makes weak State suppliers of only raw materials.Such innovation is strategically made unavailable to weak Statesfor continued exploitation.Thus, the power in the collaborative efforts of scientists, politicians (State leaders) and corporations (non-State actors) can be seen to have a significant effect.MNCs have also played a well-documented role in the communication, media, and high-technology industries as primary drivers of liberalization and privatization of domestic and global communication since the 1970s.

[1] Henry D. Thoreau, Max Weber, Martin Heidegger, Max Horkheimer, Lewis Mumford, Walter Benjamin, Jacques Ellul, Norbert Elias or Michel Foucault

[2] Mahatma Ghandi and Rabindranath Tagore

Organisational and technological innovation of hegemonic powers

The global politics of RST significantly influence the rise and fall of hegemonic powers, as evident in the linkage between organizational and technological innovation.While technological innovation refers to introducing new or improved technology, organizational innovation refers to introducing new or improved organizational processes, structures, and practices.

Early hegemony

Usually not reported by Western epistemes, Africa once dominated the world through its advancement in science and technology.The Egyptian Pyramid, the science of mummification, Kemet as the origin of chemistry from Egypt, and algorithm and algebra from Egypt were all the centres of attraction and learning points for the Greeks and Europeans.However, the exploitative nature of the West and colonization interrupted and truncated the hegemonic rule of Africa.The interrupters were able to easily learn the knowledge and transform it as if it was of their origin.During the colonial era, technological innovation in knowledge and communication was politically driven, motivated to facilitate exploitation and saw the globalization of specific cultures and suppression of others(Chandler, 1997; Hughes, 2004).

Some I.R. scholarship considers Portugal the first hegemon at about 1494, using strong naval force to expand the market and trading in Africa and India(Bahrisch & Kim, 2011, pp. 562–563).The Netherlands took over in 1580, aided by the development of skills, craft and business merchants.Spain took over withthe same technological advancement, which shows that at every slightest innovation, the political power play is used to conquer or dominate other nations.The development of windmills, canals and sawmills by the Dutch facilitated the production of cheap energy and efficient means of transportation and aided naval transformation; this propelled their dominance.

In 1690, England dominated the sea due to its naval tech development but lost control of North America in 1792.The industrial revolution propelled the British Naval and expanded British colonies.The returns on naval investment for the British began to decline since their world production contribution chiefly through slavery and colonies were no longer lucrative.Germany, Italy and Japan began investment in research and military science.At the same time, theworld contribution of the U.S. increased through rail-trade expansion, aiding the U.S. to overtake Britain as the new hegemon in post 1928. (Theodore, 2007)

The hegemonic U.S

TheU.S. and Britain tremendously developed and invested in their research and technology sectorsbefore their assumption into hegemons. Research(Oldenziel, 2011) shows that the development and advancement of global surveillance infrastructural and technological installations are motivated by the politics of oppression and dominance.For example, the construction of rail and roads to aid the colonial exploiters and the installations and technological deployment in U.S. military bases across the worldbenefit the U.S.(Shamir, 2013).

The U.S. missile defence development and nuclear programme were heavily secretive to prevented or frustrated the effort of its allies to acquire such technologies. This strategic move was meant to buy time for the U.S. to amass technological supremacy(Krige, 2014). To avoid being challenged, the intelligent control and agreementover nuclear energy was introduced to align its allies to the political agendas and interests of the U.S.(Maddock, 2010).This strategy applied to Britain(Benn, 1998), France(Ullman, 1989) and Iran.

The theory of Hegemonic Stability posits that the world will enjoy peace, stability in the economy and security when only

one Statedominates and dictates world affairs.The theory supported the technological supremacy of the U.S. However, it began to lose its relevance from the 60s through the 70s as other countries, particularly the USSR, began to acquire and race with the technological capacity of the U.S.(Krasner, 2004).

Oganiski's Power Transition theory(Kugler, J., Organski, 1989)emphasizes degrees of power in the international system.For example, "dominantnation, greatpowers, middlepowers, smallpowersandcolonies".In application to technological power: while the author agrees that such power arrangement leads to dissatisfaction and some form of conflict[3], the author, however, disagrees with Organiski that such power arrangement will resultin blown conflict.This negation is basedon the emergence of a balance of power which explains that when at least two States are hegemonic power, there are high tendencies of an absence of full-blown international war.The argument is that when a nation wields significant power, there is still some level of balancing through soft power that weak nations enjoy (Bahrisch & Kim, 2011).On that basis, the present-day technological capability is shared along the hierarchical lines of Oganiski as modelled in Table 2 below:

Table 2: Level of Technological Power

Level	Technological power	Region and Countries
1	Dominant nation	U.S./ China
2	Great powers	Japan/Russia/ Britain/Germany
3	Middle powers	India, Pakistan, North & South Korea/Israel/France/ Asian Tigers
4	Small powers	Rest European and Asian Countries
5	Colonies	Africa and Latin America, and South-East Asian Countries

Source: Modelled from Organiski's Power Transition Theory

States at the lower level are not satisfied with the current technological power arrangement and will want to see changes. However, they usually cannot change the structure.The level of satisfaction increases as the level goes down from 1 to 5.Also, those at the upper level engage in techno-politics to guard their technological skills and innovations well enough so that those at the lower level cannotmeet up.This situation makes those at the lower level continually dependent on those at, the higher level.

Literature suggests that a nation'sorganizational and technological innovation capacity affects its chances of obtaining hegemonic status.For instance, the United States'organizational and technological innovation capacity has allowed it to sustain its status as a hegemonic power (Nye, 1990).Similarly, Japan's unique organizational techniques contributed to its capacity to attain economic hegemony (Posen, 1993).A hegemonic power's decline can also be attributed to the link between organizational and technological

[3]As observed in the soft conflict between China and US on the basis of China's technological advancement; see (Kugler, J., Organski, 1989, p. 175)on the notion that conflict is likely when two nation grow in same power size

innovation.For instance, the Soviet Union's demise as a hegemonic force was influenced by its inability to innovate technologically and organizationally (Gaddis, 2005).

Twenty-first-century hegemony

According to a report by the United Nations Conference on Trade and Development (UNCTAD), just five countries - the United States, China, Japan, Korea, and Germany - account for over 70% of all patent applications worldwide (UNCTAD, 2021) China'spositioning ineconomic and technological advancement has helped China become a significant global player.The nation has been investing significantly in research and development, emphasising cutting-edge fields, including renewable energy, biotechnology, and artificial intelligence.For instance, China's substantial advantage in the global supply chain due to its dominance in the manufacturing of rare earth metals, which are essential for the creation of many high-tech products (Lora, 2019). As a result, China has become a global leader in many areas, strengthening its economic and political might (Li, 2019).This is due to its advancement in development of 5G, artificial intelligence, and quantum computing. China is threatening U.S.'s supremacy in technological innovation ranking.As shown in Table3 below, China and Japan are racing with the U.S. technologically in competing ranks.

Table 3: Technological Ranks

Highest Number of	**Rank**
International patent applications (2020)	1. U.S. 2. Japan 3. China 4. Germany 5. South Korea
Supercomputer calculation speed (2021)	1. Japan 2. U.S. 3. China 4. Italy 5. Germany
Supercomputers owned (2021)	1. China 2. U.S. 3. Japan
Companies undertaking A.I. (2019)	1. U.S. 2. China 3. Japan 4. South Korea 5. Germany

Source: WIPO. (2019); WIPO.(2021); Top500. (2021)

The observations from the rise of hegemonic power outlined above show that technological capacity cannot be overlooked with respect to power.States must technologically innovate to survive and have a stake in the international arena.The rise of technology in countries like the US, China, Japan and Germany is owned to their heavy investment in research and development.

South Korea's economic success is partly linked to its research, development, and education investments.The nation has made significant investments in its educational system, producing a highly qualified workforce capable of technological advancement.This advancement has aided South Korea's ascent to the top of the global semiconductor, consumer electronics,

and automotive industries.(Lim, 2019)Taiwan's investment in R&D and emphasis on innovation are credited with its technological advancement.Taiwan has a thriving technology sector, with businesses like TSMC (Taiwan Semiconductor Manufacturing Company) rising to prominence on a global scale.This development has aided Taiwan's ascent to the status of a significant player in the world economy (Lin, 2020).

Kenya has recently become a regional power with a rising economy and a growing political influence in East Africa.For instance, the 2013 $14.5 billion Konza Technology City, aimedat developing a hub for innovation and technology in Africa, has garnered considerable investment and positioned Kenya as a leader in the tech sector.In addition, theHudumaNamba biometric identification system and a variety of e-government programs have supported Kenya's ascent as a regional power by fostering a more business-friendly climate and luring foreign investment.In particular, Kenya's banking sector growth has been primarily attributed to the development and use of mobile money transfer technology, such as M-Pesa(Mbiti & Weil, 2014).M-Pesa, introduced by Safaricom in 2007, has assisted in revolutionizing the nation's financial industry and expanding financial inclusion(Kiplagat, 2020).

Zimbabwe previously held considerable political and economic clout in southern Africa and was regarded as a regional power.However, the nation's political unrest and economic stagnation have contributed to a fall in its position as a regional force in Southern Africa (Chitiyo& Dietrich, 2018).South Africa's now dominates southern Africa (Munyaka, 2019) and 2nd in sub-Saharan Africa in terms of innovation performance (Cornell University, INSEAD, & WIPO, 2020). This reposition is due to the advancementand investment of South Africa in the number of R&D organizations and telecommunications. Turning to West Africa, Nigeria,regarded as a regional force, has a sizable economy and significant political clout.However, the nation's continued economic and security issues have jeopardised its position as a regional force.(Baker, 2021)

Therefore, in power politics, it is impossible to ignore the connections between organizational and technological innovation and their effects on the rise and fall of hegemonic or regional powers, as presented in the case of African countries. Particularly, developing countries need to reconsider their investment in R&D in order toearn a respectable position and not left out in the future A.I.

Rational technological capabilities decisions

In the context of neo-realism, Kenneth W. argues that "the danger of warfare due to anarchy is weightless to the extent that collective action that is more or less rational calculation is played out primarily in human minds"(Waltz, 1959).Hedley Bull's Anarchical Society similarly pictures the political world exclusively regarding social practices.Bull sees the international society as "a functioning rule-based order"."International order", he proposes, "is order among States; but States are simply groupings of men"(Bull, 1977).

Science and technology were key tools in the Cold War and the modern day.The politicization of science and technology can be observed in manufacturing nuclear weapons, developing and using autonomous technologies and AI, and advancing genetic engineering and biotechnology.Military science, from the development of clocks to warplanes, diesel engines, missiles, drones, and cyber technology, has revolutionized the military(Der Derian, 2009).All those developments were not in service to protect humanity. However, they geared towards the national interest of the States that invented them.

A State's evaluation of the potential danger to its national security, territorial integrity, or economic well-being is referred to as its perception of threats (Jervis, 2017).These alleged dangers may originate from a number of entities, such as rival nations, non-State actors, or universal problems like climate

change.States frequently decide how to respond to these alleged dangers by creating or obtaining new technological capabilities.For instance, a nation might spend money on cutting-edge military technology to frighten off prospective enemies or on renewable energy research and development to address issues with energy security.

The rising technological capacity of States may significantly impact the international politics of RST.States with more advanced technology skills may be more able to compete in the global economy, better equipped to handle global difficulties, or possess more military might.The international system may experience conflict, collaboration, or rivalry as a result.For instance, the development and acquisition of nuclear weaponry by some States have sparked an arms race and increased tension on the global stage.The international politics of research, science, and technology depend critically on rational judgments about perceived threats and the rising technological capabilities of states.To encourage collaboration and prevent conflict in the global system, it is crucial to comprehend the causes and effects of these choices.

Tech-advancement and the Alteration of International Order

Theorists argues that trends from the politicization of science and technology through A.I.are restructuring urbanization, global market and production(Kurzweil, 2006).Such collaborative efforts towards developing efficient technologiesare evident in institutionalising regimes for scientific research and development(United Nations, 2012, 2013); digitization of technology and modernization of agriculture(Juma, 2010).On the other hand, academics have called for limiting science and technology to deter militarization and weaponization(David, 2011)and destruction of the environment(Lear, 1993).While all these advancementshave created concerns, politics have clouded objective action towards taking a result-based action(Beck et al., 1994).Scholars call this the era of postmodernity(Virilio, 2010), a digitally wired world(Castells, 1996) and the Internet of Thingswhich weakens the infrastructural organization(Morozov, 2013, 2014), the economy(Friedman, 2009) and as a whole society(Singh, 2002).

The 19th-century era of revolutionary technologies like satellites, radio, television, telegram and telegraph marked the increasing height of technology and politics.The installation of deep-sea cables and pipelines transformed imperialistic governance, and the quest for economic control(Potter, 2007) are other significant developments.As outlined, the connection between politics and economics, whether geographically local or international, cannot be fully understood without including science and technology(H. J. Morgenthau, 1964).This infrastructural and material organisation to gain power is considered an illustration ofthe Assemblage theory.For example, the use of “railways, river management, electricity grids, roads, border protection, common currency” by the colonialist or, in modern-day, by States and regional organizations for integration illustrates the connection of politics and economy.

States have long invested in education and research to advance their innovative and developmental skills.For example, we observed a politically motivated knowledge modification from Egypt to the Greek era.Then to the knowledge restriction of“schools, universities, and academic disciplines” in Prussia and Europe in the 19th century and Asia in the 20th century, whereby they were able to invest in covertly transferring the African knowledge to Western and then to nation-personalizedknowledge.In the present day, the politics of publication and research between the Global-South and North cannot be ignored. Functionalistsrecognize the separated functioning of politicians and technocrats, working in cooperation to overcome societal burdens.A neo-functionalist scholar Haas argued that scientists and politicians work hand in hand in technical cooperation for policy formulation and

decision-making, and their penetration into the international spheres is highly political.(Ernst, 1990)

In applying the Neo-Gramscian school to the politics of science and technology, the concept of power politics is factored by the ability of State and/or non-State actors to universalize their technological innovation.Such actor(s), considered hegemonic, appeal to weaker actors.This relationship is because the former is responsive and respective, to a certain degree, to the interest of the latter actors(Cox & Sinclair, 1996). Liberal theorists recognize the political undertone and importance of science and technology as the driver of the globalized military and economic complex(Keohane & Nye, 1998; Morse, 1976)often politicized through policy choice, re-orders the global society.

Technology innovations like the internet, social media, and instant messaging have aided in disseminating knowledge and ideas, enabling quicker and more effective State-to-State coordination, transit, and communication. According to Choucri (2013), these technological advancements have facilitated the rise of new types of power, like soft power.This type of power allows nations to shape and influence the conduct of other States through non-coercive means like culture and diplomacy.Technology innovation has also contributed to the rise of non-State players like multinational enterprises and CSOs.These players have the power to influence State conduct, question the conventional primacy of States in international affairs, and challenge State dominance.(Haas, 1990).

However, the international system now faces new threats from conflict and rivalry brought about by technical breakthroughs.Governments can influence operations against other governments by using technology to launch election manipulations, cyberattacks and conduct espionage.Mearsheimer (2001) draws attention to the fact that acquiring cutting-edge military technologies, such as unmanned aerial vehicles and hypersonic missiles, may change the balance of power in the global order and could result in wars and arms races.

The disruption of old power structures caused by the alteration of State interaction capacity as a result of technical improvement has resulted in the rise of new actors and the challenge to established States' hegemony in international affairs.Technology development has profoundly impacted international systems' structure, making them more fluid and complicated.For instance, China's development as a technological powerhouse has challenged the United States' hegemony over the world economy and the international system (Nye, 2017).

The ability of states to interact and the structure of international systems have been considerably affected by technological development, opening up new possibilities for collaboration and cooperation while posing new threats and obstacles.States must engage in international collaboration and discourse to solve these issues and consider the potential effects of technology growth.

Central Factors of Research, Science and Technology in International Relations

Anarchy, capitalism, welfare, and security are critical concepts in the study of I.R. and substantially impact the international politics of RST (Buzan &Waever, 2003; Giddens, 2009).First, as governments and businesses compete for a competitive edge in the global market, anarchy and capitalism foster a competitive atmosphere that promotes innovation and technical growth.As they provide funds and support for technical and scientific initiatives that benefit society, welfare policies and programs can also contribute to fostering research and development (Sen, 1999).In order forStates to keep their military edge and defend themselves from future attacks, security concerns can also drive technological growth, notably in the field of military technology.

Both positive and negative effects of these elements on the international politics of RST are possible.On the one hand, they may spur greater creativity and technological advancement, which may positively impact both people and societies.For instance, substantial advancements in public health and well-beinghave occurred due to the introduction of vaccinations and other medical innovations, as exemplified in response toCOVID-19.Nevertheless, if the advantages of technological innovation are not dispersed equitably, they can also result in rivalry, conflict, and inequality (Carty, 2015).

5.0 Policy Directions in the Polity of Research, Science and Technology

Ideological Service of Technology

International politics has been heavily influenced by the ideological use of technology and its misuse, which has produced several moral and social conundrums (Nye, 2010).In order to stifle dissent, increase the power of authoritarian regimes, and influence public opinion (Morozov, 2011), technological advancements have been employed.Additionally, concerns have been voiced regarding the potential for new technologies like biotechnology and artificial intelligence to worsen already-existing disparities and endanger human dignity.

Promoting the ethical standards that direct the creation and use of technology is one strategy to counteract its misuse (Van den Hoven, 2013).According to Owen et al. (2012), the "responsible innovation" idea, for instance, underlines the significance of predicting and resolving emerging technology's social and ethical ramifications.The "precautionary principle" is similar in that it encourages taking precautions to avoid probable harm even in the lack of solid proof (Rip, 1999).

Additionally, it is crucial to foster a critical understanding of the beliefs and values that guide the creation and application of technology (Winner, 1986).This value system entails challenging the presumptions and biases ingrained in technological artifacts and looking at the power dynamics that influence their creation and use (Bijker et al., 1987).By doing this, one can interrogatethe prevailing theories and promote inclusive and democratic models of technical governance (Jasanoff, 2016).

The international politics of RST are significantly affected by the technological misuse and ideological service of technology.However, their negative impacts can be lessened. More responsible and inclusive use of technology can be fostered by encouraging ethical values and critical viewpoints.

Research and Network of Knowledge-based Experts as Policy Influencers

Expert advice and scientific evidence are frequently used to drive policy decisions, and the knowledge generated by researchers can significantly impact how policies turn out.Creating knowledge that guides policy choices is one-way research impacts policy.In order to reduce greenhouse gas emissions, for instance, international accords and policies have mainly been shaped by research on climate change's effects (IPCC, 2018).Similarly, analysis of the results of various public health measures has helped inform policy choices about disease prevention and control (Lavis et al., 2009).

The impact of research, however, extends beyond merely generating new knowledge.The network of knowledge-based experts is also critical in determining how policies turn out.Expert networks can help policymakers by advising them on complex topics and bridging the gap between policy theory and reality (Haas, 1992).For instance, Cairns Jr. (2001) cites the role of expert networks in developing global conservation and management policies for biodiversity.

Furthermore, research and the network of knowledge-based professionals have an impact on domestic policy as well.These individuals may have a significant influence on regional policy

choices.Local authorities frequently look to scientific research and expert opinion to make decisions about public health, environmental protection, and urban planning (Hornidge et al., 2017).

Research and the network of knowledge-based professionals influence international and local policy decisions.These actors are critical in addressing complex global concerns and advancing evidence-based policy decisions by producing information and offering expert counsel. However, we must understand that those networks of experts are influenced by their employers or funders.

Cultural Hegemony, Socio-political and Economic Control

According to Foucault (1975), research, science, and technology have long been instruments for socio-political control, cultural hegemony, and economic dominance.As a result, power dynamics have influenced how knowledge is produced and disseminated, with dominant groups exploiting research and technology to legitimize their authority and marginalize other viewpoints (Chomsky, 1997).Additionally, the creation of new technologies has frequently been influenced by commercial interests, which has resulted in the concentration of money and power in the hands of a select few.

Examininghow information is created, disseminated, and employed is vital to assess how cultural hegemony, socio-political control, and economic control are advanced.In order to achieve this, one must have a critical knowledge of the social and political settings in which research and technology are situated, as well as the power dynamics that influence their creation and use.

Promotingparticular worldviews and values is one way research and technology can achieve cultural hegemony (Gramsci, 1971).As an illustration, historically, the paradigms that have dominated science and technology have been Eurocentric and Masculinist, which have served to reinforce the perspectives and interests of privileged groups. Similarly, technology's usage in media, communication, and education has frequently been used to reinforce existing power structures and silence alternative viewpoints.

Technology, science, and research are not unbiased tools; rather, they are influenced by and reinforce pre-existing power relations.Socio-political hegemony, economic domination, and other forms of control are promoted through the creation and use of knowledge and technology.Adopting a critical viewpoint and promoting alternative, inclusive, and democratic knowledge production and transmission methods are important to counteract these processes.

7.0 Conclusion

The paper identified several implications for global governance based on case studies, including the need for improved coordination between States and international organizations, the significance of ethical principles governing the development and use of technology, and the requirement for more inclusive and democratic forms of technological governance.

This paper anticipates that research on the global politics of science, technology, and research will remain an important study area.The moral and social ramifications of developing and using future technologies, such as biotechnology and quantum computing, will become more important as they spread.Additionally, a deeper comprehension of the intricate ways science and technology interface with politics, culture, society, and other fields will be necessary, given the expanding significance of these fields in world affairs.

In conclusion, research and thought are ongoing in the dynamic and developing field of international research, scientific, and technology politics.To better grasp the issues and potential in this area and work toward a more responsible and inclusive use

of technology for the good of all,there is a need to encourage a critical viewpoint and a multidisciplinary approach.

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